CENTRAL CALIFORNIA COASTAL PREHISTORY

A View from Little Pico Creek

Terry L. Jones and Georgie Waugh

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Acknowledgments

THE ARCHAEOLOGICAL INVESTIGATIONS reported upon here represent the result of two fieldwork sessions in 1989 conducted by Caltrans personnel and the reanalysis of work originally accomplished during the years 1965 and 1966 by David Abrams supported the UCLA Archaeological Survey in cooperation with the California Department of Parks and Recreation.

The success of the excavations in 1989 was owing to the more than able efforts of our crew and our special appreciation goes to them: Tina Biorn, Larry Weigel, Janis Offerman, Judy Tordoff, Karen Crafts, Judy Schulte, Dana McGowan, Daryl Noble, Mary Clark, Terry Cirilo, Kathy Dowdell, Vickie Beard, and Marcia Kelly. Martha Proctor provided assistance from Caltrans headquarters, and Wendy Waldron, Caltrans District 5 archaeologist, was invaluable in all aspects of the undertaking including district coordination, Native American representation, and joining in the labor of excavation and of poison oak eradication. Personnel from Caltrans District 5 Engineering staff and the Maintenance Station were more than patient and helpful in many aspects of the operation. Greg Smith, Caltrans District 5 biologist, furthered our knowledge of botanical and faunal species of the area.

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In accordance with the wishes of our Chumash advisor, LeiLynn Odom, we have included illustrations of burials rather than the photographs as published in David Abrams' thesis.

Our efforts in compiling this manuscript have also been aided considerably by comments provided by a series of knowledgable, gracious reviewers. For their stern yet encouraging words we thank: the Senior Series Editor Jeanne E. Arnold, Gary Breschini, Jon Erlandson, Robert Gibson, Michael Glassow, Robert Hoover, and one anonymous reviewer. We also thank Marilyn Beaudry-Corbett, the Director of Publications at the UCLA Institute of Archaeology, for her conscientious and kind editorial hand. We also offer special thanks to Brenda Johnson-Grau, Senior Editor, for her expert guidance through the final stages of the publication process.

Finally, our Chumash observer, the late Jamie Karl, assisted all our field efforts at Little Pico Creek with great good humor and valuable knowledge of the archaeology and culture of his people. We dedicate this document to his memory.

TERRY L. JONES
GEORGIE WAUGH

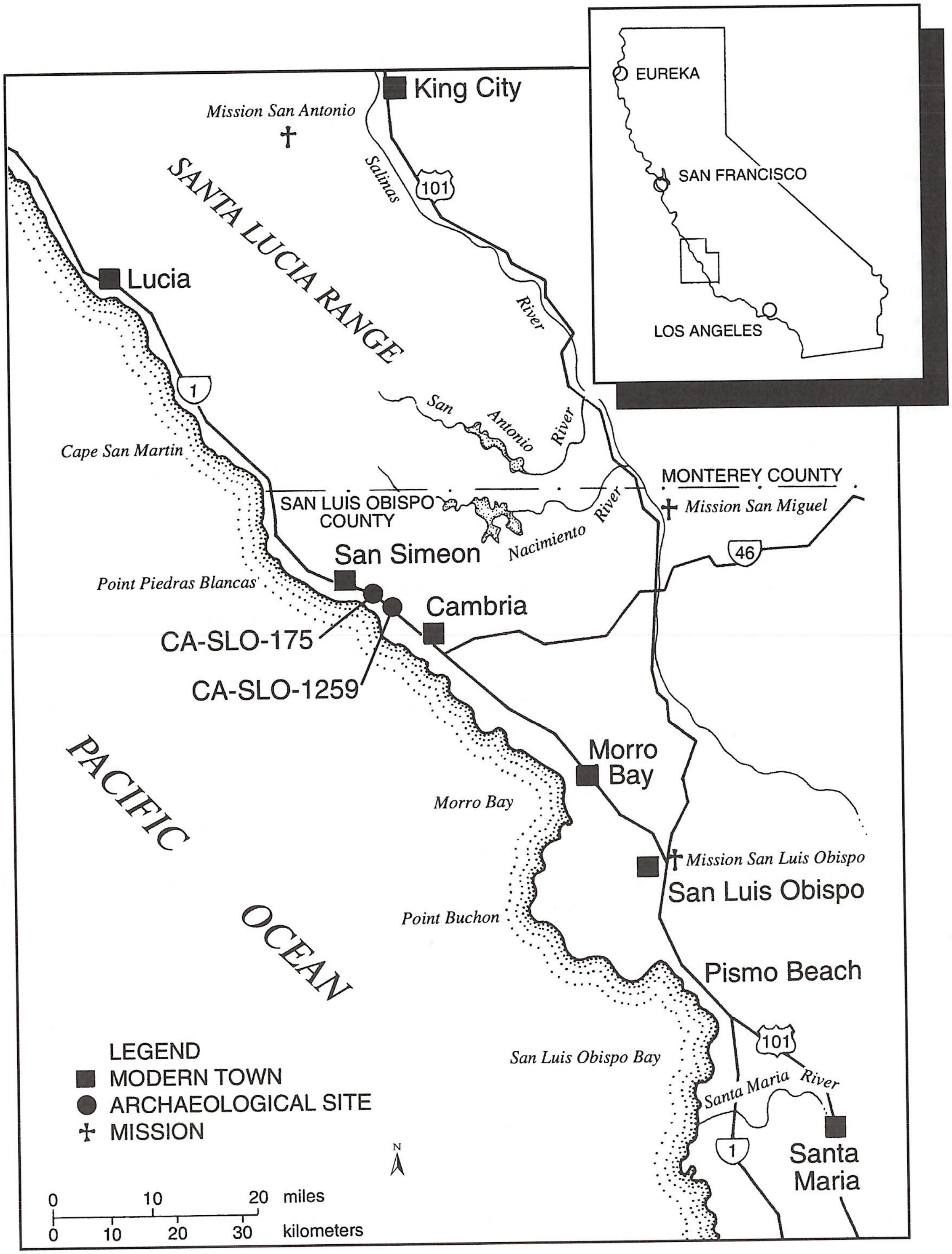

FIGURE 1.1 Project location

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Introduction

A RUGGED EXPOSED SHORELINE with narrow or no coastal terraces marks the central California coast between San Francisco Bay and Point Conception—a region long regarded as an anthropological unknown. Overshadowed by the apparently richer prehistoric and ethnohistoric contexts of the Santa Barbara Channel and San Francisco Bay, the central coast was the focus of limited investigation during the early twentieth century. Until the 1960s only two significant excavations were completed: Carter's (1941) work at Point Sal (CA-SBA-125), and investigations by the University of California Archaeological Survey at the Willow Creek site (CA-MNT-281 and -282). More recently, in conjunction with residential construction and adjunct development, legally mandated conservation archaeology has spawned a profusion of survey and excavation projects. The results of this research, however, are largely unsynthesized and unavailable to broad audiences.

Similarly, the ethnohistory of this region has been poorly documented. Historic accounts are limited for the Costanoan, Esselen, and Salinan-speaking peoples who inhabited the north central coast at the time of contact. Descriptions of the Chumash, who occupied the south central coast, are more extensive but rely largely on materials gathered from regions adjacent to the Santa Barbara Channel, where the presence of offshore islands and rich pelagic fisheries accommodated an intensive maritime economy. North of Point Conception, maritime technology was less sophisticated and a sea-focused economy less evident.

Accounts of the prehistory of the Chumash that focused on the Santa Barbara Channel illuminate a progressively elaborate maritime adaptation over time. Immediately north of Point Conception, patterns, however, change (Glassow and Wilcoxon 1988). Studies at Diablo Canyon on the San Luis Obispo coast (Greenwood 1972) indicate that marine resources are much in evidence in the archaeological record for more than nine thousand years, but local ethnohistory suggests that a terminal intensive maritime adaptation was lacking. Given that absence, the trajectory of settlement and subsistence and the mix of marine and terrestrial foods over time are poorly understood.

Our 1989 investigations at two archaeological sites at Little Pico Creek in north coastal San Luis Obispo County—CA-SLO-175 and CA-SLO-1259—provide both a baseline for a synthesis of past data and a direction for future research into the prehistory of the central coast. Located 6 km (4 miles) north of Cambria (fig. 1.1) in an area occupied by Chumash speakers at the time of historic contact, CA-SLO-175 was investigated previously by archaeologists from the University of California, Los Angeles (UCLA). In 1965 and 1966 under the direction of David Abrams, an undergraduate in Anthropology, this salvage investigation involved an exceptionally large excavation volume, from which was recovered a substantial, diverse cultural assemblage, including 42 human burials. Abrams reported these materials in three separate monographs, which included two of the first radiocarbon dates from San Luis Obispo County, the first obsidian hydration results, and the first in-depth human osteological analysis for that region (Abrams 1968a, b, c). With little funding available for report preparation, only a portion of the large collection was illustrated. The materials were subsequently curated at UCLA.

The work at Little Pico Creek by UCLA was conducted in anticipation of a highway project, and this was again the case in 1989 when the California Department of Transportation (Caltrans) began construction to replace the bridge over Little Pico Creek. Initial plans for the bridge replacement called for avoidance of what remained of CA-SLO-175. During construction, archaeological monitors discovered a previously unidentified portion of the deposit beneath the old Little Pico bridge, as well as a previously unknown midden, CA-SLO-1259, beneath 1.7 m of fill on the south bank of the creek, and Caltrans conducted data recovery excavations.

Analyses of the original collection were integrated with those of the newly acquired materials. Given that this important collection will be useful for future comparative analysis, several objectives have guided this work. Effort has been exerted to refine dating for the site and to isolate temporal components by employing radiocarbon data, contemporary shell-bead typological analysis, and an enhanced obsidian

source and hydration sample. To relate site findings to research issues of cultural chronology, subsistence, mobility, social structure, and exchange, faunal remains, human osteology, flaked stone residues, and formal artifacts were studied intensively.

Two local phases are suggested by the chronological and assemblage data from Little Pico Creek. Little Pico I, representing the Early period from 3500 to 600 BC, is characterized by square and contracting stemmed projectile points (representing a proposed Central Coast Stemmed point series), side-notched projectile points, mortar and pestle, milling slab, handstone, and temporally distinct bead types. Little Pico II, representing the Middle period between 600 BC and AD 1000, shows a great deal of cultural/typological continuity from the earlier period. Examples of the Central Coast Stemmed point series persist during this period, but not the side-notched types. A variety of bead types, as well as bone and shell artifacts that display some degree of stylistic variation, occur as part of this phase. Both mortar and pestle and milling slab and handstone were used, although the former predominated during Little Pico II. Fishing implements, including net weights and shell fishhooks, are noticeably more abundant during this period, the former making an initial appearance at the onset of Little Pico II. Although important proportional variability is suggested across these phases, evidence for changes in kind (for example, typological replacement) is largely absent in the stone assemblage. From AD 1000 to 1250, a proposed Middle/Late Transition, marked by the beginning of a decline in site use, does show a retention of most of the earlier flaked and ground stone tool types. The transition phase is marked by occurrence of mass graves, with no formal burial posture and associated exotic Double Side-notched projectile points. During the Late and Protohistoric periods, CA-SLO-175 was subject to significantly reduced use.

With respect to settlement and subsistence, artifact and faunal assemblages show a distinctive trajectory of intensification through Little Pico I and II. Site function reflects increasing logistical differentiation in terms of tasks, as evident in a discrete locus emphasizing lithic manufacturing at CA-SLO-1259. Subsistence strategies show an emphasis on fishing during both phases, but Little Pico II was characterized by more intensive fish exploitation, including greater reliance on smaller taxa. The proportion of mortar/pestle pairing became more dominant during Little Pico II, indicating an increased use of labor-intensive vegetal foods, including nut crops. This phase represents an increased degree of relative stability and permanence probably through most of the annual cycle. How such stability and permanence was reflected in the social environment of the Little Pico Creek population further proceeds from analysis of burial data. An expanded understanding, if not a definitive determination, is derived from an examination of mortuary practices and human osteology, suggesting only a modicum of social complexity and increasing pathologies as a consequence of semi-sedentism.

A central focus of research in present-day hunter-gatherer studies for the general region has been directed toward the forager/collector dichotomy. Settlement patterns revealed at Little Pico do not fit these models. A fairly intensive but generalized economy, which incorporated fishing and some use of storage, was evident even in the initial phase of occupation. The transition from Little Pico I to Little Pico II represents an increasing and progressive intensification of economies and social interaction without the establishment of a fully sedentary lifeway, revealed by the diversity and character of the artifact assemblage and the full range of lithic tool manufacture. A particularly high proportion of late-stage biface reduction, characterized by a high degree of lithic detritus, suggests tooling-up operations in preparation for residential relocation and/or for hunting forays.

Little Pico Creek, similar to many localities along the central coast shoreline, appears to have been less intensively occupied after AD 1250. Those residues that do point to the Late period suggest a diminishment in the intensification process associated with the earlier lifeways. Unlike the Santa Barbara Channel, populations on the central coast were apparently forced to direct their subsistence focus inland to overcome the limited potential of the marine environment. The occurrence of mass graves in association with exotic projectile points suggests an intrusion of foreign peoples at this same time and possibly intergroup violence.

SITE DESCRIPTIONS

CA-SLO-175 is a large midden with locally dense pockets of shellfish remains, and an expansive bedrock mortar outcrop with thrty-four cups. A majority of the deposit is located on top of a marine terrace, north of Little Pico Creek at an elevation of 55 feet (16.8 m) above sea level. A portion of midden is also found on a slope that extends down from the terrace to the creek, beneath the old and new bridges. The bedrock mortar cups occur in a shale outcrop at the base of the slope, just above the beach at the mouth of the creek. A large portion of the midden deposit was destroyed when it was bisected by the original construction of Highway 1 in the early 1930s.

Identified by H.J. Walker in 1948, CA-SLO-175 has since been recorded by M.A. Baumhoff in 1952, G. Hamilton in 1961, and W. Waldron in 1986. The UCLA excavation showed the deposit to vary in depth between 42 and 90 inches (107–229 cm). It also exhibited physical stratification in the form of a rock layer, 6 to 12 inches (15–30 cm) thick at a depth of 12 to 24 inches (30–61 cm) over most of the site. Radiocarbon and obsidian hydration results suggested that

the site was occupied from circa 1200 BC to at least AD 1500.

Unlike CA-SLO-175, CA-SLO-1259 (referred to as Little Pico South during excavation) was not known to archaeologists until its discovery in 1989 in the sidewall of the southern bridge abutment construction trench. The site is characterized by a dark gray, shell-poor midden deposit, 50 to 60 cm deep, overlain by 1.7 m of construction fill. The only portion of CA-SLO-1259 that was exposed was in a 12 by 4 m abutment trench, hence the overall site area could not be measured. Before the construction of the highway, the site would have been situated on a small flat above the south bank of Pico Creek. In addition to anthropogenic soil, the site contained abundant flaked stone debris, flaked stone implements, ground stone, fire-altered rock, and a limited amount of shell and vertebrate faunal remains.

ORGANIZATION OF THE STUDY

Our reporting of the results of the Little Pico Creek investigations begins with a description of the project's research context, including a summary of the current status of central coast archaeology and ethnohistory that highlights those aspects of the region's prehistory that remain inadequately documented. Field and laboratory methods used in 1965/66 and 1989 are then described. A results section begins with a summary of site structure, including stratigraphy and features and continues with a discussion of site chronology and a detailed treatment of the burial population at CA-SLO-175. Flaked stone, ground and battered stone, and bone artifacts are described in chapters 7 , 8, and 9. Results of faunal analyses are presented in chapter 10, and overall research conclusions are presented in chapter 11.

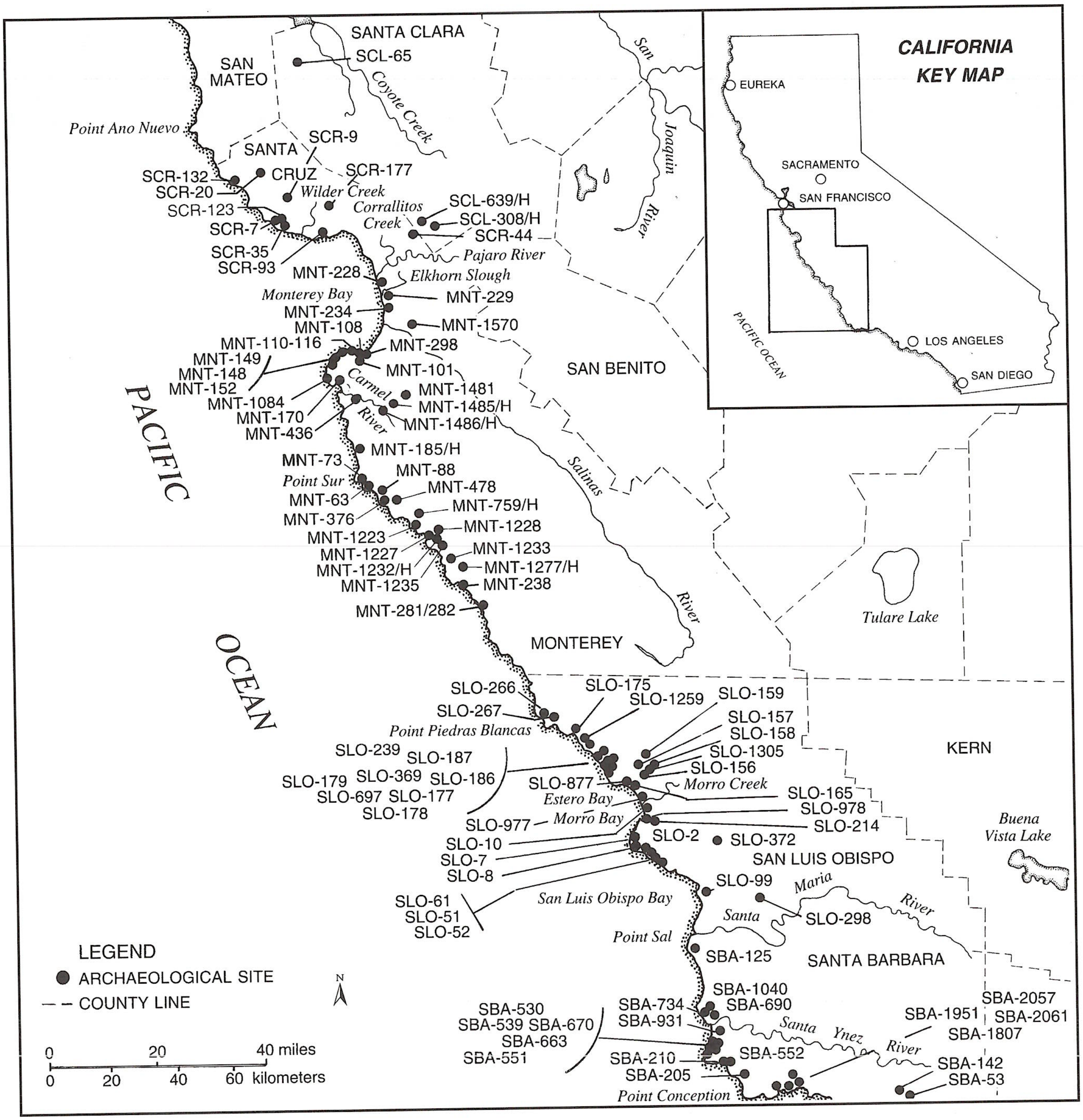

FIGURE 2.1 Important archaeological sites of the central California coast

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Research Context

THE TOPOGRAPHY of the central California coastal province north of Morro Bay is distinguished by a narrow marine terrace that extends southward from Carpóforo Creek to Cayucos Point (fig. 2.1). The terrace is bounded on the west by sea cliffs that overlook the Pacific strand and offshore rocks and reefs, some of which are apparent remnants of ancient sea stacks. To the east, the rugged Santa Lucia Mountains rise abruptly to elevations of from 760 to 1033 m (2500 to 3400 feet). Draining westward from the mountains and foothills, a number of perennial streams have deeply dissected the terrace. The flows from several of these streams, including Little Pico Creek, have created small estuaries and floodplains near inlets to the ocean. Formed in Late Pleistocene times, the terrace north of the town of Harmony is characterized by unconsolidated fill that overlies indurated sandstones, conglomerates, and argillites of the Cretaceous-age Franciscan formation (Weide and Susia 1968). Directly east and north of the coastal outlets of Little Pico and Pico creeks lies a Monterey formation formed mainly in lower and middle Miocene marine deposition (Jennings 1958).

A generally mild climate along the coast conforms to the Mediterranean regime with cool summer temperatures averaging less than 70°F and mild winters ranging in temperature from 40 to 50°F. The yearly rainfall is 48 cm with major precipitation falling between December and March. Fog is frequent, predominantly in the summer months when the warm inland air rises above the cool westerly ocean winds.

Hydrologically the surrounding area is distinguished by several seasonally intermittent drainages and perennial streams, seeps, and springs. Stream width and depth vary seasonally at Little Pico Creek and are particularly subject to variation during inundation caused by high tides.

Site location within this particular ecological setting replicates a pattern of several stream inlets along the coast in this area. Small estuaries, wetlands, and adjacent beaches are sheltered from the prevailing southerly tides and winds. This protected environment and the proximate rock littoral zone and ocean strand abound with a diversity of marine and land resources.

As noted by Leonard et al. (1968), three classes of maritime resources are available in this setting: shellfish, fish, and sea mammal. Shellfish in the mid to high littoral zone include mussel (*Mytilus californianus*), barnacle (*Balanus* spp.), black turban snail (*Tegula funebralis*), limpet (Acmeae), black and red abalone (*Haliotis cracherodii* and *H. rufescens)*, and chiton (*Cryptochiton stelleri* and *Mopalia muscosa*). The rock outcroppings and tide pools host a variety of intertidal invertebrates. The sea anemone (*Anthopleura xanthogrammica*), sea urchin (*Strongylocentrotus purpuratus*), ochre starfish (*Pisaster ochraceus*), hermit crab (*Pagurus hirsutiusculus*), and sand crab (*Emerita analoga*) are some of the more common species (Hines 1986:6), while the purple olive (*Olivella biplicata*) frequents the low tide water line.

Marine fish are diverse and vary in availability according to season. Schooling species such as surf smelt (*Hypomesus pretiosus*), mackerel (Scombridae), anchovy (Engraulididae), and sardine (*Sardnops* spp.) may all be procured year around, but are most abundant from September to December. Fish—such as the California sheepshead (*Pimelometopon pulchrum*), bass (Serranidae), bat ray (*Myliobatis californicus*), cabezon (*Scorpaenichtys marmoratus*), surf perch (Embiotocidae), rockfish (*Sebastes* spp.), and lingcod (*Ophiodon elongatus*)—are year-round residents near the shore and kelp beds (Roeder 1986). Freshwater fish that inhabit the creek itself include the staghorn sculpin (*Leptocottus armatus*), the three-spine stickleback (*Gasterosteus aculeatus*), and the seasonal steelhead (*Oncorhynchus mykiss*; G. Smith, personal communication 1991).

Marine mammals common to this coast area are several species of dolphin, the California gray whale (*Eschrichtius robustus*), and the sea otter (*Enhydra lutris*). Two important sea mammals are yearlong residents: the California sea lion (*Zalophus californianus*) and the Stellar sea lion (*Eumetopias jubata*). The California sea lion congregate in rookeries in May, and pups are usually born in June to mid-July. A major rookery point for both pinniped species is located at Piedras Blancas, less than 16 km northwest of the project site (Leonard 1968:16).

In the terrestrial environment, stream inlets provide a rich mosaic of articulating habitats. Plant communities com-

prise riparian woodland, marsh (saltwater and freshwater), coastal strand, coastal scrub, and annual grasslands. Historic cattle grazing and contemporary disturbance, however, have fostered the growth of ruderal species and exotic weeds. At Little Pico Creek, highway construction in the 1960s and cattle grazing since the advent of historic times have left a telling mark on the plant associations on both sites. Northeast of the highway, annual grassland species flourish, such as wild oats (*Avena fatua*), ryegrass (*Lolium multiflorum*), morning glory (*Convolvulus occidentalis*), and mustard (*Brassica geniculata*). The original association, probably coastal scrub, has been strictly curtailed by clearing, grading, and grazing. South and west of the highway on the coastal bluffs, coyote brush (*Baccharis pilularis*), occasional bush lupine (*Lupinus chamissonis*), and pervasive stands of poison oak (*Toxicodendron diversilobum*) are main constituents of the landscape. Stands of closed cone pine (*Pinus radiata*) occur in differential distribution along the bluffs. Species of the coastal strand dominate the lower portion of the cliffs as well as the vegetation of the beach below, including yarrow (*Eriophyllum staechadifolium*), beach evening primrose (*Oenothera cheiranthoifolia*), sand verbena (*Abrona maritima*), and ice plant (*Carpobrotus* spp.).

The distribution of marsh species has been disrupted by rechanneling and construction of the abutments for the new bridge, but tule (*Scirpus californicus*), spike rush (*Eleocharis palustris*), and sedge (*Carex tumulicola*) have been recorded as dominant in freshwater habitat, with jaumea (*Jaumea carnosa*), marsh rosemary (*Limonium californicum*), saltgrass (*Distichli spicata*), and pickleweed (*Salicornia* spp.) as traditional components of the saline and brackish marsh.

Riparian woodland extends north and east of the small estuary and marshland and is characterized by willows (*Salix* spp.) and more sparsely by alders (*Alnus rhombifolia*) and sycamore (*Platanus racemosa*). A more robust and structurally complex community undoubtedly prevailed in precontact times. Bordering the riparian woodland are coastal sage and grasslands, whose natural vegetation comprises annual and perennial grasses and forbs with scattered brush and hardwoods. Further east with increasing elevation, chaparral and coniferous woodland species appear, and oak parklands characterize the drier inland valley floors.

Plant associations within the varied and rich nexus of wetlands, coastal strand, and coastal sage/grasslands provide a valuable habitat for many species. Contemporary and historic land use has limited the range of large mammals. In times past, however, deer (*Odocoileus hemionus*), bobcat (*Lynx rufus*), and in forested and brushy regions mountain lion (*Felix concolor*) were common. The widespread occurrence of bear, particularly the grizzly (*Ursus arctos*), was documented by the Spanish explorers. Further diaries and accounts from those early forays reported pronghorn, wild sheep, and elk near the foothills of the Santa Lucia Mountains. Coastal prairie grassland and scrub species include brush rabbit (*Sylvilagus bachmani*), pocket gopher (*Thomomys bottae*), and ground squirrel (*Spermophilus beecheyi*), as well as numerous mice. Raccoon (*Procyon lotor*) forage through the riparian habitat and into the marshland and pond where an abundant reptile and amphibian population resides. Garter snakes (*Thamnophis* spp.), southern alligator lizards (*Elgaria multicatinata*), Pacific tree frogs (*Pseudacris regilla*), and red-legged frogs (*Rana aurora draytonii*), and the Western pond turtle (*Clemmys marmorata*) occur throughout these wetlands.

Avifauna are among the most diverse and numerous of the faunal inhabitants. Raptors, such as hawks (*Buteo* spp.) and an occasional golden eagle (*Aquila chrysaetos*), pursue prey throughout the grasslands and sage. The estuary and creek provide forage and shelter for the egret (*Casmerodius albus*), mallard (*Anas platyrhynchos*), coot (*Fulica americana*), and teal (*Anas cyanoptera*). Along the strand, a variety of shorebirds and seabirds rest and feed, including killdeer (*Charadrius vociferous*), willet (*Catoptrophorus semipalmatus*), several species of sandpipers, gulls (*Larus* spp.), terns (*Sterna* spp.), and pelican (*Pelecanus occidentalis*).

The degree to which contemporary environmental contexts mirror habitats in the distant past has been a subject of considerable discussion. In areas abutting the Santa Barbara Channel, detailed research on Holocene environments has focused on the role of environmental variability and consequent shifts in resource abundance (Glassow 1990, Glassow et al. 1988). With sometimes contradictory evidence from temperature-sensitive radiolaria (see Pisias 1978, 1979) and from pollen in offshore varved sediments (Heusser 1978), certain environmental scenarios have been postulated. Glassow (1990:6/7–6/8) has proposed a series of climatic changes for the environment in the Channel region: prior to about 6500 years ago, a wet/cool regime persisted that was marked by the presence of pine and fern in terrestrial habitats. From 6500 to 5000 years BP, warm seawater and xeric terrestrial climate predominated with oak and sunflower becoming widespread. This period in turn was followed by a general cooling trend that was, however, characterized by significant fluctuations in seawater temperatures and in plant communities, although xeric terrestrial conditions appear to have persisted. After 2000 years BP the seawater became less warm and a chaparral environment became established.

Most recently, a detailed paleoenvironmental reconstruction has been reported by Morgan et al. (1991) from the Santa Ynez River Valley. While this study incorporates detailed sediment and palynological analyses, pollen samples were derived from alluvial contexts that are difficult to date. The resulting paleoclimatic chronology differs considerably (compare Morgan et al. 1991:93) from the sequence advo-

cated by Glassow et al. (1988). It does share some patterns with the Heusser (1978) pollen sequence, but the definition of pollen zones varies between sequences. For the portion of the sequence relevant to human occupation Morgan et al. posit two basic pollen zones: zone II dating from 9000 to 2500 BC, during which conditions were warmer and/or dryer than today, and zone III dating from 2500 BC to the present, during which cooler wetter conditions prevailed. Heusser (1978) and Glassow et al. (1988) do not date the onset of warm conditions until 6000 BC. Morgan et al. (1991:90) date the peak warm dry period between 5600 BC and 2800 BC; Heusser dated a climatic optimum 3400–2200 BC. Morgan et al. (1991:95) suggest that the onset of cool wet conditions characterizing pollen zone II was interrupted between AD 400 and 1400. This event was not detected by Heusser (1978), but it does correspond with an interval of warm seawater temperatures in the Pisias (1978) chronology.

Yet another hypothesis has been proposed by Arnold (1991, 1992a and b) based on a conjunction of archaeological data and climatic models. Arnold argues that elevation in sea-surface temperatures occurred along the central California coast for a substantial period from circa AD 1150 to 1250. The disruption in the regional marine ecosystem that resulted as a consequence of this warm water regime is hypothesized to have co-occurred with a period of drought, imposing severe subsistence constraints upon prehistoric coastal inhabitants.

ETHNOGRAPHIC AND ETHNOHISTORIC SETTING

From the time of contact, the Spanish explorers and proselytizing Franciscan friars clearly were impressed by the cultural and material milieu of the Chumash peoples who inhabited the Santa Barbara Channel mainland and islands and documented their impressions of this group more extensively than of any other encountered during their explorations. Settlements on the coastal plain directly north of the Santa Barbara Channel, however, were more sparse and did not present the trappings of wealth and status that attracted the explorers to the more populous communities to the south (Bolton 1927; Fages 1937; Teggart 1911). Coastal settlement by the Spanish was limited in part because of the rugged terrain of the Santa Lucia Mountains that bound the coastal plain north of San Carpóforo Creek. As a consequence, missions were established along routes in the more accessible inland valleys, with some coastal contact maintained through the cattle ranching operations conducted near San Simeon, where a small adobe was maintained by the Mission San Antonio (Greenwood 1976). Aside from brief discussions in the early accounts of Fages, Costansó, and Crespí, little direct ethnohistoric information is available concerning either the inhabitants or their settlements along the coastal plain. Although not detailed, the most comprehensive account occurs in the Fages diaries (Fages 1937), where the native inhabitants are described within an area encompassing a radius of approximately 31 miles around the Mission San Luis Obispo. By direct reference, that description clearly subsumes the Chumash of the Santa Barbara Channel and distinctly contrasts native peoples from both further south and northeast.

As in southern California, early ethnographic research for the central coast suffered because of the decimation of the native peoples, who bore the brunt of disease and disruption of the missionization period (Castillo 1978; Cook 1976). After the initial establishment of San Miguel and San Antonio missions along the Salinas River and its tributary, the San Antonio, native converts, or neophytes, had been brought from the coast to supplement the work force recruited from valley folk. Both groups belonged to a Hokan-speaking group called Salinan (Hester 1978). Two distinct languages were spoken by the neophytes (Mason 1912). The predominant was that of the area directly surrounding the missions, with the "less important which those speak who are called 'beach people,' playanos, on account of having come from the bays of the ocean" (Mason 1918:18). Kroeber also referred to the extinct "Playano" or "beach" idiom spoken by the coastal groups, who originally had inhabited the "steep harborless coast" (1925:546). The Engelhardt translation of the reply to the Mission Interrogatorio by the fathers at San Antonio in 1813 may have been the source of the Kroeber statement:

> Two distinct languages are known to be spoken by the Indians. The dominant language is that of the site of the Mission....The less important is spoken by those called Playanos, of the seacoast, because it came from the ocean. They are few...." [Engelhardt 1972:30]

With a similar identification at the Mission San Miguel, however, of a distinct language that was spoken by neophytes recruited from the coast (Gibson 1983), it seems probable that at least for some portion of those native peoples at contact, a coastal "homeland" was likely.

Further, mission data from San Luis Obispo and San Miguel (Farris 1986; Gibson 1983, 1985) and recent examination of the linguistic and ethnographic notes of John Peabody Harrington (Rivers 1994) tend to support the conclusion that coastal settlements north of Morro Bay were within the domain of northern Chumash, specifically those who spoke the Obispeño dialect. In conjunction with the archival data, Gibson (1983, 1985) draws upon the Spanish accounts of various coastal Chumash groups, making a strong inferential case for a Chumash affiliation for those "playano" peoples of the coast south of San Carpóforo Creek. Previously, the northern boundary of this group had been placed near Point Estero south of Cambria (Greenwood 1978).

Kroeber (1925) supplied names for four Salinan villages on the coast, with the southernmost being *tsilakaka*, which he located at San Simeon. This location has not been verified in the mission records at San Antonio, however, and recently has been determined to have been at Big Creek, north of Lucia (T. Jones et al. 1989:89). A tentative conclusion, a function of the fragmented ethnography, is that those boundaries may well have fluctuated through time in response to possible shifts in economic strategies and population movements. By the post-mission period, clearly, the shrinking nucleus of Native Californians in the coastal region from Morro Bay northward consisted of Obispeño Chumash and an amalgam of Yokuts and Salinan peoples, who originally were recruited for cattle ranching tasks (Rivers 1994).

For precontact inhabitants of the coastal plain living near San Simeon and present-day Cambria, a transhumant settlement strategy has been suggested (Farris 1986), in which coastal habitation was maintained during the majority of the year, particularly in winter and spring when shellfish collecting and fishing supported the subsistence round. Fall brought a shift to the interior when collection of acorns, seeds, and pine nuts provided substantial foodstuffs. Bouey and Basgall (1991) have suggested that an alternative equally feasible pattern would have been based on a subsistence round predicated by the seasonal exploitation in the coastal environs by groups whose main focus was on interior resources.

The Costansó diary (Teggart 1911) that detailed the initial foray by the Spaniards into this region during the fall months of 1769 describes encounters with groups of natives occupied with gathering of resources in an apparent "forager" mode (Binford 1980). Both on the return south in December and during the spring of 1770 when the second Spanish expedition journeyed north along the coast, several villages were encountered that had not been observed during the original expedition in the fall (Bolton 1927; Smith and Teggart 1909). The only village occupied on a fairly consistent year-round basis was near Cambria, which the Spanish called Pinal de San Benvenuto or El Osito (Fages 1937; Farris 1986), although a settlement of considerable size located near San Simeon Point, which the explorers named San Juan de Dukla, evidently was occupied from winter to summer (Farris 1986). Another village apparently of much smaller scale was located near San Simeon Creek and has been identified in mission register data as *sataoyo* (Farris 1986) or *satajoyo* (Gibson 1992b). Confirmation of the location for this settlement has been recently verified by a correlation of the place-name in baptismal records with the "Rancho de S. Simeon," an outpost of Mission San Miguel at San Simeon Creek (Farris 1986).

As recording of lifeways for those people inhabiting the coast at contact suffered as a casualty of missionization and disease, much must be inferred from the generalities of Spanish accounts, from limited ethnographies, linguistic reconstructions, and, more securely, from archaeological investigations. As noted, the deductions from mission records and Spanish accounts indicate that at contact subsistence economies were based on substantial return from fishing and shellfish collection. Vegetal resources—including pine nuts, *pinole* produced from the mealing of various seeds, and roasted buds of the yucca—were often offered to the members of the Spanish expeditions. The Fages diary described the processing of tule root (compare Rivers 1994) in mortars to produce a "sweet, nourishing flour" (Fages 1937:50). The native population at this time was described as few in number compared to that of the Santa Barbara Channel. Greenwood (1978) points out that while large villages were not the norm, density of sites is high, which may indicate a once populous region. The degree to which these sites relate to a late prehistoric land use is uncertain.

In general, material culture in the form of dwellings, tools, and ritual items recorded for the Channel villages is also seen in the world of the northern Chumash, although in diminished number and character (Greenwood 1978). Houses near the Mission San Luis Obispo were similar in construction to those of the Channel region, "shaped like half-globes...neatly built." The use of a *temescal*, or men's sweat house, was also identified (Fages 1937:48). On the coast north of Point Conception, the Spanish were struck by the lack of formal village structures. Aside from mission documents, little was recorded that detailed kinship and social organization for groups in this region. Within the village context of the northern Chumash, however, political control was empowered to a chief, or leader, and status defined on the basis of wealth is inferred. Mortuary customs of the northern and southern Chumash were very similar (Kroeber 1925; Greenwood 1978) with cemeteries within villages distinguished by interments placed in a sitting position or flexed on the back or side. Grave markers of stone and wood indicated burials, and grave goods included quantities of beads and ornaments as well as bone whistles, lumps of pigment, and tools (Greenwood 1978). Among the northern group, steatite ornamentation and bowls were present in much reduced number compared to Channel contexts.

HISTORIC LAND USE

While several early Spanish nautical expeditions touched upon the shores of Morro and San Luis bays between the late sixteenth and early seventeenth centuries, not until 1769 during Portolá's initial foray northward was the coastal region of what is now San Luis Obispo County explored by the colonizing Spanish. Some sources (Hoover et al. 1966), following Bancroft (1886), suggest that Portolá spent the night on the banks of Little Pico Creek, although San Simeon

Creek has been more convincingly been proposed (Farris 1986; Squibb 1968). With missionization, lands along the coast were variously under the control of missions San Miguel Arcangel and San Luis Obispo, although the former is recorded as having built an adobe near San Simeon for the oversight of cattle grazing and limited cultivation of grain (Greenwood 1976). This structure, the Rancho San Simeon adobe, is historically well documented (Farris 1986; Frierman 1992), and archaeological investigation at CA-SLO-1373 in 1992 on San Simeon Creek identified the historic remains of the adobe and its outbuildings (Gibson 1992b). With subsequent secularization of the missions and the dispersing of their holdings, land along the coastal lands were granted as ranchos. Rancho Piedra Blanca (Hoover et al. 1966), or Piedras Blancas, extended southward from San Carpóforo Creek to Pico Creek. Originally granted to José de Jesús Pico, this rancho was subsequently owned by Mariano Pacheco and his heirs, Peter Gillis, and ultimately by George Hearst (Greenwood 1976). By the last decades of the nineteenth century, Hearst holdings included Ranchos Piedra Blanca, San Simeon, and Santa Rosa. Although stock raising was the primary activity on the rancho, otter hunting and whaling were also pursued. A permanent whaling station and a small but active community were established at San Simeon (Greenwood 1976; Hoover at al. 1966). Economies of smaller scale were practiced by Chinese and Japanese immigrants, who engaged in traditional seaweed farming and abalone harvesting. Other inland enterprises included dairy farming on the coastal plain and mining in the Santa Lucia Mountains (Greenwood 1976). The majority of these entrepreneurial endeavors were limited in scope and time, and the major land use for this portion of the coastal region continued to be centered around the extensive cattle ranching enterprise of the Hearst family and corporation.

ARCHAEOLOGY

The history of archaeological investigation along the central California coast is neither long nor complex. Exploratory work of the early twentieth century gave way first to salvage in the 1960s, later to underfunded cultural resources management (CRM) investigations in the 1970s, and finally to problem-oriented research in the 1980s. Even with the impetus provided by CRM, the corpus of research completed in this region remains far less than that available in neighboring areas. Determining how this region fits within the web of cultural historical relationships with San Francisco Bay, the Santa Barbara Channel, and the Sacramento/San Joaquin Delta has precipitated a long-standing debate (Heizer 1949; Gerow 1974; Gerow with Force 1968). Interpretation of the archaeology of San Luis Obispo County, in particular, has been affected as much by developments in adjoining areas as it has by research completed within the actual county boundaries. The following review incorporates our assumption that the central coast represents a cohesive environmental and cultural unit of study. Our review of the history of pertinent archaeological endeavors begins with a review of the region as a whole and concludes with a focused discussion of the northern San Luis Obispo coastal locality.

Central coast region

Histories of archaeological research completed on the central coast have been presented previously by Bouey and Basgall (1991), Breschini et al. (1983), Dietz et al. (1988), Gibson (1979b), Glassow (1981), T. Jones et al. (1989), Moratto (1984), and Pierce (1979). Early work included exploratory survey and excavation by Bowers (1878), de Cessac (Reichlen and Heizer 1963), and Schumacher (1875, 1877) in the 1870s, by Gifford (1913), P. M. Jones (1956), Kroeber (1915) and Steward (1929) during the first part of the twentieth century, and finally by Pilling (1949ab, 1951, 1955), and Pilling and Beardsley (1948) in the 1940s and 1950s. The most important early research that bears on the interpretation of San Luis Obispo County prehistory was derived from the excavations reported upon by Rogers (1929), Olson (1930), and Orr (1943) from the Santa Barbara Channel. Their work confirmed the applicability of a three-part cultural chronology in the Santa Barbara area: an early culture (Rogers' Oak Grove, Olson's Archaic), marked by milling-stone assemblages and a dearth of projectile points; an intermediate Hunting culture, characterized by mortars, pestles, large stemmed and side-notched points; and a Late or Canaliño culture, distinguished by the presence of triangular-shaped arrow points and steatite bowls.

Within the same general time frame, a three-part cultural chronology was also being developed for the Sacramento/San Joaquin Delta region by Lillard et al. (1939) and Heizer (1949). Later this sequence was extended to San Francisco Bay by Beardsley (1954). In the 1950s, additional investigations conducted by graduate students from the University of California at Berkeley resulted in several important excavations in Monterey County. Meighan excavated Isabella Meadows Cave (CA-MNT-250) in 1952 and reported his conclusions in 1955. In the early 1950s Beardsley and Heizer excavated the Willow Creek site (CA-MNT-281 and -282); the data was presented by Pohorecky (1976). An important excavation at CA-SBA-205 on the northern coast of Santa Barbara County was completed by UC Berkeley. Conducted under the direction of Donald Lathrap, this site was later reported upon by Lathrap and Hoover (1975). An early excavation north of Point Conception was undertaken at CA-SBA-125 in 1938. Located near Point Sal, this vertically stratified shell midden showed strong cultural similarity with the latter two-thirds of the Santa Barbara Channel sequence (Carter 1941).

During the 1960s the central coast was witness to a growing salvage effort, largely in response to the passage of the Reservoir Salvage Act in 1960. Significant excavations were completed at Whale Rock (Reinman 1961) and Vaquero Reservoirs (Smith and La Fave 1961; Wire 1961; Smith 1961), Avila Beach (Moriarity and Burns 1962) and Morro Bay (Clemmer 1962). Typical of the era, these projects were characterized by large excavation samples, descriptive reports, and poor chronological control.

Research on the central California coast intensified through the late 1960s and early 1970s as CRM expanded. Important excavations include those completed at CA-SLO-175 (Abrams 1968a, b, c), CA-SLO-177 (Pierce 1979; T. Rudolph 1983a, b), CA-SLO-178 (Gibson 1979b; J. Rudolph 1985), CA-SLO-369, CA-SLO-179 (Leonard 1968), CA-SLO-187B (Gibson 1979a), CA-SLO-369, CA-SLO-697 (Gibson 1979b), CA-SLO-214 (Hoover and Sawyer 1977), CA-MNT-185/H (Cartier 1979; Motz 1989), CA-MNT-238 (Gibson et al. 1976).

In 1972, Greenwood reported the results from six sites at Diablo Canyon on the central San Luis Obispo County coast. Among the most significant research yet completed in San Luis Obispo County, this project produced meaningful samples that were relatively well documented and dated. Recovered materials confirmed parallels between San Luis Obispo County and the Santa Barbara Channel, and demonstrated a time depth of approximately nine thousand years for regional cultures. Subsequently, Glassow (1981, 1990) conducted excavations at Vandenberg Air Force Base in northern Santa Barbara County, which—with varying levels of data—document subsistence-settlement systems and types "dating to a variety of periods during 9000 years of prehistory" (Glassow 1990:13–13). Investigations were undertaken at thirty-one sites in 1974 and 1978 and again in those locations that yielded samples from 1980 to 1987: CA-SBA-210, -530, -551, -552, -662, -663, -690, -1040, and particularly CA-SBA-539, -670, and -931. Additional survey and limited excavation was undertaken at the San Antonio Terrace at Vandenberg by Chambers Consultants and Planners in 1984, under the direction of Michael Glassow (Glassow 1984). Most recently, Woodman et al. (1991) have reported findings from phase II archaeological investigations completed at 23 sites in the Santa Ynez River Valley, within and near Vandenberg Air Force Base.

The Monterey Bay area was researched thoroughly during the CRM era. Perhaps most important is the report by Dietz and Jackson (1981) on nineteen Monterey Peninsula sites. Following the lead of Breschini and Haversat (1980), the authors applied Binford's (1980) forager-collector model. Although the model's aptness has been debated (Breschini and Haversat 1989; Dietz 1987; Dietz et al. 1988; D. Jones 1992; D. Jones and Hildebrandt 1990; Hylkema 1991), it has been applied to the San Luis Obispo County (Dallas 1992) and northern Santa Barbara coasts (Glassow 1990; Woodman et al. 1991).

In addition to the site reports and surveys, some theoretical syntheses of central coast archaeology have been formulated. Important contributions have been made by Baldwin (1971), Bamforth (1991), Bouey and Basgall (1991), Breschini (1983), Breschini and Haversat (1988), Breschini et al. (1983), Dallas (1992), Dietz and Jackson (1981), Gerow (1974), Gerow with Force (1968), Glassow (1992), Glassow and Wilcoxon (1988), Glassow et al. (1988), D. Jones (1992), T. Jones et al. (1989), T. Jones and Hylkema (1988), Moratto (1984), and Woodman et al. (1991).

In total, no fewer than 140 significant excavations have been completed along the central coast (appendix B), albeit with widely varying sample sizes and quality of reporting. Additionally, as discussed in more detail below, at least 17 sites have been investigated within a 15 km radius of Little Pico Creek.

San Luis Obispo north coast locality

The northern exposed coast of San Luis Obispo County, extending from the northern edge of Morro Bay to the southern extreme of the more rugged Big Sur coast at approximately the county line, can be regarded as a relatively discrete environmental and cultural subunit (fig. 2.1). A modest amount of archaeological research has been completed at seventeen sites along this shore (table 2.1). The first significant local work was completed at Little Pico and Pico creeks in the 1960s. Important contributions have since been made in each successive decade.

In July of 1964, Francis Riddell of the California Division of Beaches and Parks determined that the center of CA-SLO-175 would be destroyed by a proposed widening of Highway 1 between post miles 52.4 and 59.4. An archaeological contract was negotiated between the Archaeological Survey of the University of California at Los Angeles and the Division of Beaches and Parks to salvage the area of the site 115 feet east and 65 feet west of the centerline of the highway. Pursuant to the contract, initial excavations were conducted from July to September 14 in 1965 (Abrams 1968a:1). Thirteen 5 x 5 foot units were excavated by hand and processed through $^{1}/_{4}$-inch mesh screen, resulting in a total of 49 cubic yards of excavated midden. A second season was undertaken in 1966, at which time a road grader was employed to excavate 1 inch x 12 foot levels to locate and define burials and other features. The estimated volume of midden removed using this technique was 970 cubic meters (Abrams 1968a:1). Results of the investigations are reported by Abrams (1968a, b, c), who concluded that the site was occupied from approximately 1180 BC to AD 1420 (Abrams 1968c:92) and showed cultural similarities with Intermediate or Middle

Table 2.1 Excavations in the San Luis Obispo north coast

Site	*Reference*
CA-SLO-175	Abrams (1968a, b, c)
CA-SLO-177	Pierce (1979); T. Rudolph (1983a, b); J. Rudolph (1985)
CA-SLO-178	Gibson (1979b); J. Rudolph (1983, 1985)
CA-SLO-179	Leonard (1968); Waugh (1992)
CA-SLO-186	Hines (1986)
CA-SLO-187	Gibson (1979a); Hines (1986)
CA-SLO-221	Gibson (1992b)
CA-SLO-264	Bouey and Basgall (1991)
CA-SLO-266	Bouey and Basgall (1991)
CA-SLO-267	Bouey and Basgall (1991)
CA-SLO-268	Bouey and Basgall (1991)
CA-SLO-369	Gibson (1979b)
CA-SLO-383	Hines (1986)
CA-SLO-697	Gibson (1979b)
CA-SLO-1226	Bouey and Basgall (1991)
CA-SLO-1227	Bouey and Basgall (1991)
CA-SLO-1373	Gibson (1992b)

Horizon sites in southern California (Abrams 1968c:92). A high proportion of mussel (*Mytilus californianus*) and a relative paucity of abalone in the shellfish remains, an abundance of net weights, a virtual lack of fishhooks and fish remains, and some limited evidence of artistic elaboration in the form of bone, shell, and stone grave offerings were noted. An important report for the time, it provided a preliminary inventory of a roughly dated central coast assemblage. Offering some preliminary typologies for a number of artifact classes, particularly projectile points that were recovered in ample quantity, it also illuminated several interesting attributes of the CA-SLO-175 site and its constituents.

A cryptic reference to additional excavation at CA-SLO-175 by UCLA is found in Leonard's (1968) site report on CA-SLO-179, the nearby Pico Creek site:

> Nine pits [at CA-SLO-175] were excavated outside the highway right-of-way, in an area of the site that appeared to have a great deal more depth than the part previously sampled (this work was directed by D. Johns and sponsored by the UCLA Archaeological Survey in the form of an undergraduate research grant). It was found that the midden deposit was considerably deeper in this area. Six pits exhibited a profile consisting of two rock layers separated by a relatively sterile soil. The lower rock layer yielded a significantly higher proportion of ground stone than similar areas of rock concentration at CA-SLO-175 or CA-SLO-179. The majority of the groundstone artifacts were mortar and pestle fragments; however, a few manos were also recovered (Johns 1967). This part of the Little Pico Creek site may be a specific activity area for the processing of seeds and acorns. [Leonard 1968:21]

No report documenting this work has been located at UCLA, and the citation to Johns is listed as a personal communication in Leonard's references. None of the materials housed at UCLA and Cuesta College attribute recovery to anyone other than Abrams; however, an accession number (#522) was listed in the UCLA accession record as assigned to a excavation conducted by Johns at CA-SLO-179. It is most likely that this passage refers to eight units excavated by Abrams on the ocean side of Highway 1.

Another important excavation was undertaken by UCLA at nearby Pico Creek, also during the summer of 1965. This too was a salvage operation initiated in anticipation of a widening of State Route 1. Directed by N. Nelson Leonard III, excavation was undertaken within the existing highway right of way on the east side of the highway to depths of from 3 to 4 feet. One feature identified was a rock layer similar to that excavated at Little Pico. Further, two burials were recovered. No materials were submitted for radiocarbon dating, but the typology of the points and the character of the assemblage was analogous to that from Little Pico, and consequently, a time frame of circa 2000 BC was assumed for the main occupation. Subsequent research completed at this site documents an occupational history spanning from circa 2700 BC to AD 1200 (Waugh 1992). While the available sample of radiocarbon dates, obsidian hydration readings, and temporally diagnostic shell beads was not robust, Waugh (1992:55) has suggested that two temporal components may occur at this location: one dating to the Early period, and the second representing the late Middle period and a Middle/Late Transition. Subsistence at this location showed a maritime focus. A heavy focus on fishing appeared to correlate with the more recent occupation.

Important research completed in this vicinity in the 1970s includes Pierce's (1979) analyses of CA-SLO-177 (fig. 2.2), a physically stratified deposit that produced a substantial artifact inventory including large side-notched and contracting-stemmed projectile points, a small concave-based arrow point, a double side-notched point, pitted stones, milling stones, handstones, mortars, two *Haliotis* ornaments, and a single clam shell disk bead. Dating of the deposit was ambiguous as a radiocarbon date of circa 8400 years BP was considered too old and was rejected (Pierce 1979:42). Late Prehistoric and Historic site use was recognized, as was an earlier occupation, generally thought to have been contemporaneous with settlement at Little Pico and Pico Creeks (1200 BC–AD 1500). Subsequent research (J. Rudolph 1985:127; T. Rudolph 1983a) suggests that CA-SLO-177 was indeed occupied as early as circa 6400 BC. A subsistence transition identified by Pierce (1979:45)—from shellfish and seed gathering early to increased hunting later—conforms strongly with changes that are generally dated circa 3500 BC. CA-SLO-177 is clearly a multicomponent site and was probably occupied intermittently between 6400 BC and AD 1805.

Also in 1979, Gibson reported test excavations from three sites at Lodge Hill in Cambria. While the total recovery from these locations was small (6.15 m^3), the findings are important in providing careful data descriptions from sites whose occupation spanned from circa 3000 BC to AD 1700.

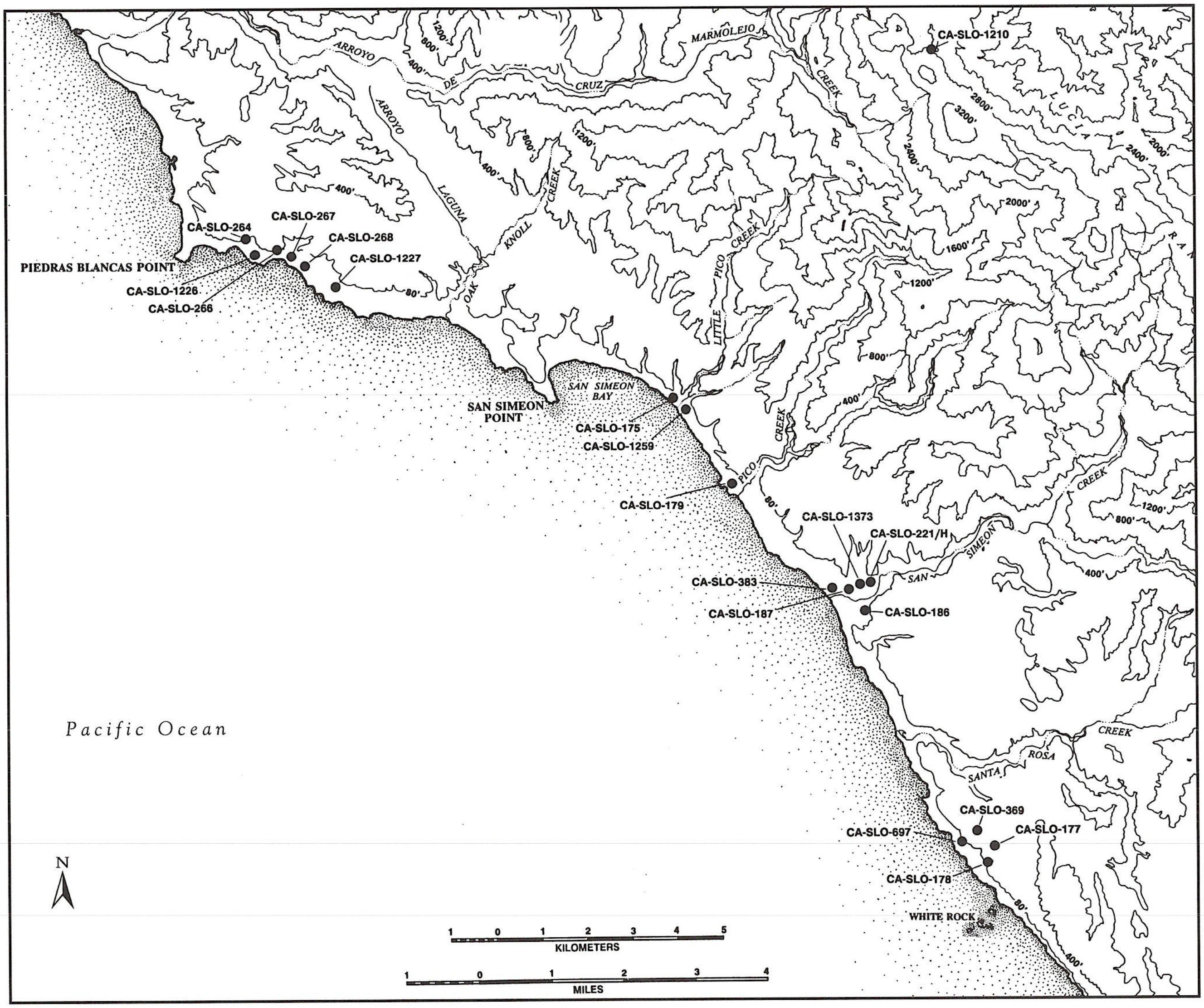


FIGURE 2.2 Important archaeological sites of the northern San Luis Obispo coast. *Illustration by J.P. Mundwiller*

Gibson, furthermore, provided a thorough review of chronological data available from the San Luis Obispo coast as of 1979. The oldest of the Lodge Hill sites excavated by Gibson was CA-SLO-697, which produced radiocarbon dates of circa 4900 and 4200 years BP. The assemblage marking this occupation included a milling slab, a handstone, mortars, pestles, pitted stones, cobble/core tools, flake tools, a large side-notched projectile point, and contracting-stemmed points. This inventory seems to be consistent with the dating results. Subsistence remains included single elements attributed to elk (*Cervus elaphus*) and deer (*Odocoileus hemionus*). Dominated by limpets, turban snails, chitons, and abalone, shellfish remains revealed a curious absence of mussel (*Mytilus californianus*). A contemporaneous occupation was identified at CA-SLO-369, where contracting-stemmed and lanceolate projectile points, pitted stones, cobble/core tools and flake tools were recovered. Vertebrate remains showed a high frequency of birds and sea mammals, with some fish. Limpets (31%), turban snails (29%), and chitons (13%) dominated the molluscan fauna (Gibson 1979b:Table 13). A more recent habitation dating circa AD 1500–1700 was identified at CA-SLO-178, which produced a handstone, a pestle, pitted stones, cobble/core tools, flake tools, a scraper plane, a small concave-based arrow point, a contracting-stemmed point, a possible double side-notched point, an *Olivella* saucer, and full-lipped beads. Vertebrate remains included those representing sea otter, southern fur seal, dog, rabbit, deer, and elk. Invertebrate remains showed proportions similar to those identified at CA-SLO-369.

A more substantial research project completed at CA-SLO-177 and CA-SLO-178 by UC Santa Barbara archaeologists refined the dating of these two important sites (J. Rudolph 1985; T. Rudolph 1983a and b). At CA-SLO-178, Middle period and historic components were identified , supplementing Late Prehistoric materials identified by Gibson (J. Rudolph 1985:128). At CA-SLO-177, an Early period component was distinguished stratigraphically from a Late component. This more refined dating facilitated the

identification of a significant change in molluscan fauna across the Early/Middle transition, in which turban snails and limpets replace mussels as the most abundant taxa. This transition has been attributed to an expansion of sandy beach habitat as a consequence of sea level rise (J. Rudolph 1985:131).

Another important testing project was completed by Gibson (1979a) at CA-SLO-187 in 1978, where five 1 x 1 m units were excavated and 330 artifacts recovered. Radiocarbon results dated occupation to the terminal Middle period or Middle/Late Transition. Further testing reported by Hines (1986) has found that occupation of this site was more extensive, spanning most of the Middle period (Hines 1986:67). Hines also completed test excavations at CA-SLO-186 and CA-SLO-383, where the former yielded radiocarbon and bead evidence for occupation during the Late period, but obsidian hydration results suggest at least some use during the Middle period. Radiocarbon and bead findings from CA-SLO-383 are consistent with habitation between 3800 and 2600 BC, but obsidian hydration results indicate more recent (Middle period) site use as well.

Two other studies have been completed in this locality during the present decade. Bouey and Basgall (1991) reported testing results from six sites in the Piedras Blancas area, just north of Little Pico Creek. Providing the first attempt at a local synthesis of research issues, including cultural chronology, settlement organization, diet, and stoneworking technology, the authors also discussed local calibration of ^{14}C and obsidian hydration.

Most recently Gibson (1992b) has undertaken testing at two additional sites in the Cambria area. CA-SLO-221 produced shell beads and radiocarbon dates indicative of occupation dating AD 1500–1650 (Gibson 1992b:39). The other site, CA-SLO-1373, was inhabited between AD 1140 and AD 1800, according to bead and radiocarbon findings (Gibson 1992b:39).

PREVIOUS RESEARCH

Early archaeological research in the Santa Barbara region by Rogers (1929) and Olson (1930) established the first cultural chronologies potentially applicable to San Luis Obispo County. This was soon followed by the central California sequence developed by Lillard and Purves (1936) and refined by Lillard et al. (1939) on the basis of extensive excavations conducted in the Sacramento/San Joaquin Delta area. Subsequent work expanded this sequence to the San Francisco Bay (Beardsley 1954), where further important revisions have been made in more recent years (Elsasser 1978; Bennyhoff and Hughes 1987). A major revision has also been proposed for the Santa Barbara sequence (C. D. King 1982, 1990).

During the first several decades after the development of the early chronologies, many California archaeologists, particularly R. F. Heizer and his students at UC Berkeley, felt that the Delta and Santa Barbara sequences were similar enough that all of California prehistory could be defined within the three horizons. This idea was criticized in the 1960s when Californianists began to recognize that there was a great deal of regional variation. In particular, Gerow with Force (1968) suggested that there were more cultural and biological differences between people of San Francisco Bay and those residing in the Delta during the Early Horizon than there were between the Bay people and the inhabitants of the Santa Barbara coast. He further proposed that through time these two putatively distinct populations merged and that the three-horizon model of California prehistory did not accurately portray this development. In 1974 Fredrickson proposed a compromise between Gerow's convergence model and the original central California taxonomic system in which periods were envisioned strictly as temporal units during which different regional cultural patterns were manifested. The central coast did not figure prominently in these areal considerations because so little work had been done in the region at that time; however, many researchers discussed the possibility of apparent cultural continuity along the central coast (Gerow 1954; Pilling 1955; Baldwin 1971).

In 1980, Breschini and Haversat attempted to integrate the Monterey Bay area into Fredrickson's central California chronology by defining two patterns at CA-MNT-170 near Carmel: the Sur pattern, which spanned from approximately 4000 to 2500 years BP, and the later Monterey pattern, dating from 2500 BP to historic contact. The earlier pattern was thought to represent a population of highly mobile foragers (*sensu* Binford 1980), who made minimal use of storage, instead moving residential bases on a frequent, possibly seasonal basis. The latter was attributed to an intruding population with a "collector" subsistence strategy. Although subsequently revised by Dietz and Jackson (1981), Moratto (1984), Breschini (1983), and Dietz et al. (1988) this model never included an actual cultural chronology (T. Jones and Hylkema 1988). Both Moratto and Breschini assigned sites to their hypothesized patterns on the basis of radiocarbon dates; however, there was never any definition of the assemblages that represent the patterns. In 1988 Dietz et al. proposed a series of five cultural periods for the Monterey Bay area and described some of the artifact forms that appeared to correlate with these periods. Dietz et al. also placed some emphasis on the temporal significance of changes in bead types evident in the region, particularly in similarities between central California and the Santa Barbara coast. These stylistic parallels suggest that the central coast probably manifests a sequence that is broadly similar to both areas, given its location midway between Santa Barbara and the Delta. Indeed, directly dated bead lots from CA-MNT-391

(Cartier 1993a) and CA-MNT-229 (Dietz et al. 1988) show that both *Olivella* saucers and occur during the same periods in the Monterey Bay area as they do to the north and south. Since that time this sequence has been modified slightly (T. Jones and Hylkema 1988) and applied to the Big Sur coast (T. Jones et al. 1989).

As a result of research completed to date, four sequences are potentially applicable to the central coast:

- The traditional Santa Barbara Channel sequence, originally developed by Rogers (1929) and since modified by Olson (1930), Orr (1943), and Harrison (1964).
- C. D. King's (1990) revised Santa Barbara sequence.
- The traditional central California sequence developed by Lillard et al. (1939) and revised by Beardsley (1954), Elsasser (1978), Bennyhoff and Hughes (1987).
- The preliminary Monterey County sequence advocated by Dietz et al. (1988), T. Jones and Hylkema (1988), and T. Jones et al. (1989).

Local chronology

The seventeen sites excavated along the northern coast of San Luis Obispo County have provided evidence for occupation spanning from 8400 years BP through historic contact. Components have been largely configured within C. D. King's (1990) sequence, but no formalized local sequence has been developed.

Explanatory models

Explanatory models applied to the central coast can largely be classified as either cultural or ecological. Cultural models include the population replacement schemes most commonly proposed during the era (circa 1915–1955) of chronological archaeology (Willey and Sabloff 1974), but still frequently applied to California (Breschini 1983; Harrison and Harrison 1966:69; Moratto 1984), as well as cultural intensification models proposed by C. D. King (1982; 1990) and Arnold (1987). Cultural ecological models include those in which environmental change and population growth are portrayed as the primary agents affecting cultural transformation. Prominent among these is the model advanced by Glassow et al. (1988). As originally devised, the forager/collector model (Binford 1980) exemplified the cultural ecological approach to explanation, posing environment as the prime mover in variation among hunter-gatherer settlement strategies. As it has been applied on the central coast, however, such change is ultimately attributable to culture (D. Jones 1992).

Population replacement. Models in which cultural change is attributed to linguistic group movement have a long history of development in California, beginning with Kroeber and Sapir's classification of California Indian language stocks. According to Kroeber (1925) the linguistic stock distribution pattern reflects prehistoric migration of people speaking these various languages. In 1929, Rogers suggested that the Santa Barbara archaeological sequence reflected the movement of three different cultural groups into the region; however, he did not affiliate any of his archaeological complexes with a specific linguistic stock. A conflicting opinion was offered as early as 1930 when Olson proposed that the Santa Barbara cultures developed in place. More recently, Harrison and Harrison (1966) suggested that the Hunting culture of the Santa Barbara Channel represented an intrusion of maritime-adapted peoples from Alaska. This last-mentioned hypothesis has been generally disregarded by contemporary researchers. Warren (1968) proposed that the Hunting culture, referred to as the Campbell Intrusion, represented an inmigration of hunting-adapted peoples from the interior deserts to the coast. Greenwood (1972), on the other hand, suggests that the 9000-year cultural sequence outlined at Diablo Canyon represents continuous occupation by one people.

Heizer (1949) and Kroeber (1955) proposed that similarities between the Early period on the Santa Barbara coast and the Early Horizon in the Sacramento/San Joaquin Delta indicated that these complexes represented a so-called basement Hokan-speaking culture. In central California, the Middle and Late Horizons were thought to represent the arrival of the Penutian speakers, and on the south coast the later cultures were so-called in situ changes by the resident Hokan speakers. Gerow with Force (1968) was one of the first to argue against this model, proposing instead that the Early Horizon peoples of the Delta area represented the first wave of Penutians and that the Hokan speakers occupied the area between Santa Barbara and San Francisco Bay during this same time. During ensuing periods these two cultures were thought to have merged.

Recent reanalyses of the historical relationships of major California linguistic stocks reported by Klar (1977) , Lathrap and Troike (1984), Nichols (1984), Shaul (1984), and Shipley (1984) have important implications for linguistic group movement models. On the basis of a meticulous comparison between Salinan and Obispeño morphemes, Klar (1977) posits that Chumash should be considered distinct from other languages classified as Hokan. This revelation has prompted renewed interest in theories suggesting prehistoric population movement in the Santa Barbara Channel, specifically those in which the Hunting culture is portrayed as an intrusive culture ancestral to historic Chumash. Lathrap and Troike (1984:131) have revived this hypothesis and offered yet another alternative: the Hunting culture represents a specialized maritime culture that developed on the Channel Islands and intruded on to the mainland, replacing earlier Uto-Aztecan speakers, who are represented archaeologically by Oak Grove and other milling-stone cul-

tures. These authors further equate the Hunting culture intrusion with the appearance of large side-notched projectile points, referred to as Jalama Side-notched. The co-occurrence of these points with Pinto type points in the southern San Joaquin Valley is further perceived as a representation of interaction between Chumash and speakers of proto-Uto-Aztecan in the area thought to represent the eastern proto-Chumash boundary and the proto Uto-Aztecan homeland (the southeastern San Joaquin Valley and adjacent foothills). Intensive interaction between these two groups in the prehistoric past is indicated by Klar's (1977) reanalysis of the Chumash language. Shaul (1984) has postulated a similar interaction among speakers of proto-Esselen, proto Uto-Aztecan, and Chumash prehistorically, with such interaction probably transpiring in the Sacramento/San Joaquin Valley. Turner (1983:17) has reported evidence for ancient and long-term contact between Salinan and Uto-Aztecan, further implying prehistoric interaction between groups that were not residing in contiguous territories at the time of the arrival of the Spanish. Such contact suggests the possibility that an intrusion of Chumash-speaking peoples could have eliminated what had previously been a shared boundary between Salinan and Uto-Aztecan speakers.

Subsistence intensification. Attempts to explain cultural transitions in the Santa Barbara Channel have emphasized human response to changing environmental conditions and population stress. Foremost among these is a model outlined by Glassow et al. (1988), in which archaeologically detected cultural changes are seen as adaptive shifts spurred on partially by environmental fluctuations and partially by population growth. Resources that require most intensive labor expenditures and/or sophisticated technology are exploited more heavily through time. The shellfish and seed diet of the milling-stone people (Early period) is supplemented by acorns and marine mammals during the Middle period with an increase in offshore fish during the Late period. The initial appearance of the mortar and pestle circa 3500 BC, in particular, is envisioned as a result of reduced productivity of marine environments during the preceding period of mid-Holocene warming, circa 5800–4000 BC. At the end of this warm interval, also referred to as the Altithermal or Xerothermic, human populations expanded, turning to more labor-intensive food resources, such as the acorn, and taking advantage of improved marine productivity associated with renewed growth of offshore kelp beds. Increased pursuit of sea mammals was also seen as part of this new reliance on labor-intensive foods by growing populations. Continued intensification culminated with the pursuit of pelagic fish during the Late period.

This model has been supported by ancillary studies reported by Petersen (1984) and Colten (1987), who present evidence that purportedly agrees with the dietary analyses proposed by Glassow et al. (1988). Petersen presented the results of a single column sample, which showed an increase in sea mammal bone coincident with the transition from Early to Middle period. Colten (1987:66) argues for increased dietary diversity across this same transition. Based on radiocarbon dating of a column from CA-SBA-1, Erlandson (1991) feels that this transition took place during the Early period. Glassow and Wilcoxon (1988) have also recently revised their estimation of the proportions of foods represented in the Late period diet in prehistoric Santa Barbara County, emphasizing variation in the distribution and availability of food resources north and south of Point Conception, generally recognized as a dividing line between different environmental zones. In both settings, Glassow and Wilcoxon (1988) argue that an optimal diet was consumed but that north of Point Conception this diet was dominated by shellfish. To the south, sea mammals and fish were most significant. Erlandson (1988a, b) has emphasized the importance of shellfish as a protein source for the earliest inhabitants of the region.

Social intensification. C. D. King (1982; 1990), using mortuary data, has proposed an alternative model for Santa Barbara Channel prehistory, focusing on changes in bead styles as a reflection of increasing economic and social sophistication through time. C.D. King's basic thesis is that the distribution of specific types of beads through social and political networks acted as a negative feedback mechanism to maintain the overall socioeconomic system. The amount of labor represented by a particular bead or ornament conveyed information to its recipient about the political and economic power of those responsible for its manufacture (C. D. King 1982:20–26). Changes in bead styles are perceived as reflections of major transitions in extant political, social, and religious systems (C. D. King 1982:26). During the Early period, political, economic, and religious institutions were not thought to be greatly differentiated from each other (C. D. King 1982:189). Most beads, ornaments, and utilitarian objects were manufactured locally (C. D. King 1982:187–188), but the rate of manufacture of potential wealth items was generally low (C. D. King 1982:187). Political power was not uniformly distributed through the region, however; wealth and power were concentrated in larger communities and were transferred from generation to generation by virtue of membership in that community. Storage of food and other objects was putatively practiced during this time, but stored commodities could not be passed on to relatives; rather, stores were disposed of at the time of death of the individual who accrued them by being included in the grave offerings. A major change transpired in this system at the end of C. D. King's Early period, when an increase in food storage,

associated with increased use of the mortar and pestle was apparent. Along with greater reliance on storage came increased potential for individual wealth, greater monetary disparity, and a centralized political system. According to C. D. King, political power was inherited by elite rulers who had almost complete control of the economic interactions undertaken by the members of their communities (C. D. King 1982:251). Systemic changes in the political and economic structure are again purported to have transpired at the onset of the Late period. Salient among those changes was a relatively clear separation between political and secular economic subsystems. Certain bead types were used only by members of the families of hereditary rulers; others were used by families of political leaders (C. D. King 1982:323–324). Development of different economic subsystems was accompanied by differentiation of many new types of beads and was apparently the result of "the evolution of relatively distinct subsystems at the end of the Middle Period" (C. D. King 1982:324). As the subsystems became more clearly differentiated from each other, competition between them and the efficiency of having separate economic subsystems stimulated their growth (C. D. King 1982:324).

Arnold (1992a, b) has presented an alternative explanation for the timing and causes underlying the evolution of complex sociopolitical organization in the Santa Barbara Channel. Based on craft production, settlement, paleoenvironmental and dietary data, she argues that through the Middle period, social organization in the Channel area was much less complex than the socially stratified chiefdom that apparently existed immediately prior to historic contact. Significant environmental change, however, in the form of a 100-year interval of elevated sea surface temperature resulted in a period of severe deterioration in marine productivity, which in turn was the impetus for the development of craft specialization as an attempt by elites to cope with environmental stress.

Other attempts to describe and explain the development of nonegalitarian social interaction among the Chumash have also been offered by L. King (1982) and Martz (1984, 1992). L. King (1982) attributes the evolution of social complexity among the Chumash to the development of the plank canoe, which according to C. D. King (1982c:357) may have come into existence as early as circa AD 700. The absence of the canoe from the San Luis Obispo coast raises the possibilities that either less-advanced sociopolitical integration evolved here or the factors responsible for the attainment of a nonegalitarian social system were not limited to the construction of canoes. Martz (1984) dates the appearance of status ascription in Chumash cemeteries to the late Middle period. Both of these postulates are based on data from extreme southern Chumash territory.

Foragers, collectors, and settlement organization. Application of Binford's (1980) forager/collector model was undertaken when Breschini and Haversat (1980) proposed the existence of two separate archaeological patterns in the Monterey Bay area: one representing a forager subsistence, pursued by speakers of Hokan languages, and the other, a population of collectors, who spoke Costanoan languages. The earlier Hokan-speaking population was marked by a putative Sur pattern. The later collector pattern, associated with occupation post-500 BC, was designated the Monterey pattern.

Dietz and Jackson (1981) expanded on this model, also classifying the native subsistence pursuits as representative of either foraging or collecting economies. They too correlate the collector subsistence strategy with Costanoan speakers. During this time period, collector populations established residential bases in the inland areas while the shoreline of the Monterey Peninsula was used for field camps, locations, stations, and caches (Dietz and Jackson 1981). Before the advent of the collector subsistence strategy (pre-2000 BP), the region was populated by people pursuing a forager subsistence strategy.

The forager strategy involved the use of residential bases, which would be characterized by substantial marine and terrestrial food remains and high archaeological visibility. In addition, a wide variety of artifacts and features are likely to be found, including evidence for houses or shelters, hearths, cemeteries, a full tool assemblage, exotics, and evidence for food processing and tool manufacture. In contrast, forager special activity sites were occupied for only a short period of time, resulting in the deposition of few cultural remains.

At Piedras Blancas on the northern San Luis Obispo coast, Bouey and Basgall (1991) have echoed Bamforth's (1991) conclusions on stone tool use and settlement strategies. While they were able to distinguish technological and functional variability in local tool and faunal assemblages, they wisely recognized that differences in sample size and recovery methods may have been contributing strongly to an appearance of culturally meaningful variation. When these sampling biases were factored out, the resulting impression was one of a coastal exploitation strategy that was relatively homogeneous over time. It was unclear, however, if this strategy featured logistical, residential, or other type of mobility.

Breschini and Haversat (1989) have also modified their views on prehistoric Monterey Bay foraging strategies, based on findings from CA-MNT-108 on the Monterey peninsula. This important site produced radiocarbon results dating this deposit to the Early period (circa 2800–400 BC), although the occurrence of later shell bead types and obsidian hydration readings suggest longer site use and possible component mixing. Temporal integrity aside, the site is remarkable in producing an abundance of obsidian and fish bone. Analyses of fish otoliths indicated summer fishing. Breschini

and Haversat (1989:84) interpret the site as a summer village and major economic center. The site does not conform to Binford's definition of a forager residential base and exhibits more characteristics of location where food storage was practiced (Breschini and Haversat 1989:85).

Employing data from Vandenberg Air Force Base in northern Santa Barbara County, Glassow (1990) has developed a different forager/collector scenario. Based on the initial appearance of manos and metates in abundance, Glassow (1990:13–25) posits a transition from a forager to collector subsistence/settlement strategy circa 6500 BC. Hard seeds processed with these implements were thought to have been stored. After this initial shift to a storage-dependent economy, a gradual intensification of marine resources is postulated, although an occupational hiatus is evident between circa 4700 BC and 3000 BC, which may reflect a period of exceptionally arid conditions. Shellfish were an important resource throughout the Vandenberg sequence, although a significant subsistence transition did occur circa 3000 BC, marked by the appearance of the mortar and pestle. A gradual intensification continued through the Middle period, with an increased focus on fishing and fowling during the Late period (Glassow 1992:125, 127).

Bamforth (1991) also discussed the forager/collector model with reference to flaked stone assemblages from northern Santa Barbara County, where he describes strong continuity in the manner in which stone tools were produced and used through time. Most tool and debitage collections from his study area are thought to represent field camps, which could have been employed as part of either forager or collector settlement systems. The absence of diachronic variation in flaked stone technologies, in the face of other regional evidence for cultural change through time was taken as an indication of the inappropriateness of assessing mobility through flaked stone industries. Such a conclusion contrasts with that of Kelly (1983) or with Bouey and Basgall (1991:93), who conclude that the flaked stone materials recovered from CA-SLO-267 suggest a fairly mobile population. These authors refrained from drawing definitive conclusions on the relative mobility of the inhabitants of Piedras Blancas sites vis-à-vis the forager/collector dichotomy. They did, however, summarize alternative functional interpretations of types of sites occurring in this vicinity with respect to the forager/collector question: small shell middens with relatively complete assemblages, as identified at CA-SLO-267, could represent either encampments by logistical groups associated with major residential bases elsewhere or the residues of small, mobile social groups (that is, foragers).

Woodman et al. (1991:336) have proposed a relative constancy in mobility over the last nine thousand years in the Santa Ynez River Valley. They posit that sites in their study area represent a rather generalized settlement strategy that was neither pure foraging nor pure collecting, but rather emphasized short-term occupations by mobile family groups. Increased use of this marginal resource zone was apparent at the onset of the Middle period, apparently in response to increased aridity (Woodman et al. 1991:337). This model is consistent with Bamforth's interpretation of flaked stone assemblages from the same area.

RESEARCH ISSUES

Despite the apparent wealth of excavations, the central California coast, particularly north of Point Argüello is poorly known archaeologically, both with regard to basic cultural chronology and explanation for observed cultural changes. The following is an attempt to summarize major issues in the current understanding of the archaeology of San Luis Obispo County and of the central coast as a means of describing research questions that can be addressed with the excavation data from CA-SLO-175 and CA-SLO-1259.

Regional chronology

The work of Carter (1941) and Greenwood (1972) demonstrates fairly convincingly that the area north of Point Conception correlates with the Santa Barbara Channel cultural sequence. Greenwood's work was particularly important in demonstrating that the Diablo Canyon sites manifested three temporally discrete cultures:

- Early Oak Grove or Milling-stone culture
- Intermediate or Hunting culture
- Late or Canaliño culture

Despite general correspondence, however, detailed assemblage definition is still seriously lacking for the region. Greenwood never actually ascribed specific artifact types to any of the three cultures; most artifacts were classified into types and approximate relative chronology of some types was discussed, but no serious typological synthesis was developed. Much of the other work done in the region is equally inadequate with respect to definition of regionally significant temporal types. Hoover (1971) proposed a regional typology that is completely atemporal, and Lathrap and Hoover (1975) present comparative analysis of projectile points, but assign all types to the Late period, despite apparent typological correlation with earlier Santa Barbara Channel cultures. Hoover and Sawyer (1977) follow the same procedure with materials recovered from CA-SLO-214. Gibson (1979b) made reasonable, albeit tentative, steps toward a locally applicable culture history but more recently advocates wholesale importation of the Santa Barbara Channel sequence to the San Luis Obispo coast (see Gibson 1992a). There are simply too many environmental and ethnohistoric differences between the Channel and the San Luis Obispo coast to assume cultural

uniformity throughout the sequence of habitation.

C. D. King's (1982) chronology represents a singular contribution to regional culture history with its precise temporal definitions of bead and ornament types. Similar to the classic central California chronology, after which it is modeled, this sequence still does not accommodate spatial variation, and the limits of its applicability remain unclear. Particularly troublesome are questions related to its articulation with chronologies proposed for the northern central coast. Part of this difficulty arises from differences in the focus of each sequence: C. D. King is concerned almost exclusively with mortuary items, as part of his emphasis on exchange and sociopolitical organization, while the occurrence of utilitarian artifacts has been stressed in the Monterey County schemes, where settlement and subsistence are weighed more heavily in attempts to define culture change. This variation in emphasis has also fostered discrepancies in the dating of major cultural transitions. Previous researchers on the south coast emphasized the appearance of the mortar and pestle as a major divergence from earlier milling-stone cultures, but C. D. King (1982) portrays this technological innovation as merely a phase within the Early period. Refined dating is still lacking, as shown by C. D. King's (1989) recent acknowledgment of possible problems with the radiocarbon dates used to define temporal parameters of his sequence. Reconciliation of the variant chronologies proposed for the north and south also seems desirable, but divergent opinions on the proper emphasis for chronology construction may preclude an easy resolution to this problem.

Explanatory models

Explanations for diachronic variability in the central coast archaeological record exhibit a diversity of theoretical orientations. As with culture history, some of this diversity is geographically based. Researchers from the south have tended to emphasize apparent parallels between the Santa Barbara Channel and the San Luis Obispo coast; researchers from the Monterey Bay area see commonalities with areas to the north. In all areas there is a strong emphasis on ecology, as explanation is sought within a framework of diachronic change in settlement, mobility, diet, population, and environment (Dietz and Jackson 1981; Dietz et al. 1988; Glassow 1990, 1992). These efforts rely heavily on the forager/collector model and dietary reconstruction and are supported by types of archaeological data normally recovered from nonmortuary contexts: utilitarian flaked and ground-stone implements and vertebrate and invertebrate faunal remains. The chronological sequences used to provide the temporal underpinning for these models generally define relatively large blocks of time because of the lack of temporal resolution associated with these types of archaeological residues. Salient issues to which such data can be directed include:

- Documentation of central coast settlement strategies through time with particular attention to the types and location of sites occupied and the manner in which they articulate with each other and the natural environment.
- Inferred presence or absence of food storage and its relationship to mobility strategies.
- Composition of the diet through time with particular regard for diachronic patterns in the use of labor-intensive resources, storage-related resources, and changes over time in the mix of marine versus terrestrial foods.

The emergence of complex or nonegalitarian social organization provides another focus for research along the central coast. Interest in this topic derives primarily from the Santa Barbara Channel, where the ethnohistoric record suggests that a chiefdom-like form of sociopolitical organization was present immediately before historic contact. Most models attempting to explain the evolution of this system are largely reliant on mortuary data and a chronology derived almost exclusively from grave-lot seriation (C. D. King 1982; 1990; Martz 1984, 1992). Arnold (1992a, b) and Colten (1993), however, have employed multiple lines of evidence—including settlement, subsistence, and paleoenvironmental data—to integrate the study of social evolution within a framework of overall ecology. The primary discrepancy in alternative models involves the appearance of advanced forms of sociopolitical integration in this region and the causal circumstances surrounding its emergence. C. D. King (1982) argues that nonegalitarian social systems were in place in the Santa Barbara Channel circa 2000–1400 BC, whereas Martz (1984, 1992) and Arnold (1983, 1987, 1992a, b) posit a significantly later date. Based on revised interpretation of radiocarbon evidence for the beginning of the Middle period, C. D. King (1990) has more recently adjusted his estimate for the emergence of inherited status in the Channel to circa 600 BC. Clearly there is a continuing need to recognize and date archaeological evidence (for example, status ascription) of nonegalitarian social organization (T. King 1974, 1976) in California burial populations and midden residues.

Models that incorporate ethnolinguistic identity and group movement within their explanatory framework—such as the Monterey Bay forager/collector scheme, Gerow with Force (1968) convergence model, and the archaeolinguistic proposals developed by Lathrap and Troike (1984)—require continued efforts to isolate prehistoric social boundaries. Comparative artifact analysis, obsidian and bead exchange patterns, and human osteometrics can aid the effort.

Although it is clear that various models cannot, or will not, subsume premises advanced by others, some degree of

synthesis may be at once possible and valuable. Future models must accommodate patterns revealed in multiple sets of data and in their analyses if we are to gain an understanding of this poorly known and poorly understood region of the central California coast and the hunter-gatherer lifeways that have marked its prehistory.

The work presented here reflects an effort to delineate and analyze an archaeological assemblage from this coastal context derived from both utilitarian and mortuary contexts. This research provides data to enhance a portion of the cultural chronology from the central California coast and within that chronology to examine an expression of land-use that is spatially discrete and that represents a particular settlement/subsistence regime. Economy and social structure are not mutually exclusive and together produce a response to ecological constraints and opportunities. The degree to which this response reflects an organized response to those constraints and opportunities or occurs as a reaction to environmental or social perturbation is a matter for investigation, but there is scarcely a doubt that the result had historic consequence within the region.

Explicit consideration of concerns or "models" within the rubric of hunter-gatherers would be dependent upon a more substantially detailed data recovery than was possible either in the most recent undertaking or in the reanalyses of data from past investigations. The 1989 sample was limited in terms of spatial distribution and in temporal span. The nature of the collection obtained during the 1965–66 fieldwork places further restrictions upon conclusions that can be derived in terms of assemblage definition and subsistence evaluation. Primarily because of the disparate methods of excavation in the early undertaking, a strong bias existed toward the recovery of large so-called formal artifacts and the underrepresentation of small tools and debitage. Further, only a very general discussion of both vertebrate and invertebrate faunal remains was included in the original summary, with no quantification or distributional information. Nonetheless, when compared and conjoined with results from other undertakings in the region (Bouey and Basgall 1991; Carter 1941; Greenwood 1972; Harrison 1964; Harrison and Harrison 1966; Hines 1986, among others), the analyses of information and concomitant data supplied by the sites at Little Pico Creek can substantially advance the understanding of chronology, assemblage constituents, site function, and component definition within a chronological framework.

Local chronological sequences for the central coast in this region are not well defined, owing in large part to a paucity of obsidian hydration and ^{14}C data firmly associated with discrete components and established typologies for projectile points and beads. Beside bringing to bear all appropriate materials from the recent excavation, extensive examination of temporally sensitive artifacts from the Abrams collection provides useful comparable criteria. In this regard, reexamination and reanalyses of the obsidian materials from that investigation offer potential for an expanded database. Incorporating available discussions from reports from regional contexts including those to the north and south is an integral part of assessing possible chronological schema and methods for constructing such schema.

Definition of assemblage constituents, particularly formal and informal artifacts and the debris from their manufacture, enhances the discussion of site function locationally and structurally. Examination of flaked stone procurement patterns and production techniques has proven particularly revealing. Even though limitations exist for the original collection, the subsequent fieldwork has provided a basis for solid inference. Further, the diversity and character of the ground- and battered-stone tools and bone implements have the potential to enlarge the perspective and identity of assemblage constituents and site function. A final and telling body of data can be drawn from the mortuary context. That context can provide not only important supportive evidence for chronology in the form of bead and projectile point sequences—and possibly ^{14}C determinations—but can also offer a rich testimony for deductions in regard to social structure and population parameters.

These areas of inquiry are designed to be at once discrete and yet interrelated in their examination of a specific instance or sequence of prehistory, but the trajectory of that inquiry is conducted under a more general perspective on causal relationships that produced the prehistory of the sites at Little Pico Creek. This perspective considers the mechanism of intensification, a concept that has occupied much of the research in the area (Arnold 1987, 1992a; Glassow 1990; C. D. King 1990; Martz 1984) and in California in general (Basgall 1987; Bouey 1987). Intensification is signaled by a marked shift or increase in effort, either in economic strategies such as subsistence and technological production or in the sociopolitical sphere as expressed in status differentiation, redistribution of goods and services, or craft specialization. Although the Santa Barbara Channel area has produced data that speak to this inquiry, the area directly north can bring significant comparative data to bear on an understanding of the development of intensification apparent in economic and social patterning that characterizes the prehistory of the south central coast of California.

3

Field and Laboratory Methods

EVEN THOUGH THE EXCAVATIONS at CA-SLO-175 and -1259 in 1989 were conducted during an ongoing construction project, field techniques did not deviate from standard archaeological practice. The field strategy was designed to fully explore the newly discovered deposits and to obtain meaningful samples of all extant constituents. A mixed excavation strategy—including a variety of excavation and screening techniques—was therefore employed.

Since we have reanalyzed and illustrated materials recovered from CA-SLO-175 in 1965 and 1966, field and laboratory methods employed at that time are also described here. As the earlier project was also conducted in relation to a highway construction project, there is some similarity between methods employed in 1965 and those used in 1989. Differences between the earlier and later techniques have affected the comparability of the collections. Because of its size, diversity, apparent temporal cohesiveness, and the presence of datable grave lots, the sample obtained from CA-SLO-175 in 1965–1966 is important; however, most of the artifacts found in the collection dating to the 1965 and 1966 work were collected with the aid of a road grader. Well provenienced and useful for defining component assemblages, these specimens cannot be used to assess artifact diversity because they were not obtained from a controlled, screened context. Mechanical excavation is biased toward the recovery of large, formal tools at the expense of smaller specimens. Some hand excavation was also conducted at CA-SLO-175 in 1965–66, and identification of materials resulting from that work can be used to consider assemblage diversity. We have therefore documented the discovery technique associated with each artifact in order to acknowledge possible limitations to its interpretive potential.

1965 FIELD SEASON AT CA-SLO-175

Field procedures

The initial excavation of CA-SLO-175 took place in July of 1965, when David Abrams and a small crew from UCLA excavated two sondage pits, one on each side of Highway 1. Test pit A, 1 x 2 m, was located on the northeast side of the Highway. Excavated in 10 cm levels to a depth of 100 cm below surface, it was the only unit from either 1965 or 1966 in which metric measurements were used. Soils from this unit were also processed through 3-mm (⅛ inch) screen. Test pit B was located outside the project impact area on the southwest side of Highway 1 (fig. 3.1). Similar to all subsequent units completed by UCLA, test pit B measured 5 x 5 feet (152 cm) and was excavated in 6-inch (15 cm) levels. Excavation was terminated at a depth of 6.5 feet (168 cm), and soils were processed through 6-mm (¼ inch) screen. A 6 x 6 inch (15 cm) column sample was isolated and removed from the sidewall of this unit.

In August and September of 1965, a sampling grid was laid out and twelve additional 5 x 5 feet units were excavated, two on the southwest, or ocean, side of the highway and ten on the northwest, or inland, side. Material recovered from nine of these units was screened through 3-mm mesh; deposit from three others was screened through 6-mm mesh. Unfortunately, the specific screen size for each unit was not documented. Most units on the inland side of the highway reached sterile soil and were terminated at depths of approximately 3.5 feet (91 cm), but several on the ocean side of the highway went to depths of approximately 5 feet (183 cm). Since no catalog entries refer to debitage, it appears that these units were intended to recover formal artifacts and artifact fragments only. Shellfish and other faunal remains were not retained from the units, other than from columns excavated into the sidewalls of several completed units.

According to the site report (Abrams 1968a:1), the net recovery from the 1965 field season was 1025 specimens including projectile points, beads, bone tools, flakes, and cores. The total amount of deposit examined was stated to be 120 cubic yards; however the site map, description of field methods, and the collection catalog yield evidence of only 46.5 cubic yards or 35.2 m^3 of midden (table 3.1). Five burials (1–5) were also removed during the 1965 field season.

Laboratory procedures

After field recovery, artifacts were transferred to a field laboratory set up in trailers at the site. Once in the laboratory,

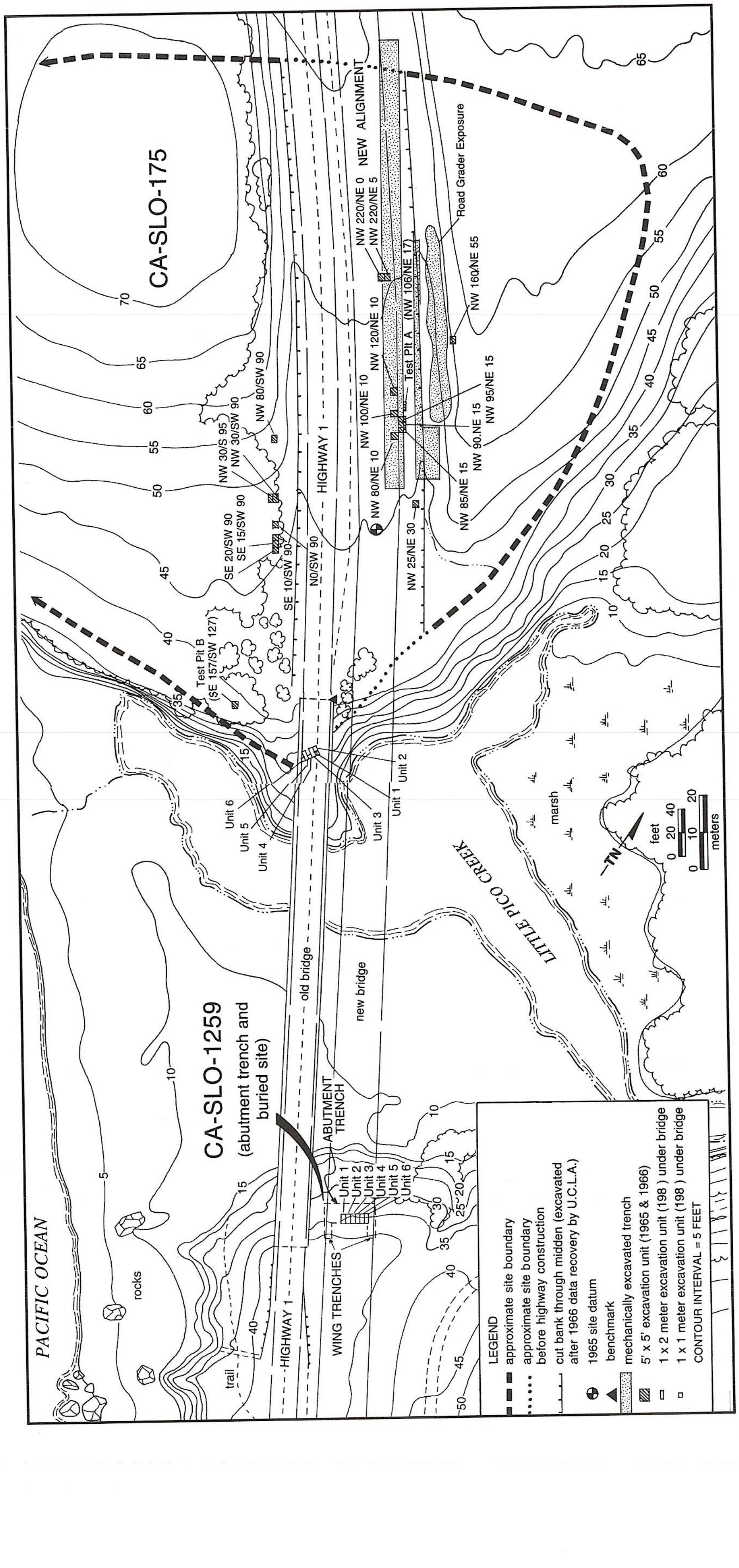


FIGURE 3.1 Composite site map of CA-SLO-175 and CA-SLO-1259 at Little Pico Creek. *Illustration by Nelson Thompson*

artifacts were washed and numbered consecutively, using the accession number 511 as a prefix.

1966 FIELD SEASON AT CA-SLO-175

Field procedures

One of the most significant findings of the first field season was a dense layer of rocks, 6 to 12 in (15–30 cm) thick, at a depth of 12 to 24 inches (30–61 cm) below the modern site surface, across the entire site. Further exposure and documentation of this layer, recovery of human burials from the direct impact area of the proposed widening project, and the determination of the stratigraphic relationship between the burials and the rock stratum were objectives for the work of 1966. The 1966 field season therefore relied on mechanical excavation with a Caterpillar road grader equipped with a 12-foot blade. In ¼- to ½-inch increments, the grader bladed a trench 500 feet long and 12 feet wide on a northwest-southeast axis parallel to both the highway and the excavation sampling grid. When a field monitor identified a burial, the grader moved ahead and the interment was exposed by hand. Burials and artifacts unearthed by the grader were mapped in horizontally according to their proximity to a series of provenience stakes placed at regular intervals along the grid. Vertical provenience was established with a transit set up at the site datum. Depths were recorded in absolute elevation above mean sea level. These have been converted into metric depths below surface. The trench was excavated to sterile soil, generally 4 feet (122 cm) below surface. Soil samples were collected from the edge of the trench at 20 feet (6.15 m) intervals in order to document horizontal variation in midden composition and color. After completion of the trench, the road grader was used to expose another area, east of the main trench. This irregularly shaped exposure was 20 to 30 feet (6.2–9.2 m) wide and approximately 95 feet (29.2 m) long (Abrams 1968c:77).

Also completed during this field phase was a 40 x 15 feet (12.3 x 4.6 m) exposure of the rock layer. Test pits were first excavated by hand at the corners of the exposure to locate the surface of the rock stratum; subsequently, the remaining overburden was removed mechanically. The surface of the feature was exposed carefully by hand, mapped, and photographed.

Five additional hand-excavated pits (table 3.1) were also undertaken in 1966 on the ocean side of Highway 1. Four of these were 5 x 5 feet (1.5 x 1.5 m), and one (NW30SW95), which was opened explicitly to facilitate a burial removal, was 5 x 2.5 feet (1.5 x 0.75 m). Upon completion, units were backfilled mechanically. The total hand sample from 1966 consisted of 14.5 m^3 (19.1 cubic yards), and the combined volume of mechanical and hand excavation was 970 cubic yards (737.2 m^3; Abrams 1968a:1).

Laboratory procedures

Laboratory methods employed in 1966 were largely similar to those used in the previous season, with several important exceptions. Artifacts were again washed and cataloged at an on-site laboratory, but provenience designations on artifacts were different. All items were given the accession prefix of 511, but the remainder of the provenience code varied in accordance with the discovery context of the object. Burial-related artifacts were grouped together, with a "B" designating burial, followed by the number of the interment, and then a lowercase letter designating the specimen: 511-B12a, for example, is a projectile point associated with burial 12. Artifacts recovered during trenching were coded with reference to the nearest grid stake, followed by the depth of the item's recovery, recorded in either inches below surface or feet above sea level. The catalog entry 511-NW140NE0:3 designates an artifact found 140 feet NW of datum/0 feet NE of datum in the trench at a depth of 3 inches. Provenience for surface specimens is 511-1966-SURFACE- #. Provenience for artifacts recovered from hand excavation units was designated in a fashion similar to trench artifacts, in that units were numbered by reference to the excavation sampling grid. The axes of the grid were laid out NW-SE and NE-SW so that unit designations consist of two parts: the first indicating the number of feet NW or SE from datum and the second indicating feet NE or SW from datum.

The collection from the 1965 and 1966 excavations was originally accessioned to the University of California, Los Angeles; however, in 1978 all site materials, except the human remains, were transferred to a facility at Cuesta College in San Luis Obispo, following a request by the San Luis Obispo County Archaeological Society (SLOCAS). The burials remain at UCLA, while the rest of the collection is housed at Cuesta College under the curatorship of SLOCAS.

1989 CALTRANS EXCAVATION AT CA-SLO-175

Field procedures

Six units (two 1 x 2 m, four 1 x 1m) were excavated by Caltrans at CA-SLO-175 in July and August 1989, all in the area of direct impact of the bridge replacement. A multitechnique recovery strategy was employed; techniques varied according to research objectives (table 3.1). The retrieval of small-size lithic and faunal constituents (for example, pressure flakes and fish vertebrae) was emphasized in unit 1. All excavated material from this unit was dry screened in the field through 3-mm mesh. Screened residue from this unit was then taken to a field facility at a nearby maintenance station for additional wet screening through 3-mm mesh. Residual materials were air dried and examined for cultural content and bone. In order to expedite the retrieval of a larger sample of formal artifacts and identifiable faunal

remains, the material from the remainder of the units was dry screened in the field through 6-mm mesh. Shellfish fragments were sampled with two column samples taken from units 2 and 5 which were excavated into the sidewalls of the completed units. The column sample collected from unit 2 was 10 x 10 cm; that from unit 5 was 20 x 20 cm. Both were excavated in 10 cm levels. Subsequent to fieldwork all material from the column samples was transported to the Caltrans archaeological laboratory in Sacramento for wet screening through nested 6-mm and 3-mm mesh. Fire-altered rock was weighed and discarded. Since we hoped to bolster the sample of identifiable fish bone by using a variety of mesh sizes, bulk samples were recovered to process through 1.5-mm mesh. Two 10 x 10 x 20 cm samples were excavated from the midden zone on the face of the cliff on the seaward side of Highway 1: one at 60 to 80 cm below ground surface and a second at 130 to 150 cm. Two more samples were obtained from the cutbank east of Highway 1 and north of the bridge: one at 10 to 20 cm and the second at 70 to 80 cm. Materials from the bulk samples were removed and taken to the Caltrans laboratory in Sacramento for wet screening through 1.5-mm mesh. The net recovery from Caltrans excavation at CA-SLO-175 was 5.8 m^3—excluding the column and bulk samples.

Table 3.1 Summary of hand excavation at CA-SLO-175

	Date	*Depth*	*Wet/dry*	*Size*	*Increments*	*Screen*	*Yds*^{3}	m^3
Test pit A	1965	100 cm	Dry	1x2 m	10 cm	1/8 inch	2.6	2.0
Test pit B	1965	6.5 ft	Dry	5x5 feet	6 inch	1/4 inch	6.0	4.6
NW0SW90	1965	5.0 ft	Dry	5x5 feet	6 inch	?	4.6	3.5
NW80SW90	1965	3.5 ft	Dry	5x5 feet	6 inch	?	3.2	2.4
NW25NE30	1965	4.5 ft	Dry	5x5 feet	6 inch	?	4.2	3.2
NW80NE10	1965	2.0 ft	Dry	5x5 feet	6 inch	?	1.4	1.1
NW85NE15	1965	3.5 ft	Dry	5x5 feet	6 inch	?	3.2	2.4
NW90NW15	1965	3.5 ft	Dry	5x5 feet	6 inch	?	3.2	2.4
NW95NE15	1965	3.0 ft	Dry	5x5 feet	6 inch	?	2.8	2.1
NW100NE10	1965	2.0 ft	Dry	5x5 feet	6 inch	?	1.9	1.4
NW120NE10	1965	4.0 ft	Dry	5x5 feet	6 inch	?	3.7	2.8
NW160NE55	1965	3.0 ft	Dry	5x5 feet	6 inch	?	2.8	2.1
NW220NE0	1966	4.0 ft	Dry	5x5 feet	6 inch	?	3.7	2.8
NW220NE5	1965	3.5 ft	Dry	5x5 feet	6 inch	?	3.2	2.4
Totals							46.5	35.2
	Date	*Depth*	*Wet/dry*	*Size*	*Increments*	*Screen*	*Yds*^{3}	m^3
NW30SW90	1966	5.0 ft	Dry	5x5 feet	6 inch	1/4 inch	4.6	3.5
NW30SW95 (NE 1/2)	1966	1.0 ft	Dry	5x2.5 feet	6 inch	1/4 inch	0.5	0.4
SE10SW90	1966	3.5 ft	Dry	5x5 feet	6 inch	1/4 inch	2.4	1.8
SE15SW90	1966	4.0 ft	Dry	5x5 feet	6 inch	1/4 inch	3.7	2.8
SE20SW90	1966	8.5 ft	Dry	5x5 feet	6 inch	1/4 inch	7.9	6.0
Totals							19.1	14.5
	Date	*Depth*	*Wet/dry*	*Size*	*Increments*	*Screen*	*Yds*^{3}	m^3
1	1989	80 cm	Wet	1x1 m	10 cm	3 mm	1.0	0.8
2	1989	70 cm	Dry	1x1 m	10 cm	6 mm	0.9	0.7
3	1989	60 cm	Dry	1x2 m	10 cm	6 mm	1.6	1.2
4	1989	60 cm	Dry	1x1 m	10 cm	6 mm	0.8	0.6
5	1989	70 cm	Dry	1x2 m	10 cm	6 mm	2.1	1.6
6	1989	90 cm	Dry	1x1 m	10 cm	6 mm	1.2	0.9
Totals							7.6	5.8

Table 3.2 Summary of hand excavation at CA-SLO-1259

	Date	*Depth*	*Wet/dry*	*Size*	*Increments*	*Screen*	*Yds*^{3}	m^3
1	1989	50 cm	Wet	1x2 m	10 cm	3 mm	1.3	1.0
2	1989	50 cm	Wet	1x2 m	10 cm	3 mm	1.3	1.0
3	1989	60 cm	Wet	1x2 m	10 cm	6 mm	1.6	1.2
4	1989	60 cm	Dry	1x2 m	10 cm	6 mm	1.6	1.2
5	1989	50 cm	Dry	1x2 m	10 cm	6 mm	1.3	1.0
6	1989	50 cm	Dry	1x2 m	10 cm	6 mm	1.3	1.0
Totals							8.4	6.4

Laboratory procedures

Artifacts and faunal remains recovered during the 1989 excavation were transported to the Caltrans archaeological laboratory in Sacramento, where they were washed and cataloged using the accession prefix of 484, as provided by the University of California at Santa Barbara (UCSB). The collection from the 1989 work is curated at UCSB. Cataloged materials were then divided into analytical lots.

Shell samples. The field strategy yielded two types of shell samples: whole and large fragments of shell intended for radiocarbon analysis and column samples. Shell samples of adequate size for ^{14}C analysis were limited. A random sample of shells of adequate weight for traditional radiocarbon analysis was selected from a variety of depth proveniences and submitted to Washington State University for analysis.

Column samples were processed with water through nested 6-mm and 3-mm mesh in the field, resulting in two bags of different-sized residues for each excavation level. For analysis, the residues retained in 6-mm mesh were examined in their entirety, and a 25 percent sample was taken from the 3-mm mesh residue. Rocks and roots were sorted out from the analytical samples and discarded. The remaining shell fragments, bone, and other cultural items were subsequently analyzed.

Obsidian. All obsidian items were segregated from the other flaked stone and submitted first to Dr. Paul Bouey for source identification and then to Tom Origer for hydration analysis.

Vertebrate remains. Vertebrate remains were segregated into fish, bird, and mammals, then cataloged by unit and level lot. Cataloged lots were delivered to specialists for identification. Analysis emphasized specimens that could be identified to the genus level or better. Indentifiable and nonindentifiable elements were tabulated for each taxonomic class.

Artifacts. Artifacts were classified into morphological/functional categories and were assigned individual specimen numbers. Debitage was cataloged by lot.

CALTRANS EXCAVATION AT CA-SLO-1259

Field procedures

CA-SLO-1259 was discovered below a 0.9 to 1.7 m thick deposit of sterile fill during excavation of an abutment trench for the new Little Pico Creek bridge. The trench was 12 m x 4 m and was planned for a depth of approximately 3.0 m. Excavation had been completed to that depth in the western third of the trench when the cultural deposit was discovered. Archaeological excavation was then planned to remove the cultural soils remaining in the eastern portion of the trench. Sterile overburden was first removed from the surface of the cultural deposit with heavy equipment, and six contiguous 1 x 2 m units were laid out on the exposed midden surface. Units were excavated in 10 cm levels, using a variety of techniques (table 3.2), because of heavy clay inclusions and resultant plasticity of the soil. The deposit from units 4 through 6 was dry screened in the field through 6-mm mesh. The material from unit 3 was first dry screened in the field through 6-mm mesh; the residue was transported to the maintenance facility for wet screening through 6-mm mesh. Materials from units 1 and 2 were first dry-screened in the field through 3-mm mesh at the field laboratory.

A rock concentration, similar to that found at CA-SLO-175, was also identified at CA-SLO-1259, at a depth roughly 30 cm below surface. This feature was exposed, mapped, photographed, and sampled in all units before excavation continued through it into deeper levels. The cultural deposit proved to range between 50 and 60 cm in depth.

Upon completion of the hand sample from units 1 through 6, heavy equipment was used to excavate the remainder of the midden deposit from the trench. Excavation was monitored by a Caltrans archaeologist and a member of the local Native American community. No human remains or other features requiring additional manual excavation were encountered and the abutment trench was completed.

Laboratory procedures

Laboratory processing of materials from CA-SLO-1259 took place at the Caltrans archaeological laboratory in Sacramento, where artifacts were washed and cataloged, using the UCSB accession prefix of 485. Procedures were the same as those used with the CA-SLO-175 materials. The CA-SLO-1259 collection has been curated at UCSB.

4

Site Structure

THE STRUCTURE OF THE SITES at Little Pico Creek is a result of the natural sedimentary context, contemporary land use, and the archaeological remains.

SOIL STRATIGRAPHY AND STRUCTURE

Soils belong to the Concepcion loam series, 2 to 5 percent slopes—a type that occurs over much of the coastal terrace in this region (Soil Conservation Service 1984). These very deep and moderately drained soils have formed slowly in old soil weathered from sedimentary rock. Surface loam overlies a clay subsoil at depths from 50 to 120 cm (20 to 47 inches). This subsoil has a high shrink-swell potential, a hindrance to permeability. Nearby steep soils bordering the creek are in the Los Osos-Lodo complex, 30 to 75 percent slopes—soils that are moderately deep and well drained with rapid runoff.

CA-SLO-175

During the 1989 season, excavation units under the bridge were placed in an area that has been subject to some foot traffic but appeared to avoid subsurface disturbance from the numerous unauthorized excavations that elsewhere mark the cliff. Excavation subsequently revealed little evidence of disturbance below circa 20 cm, as indicated by the absence of contemporary debris in lower levels. Four strata were provisionally identified (figs. 4.1 and 4.2), although the components of strata B and B1 were only vaguely differentiated. Particle size estimates vary from the characterization for the soil type in that, with the exception of the top 10 cm, the constituents remain fairly constant. Silt predominates at 45 to 55 percent throughout, and clay accounts for only 15 percent or lower.

Stratum A consisted of a discontinuous layer of faintly reddish sandy loam with a 60 percent sand component, reflecting disturbance and a lack of humus, possibly because of intermittent pedestrian use. Stratum A was shallow, extending from 4 to 5 cm, and was variably apparent in different units.

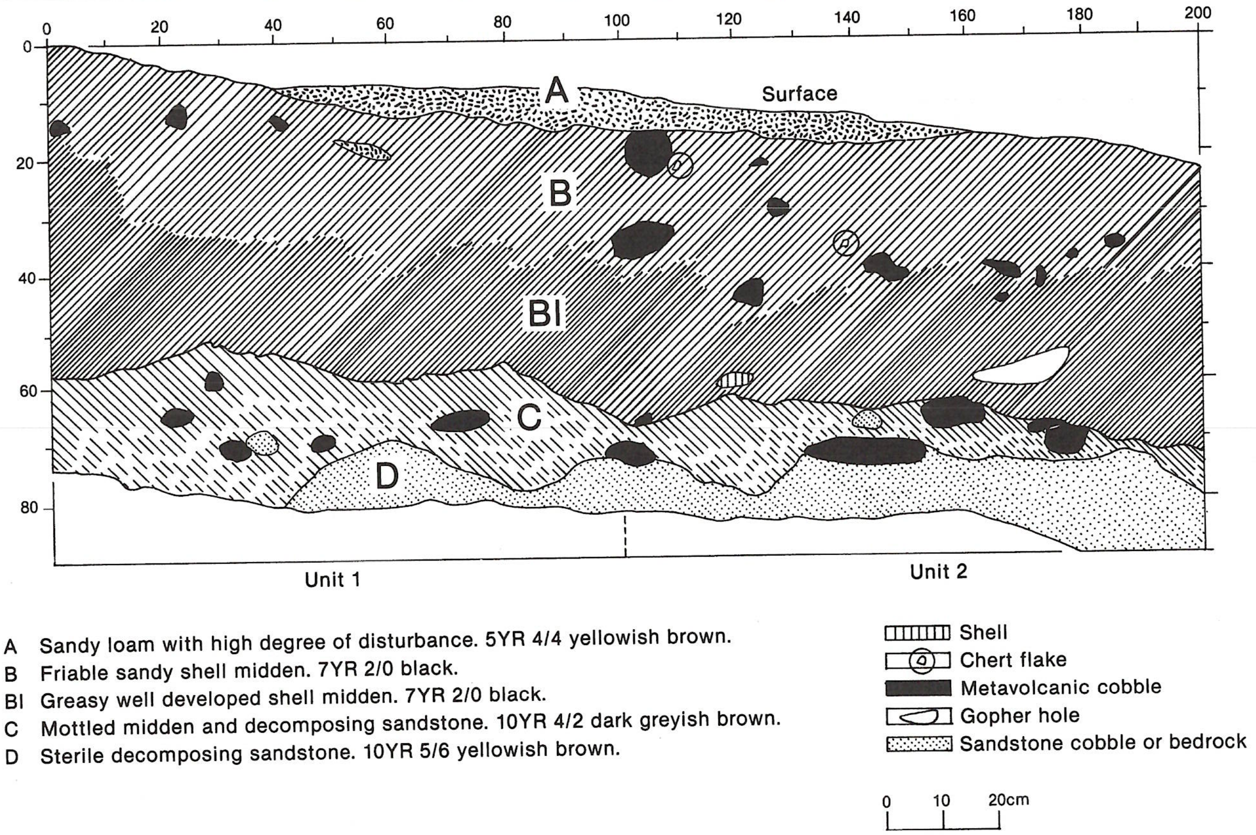
Strata B and B1 were characterized by a midden component that was very high in organic carbon. Graded from a dark brown to a dark gray black, the soils contained a strong shell component that lessened at the base of stratum B1. The contact between B and B1 was very vague. The deposit was friable and dry, becoming more compact and moist with depth. Shell was extensive throughout the deposit, but in unit 4 shell fragments formed a dense indurated lens that began at 20 to 30 cm below the surface and continued to 40 to 50 cm. In unit 5 a similar lens was identified at 20 to 25 cm and at 60 to 70 cm where the lens was thinner (fig. 4.2). Traces of a shell lens were identified at 30 cm in unit 3. Silts predominated in these strata (50 to 65%) with less sand (27 to 35%) and minimal clay. Rodent disturbance was noted in the form of krotovina in units 3 and 6. Fire-affected rock was identified but not weighed. From less than 15 to less than 20 percent of the total rock was fire affected. At 40 cm in units 4 and 5, an increase in ocean and stream cobbles was noted; however, no real layer was recorded.

Described as a combination of mottled midden—that is, midden that was down-mixed with a decomposing sandstone and was mainly lodged in the crevices of large sandstone boulders, stratum C commenced from 40 to 60 cm below the ground surface. The soils were characterized as yellowish brown very fine sandy loam. Again, the contact between the strata was moderately vague. In unit 5 at 68 cm, a rodent hole filled with midden soils from the prior stratum was encountered. Stratum D was characterized by decomposing sandstone, boulders, and cobbles.

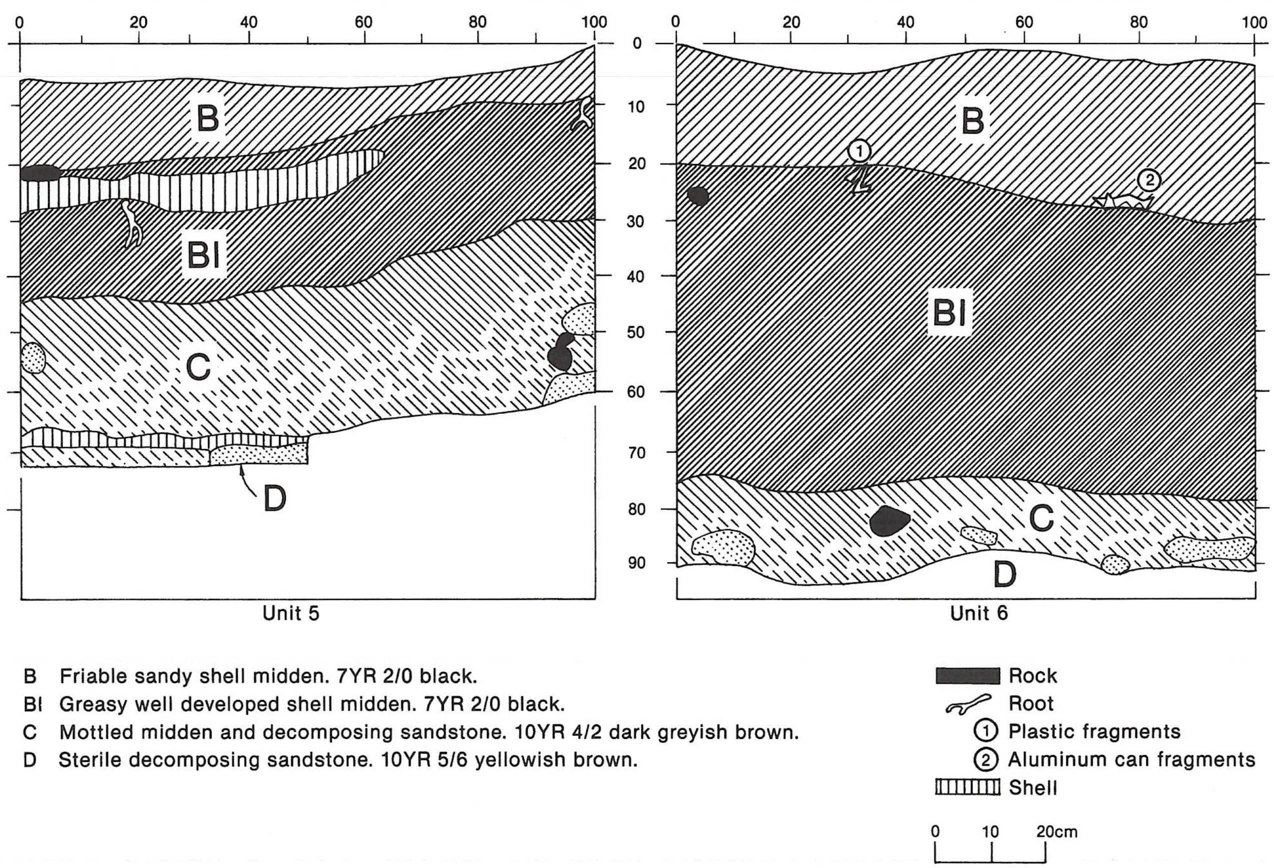
Although unit 6 generally conformed to the pattern of soil strata evident in the other units, more disturbance was apparent in the form of contemporary trash, with glass fragments found in the terminal level at 90 cm (fig. 4.2). Because this unit was the most southwesterly and beneath the toss zone of the bridge above and because active rodent disturbance was noted, down-mixing of small materials within the deposit can be attributed to rodent churning.

CA-SLO-1259

The midden deposit of CA-SLO-1259 was buried at depths of 0.9 to 1.7 m beneath an overburden that apparently had been cast over the side of the embankment during the ex-



Above, FIGURE 4.1 Profile of west wall, units 1 and 2, CA-SLO-175
Below, FIGURE 4.2 Profile of west wall, units 5 and 6, CA-SLO-175. *Illustrations by Rusty van Rossman*



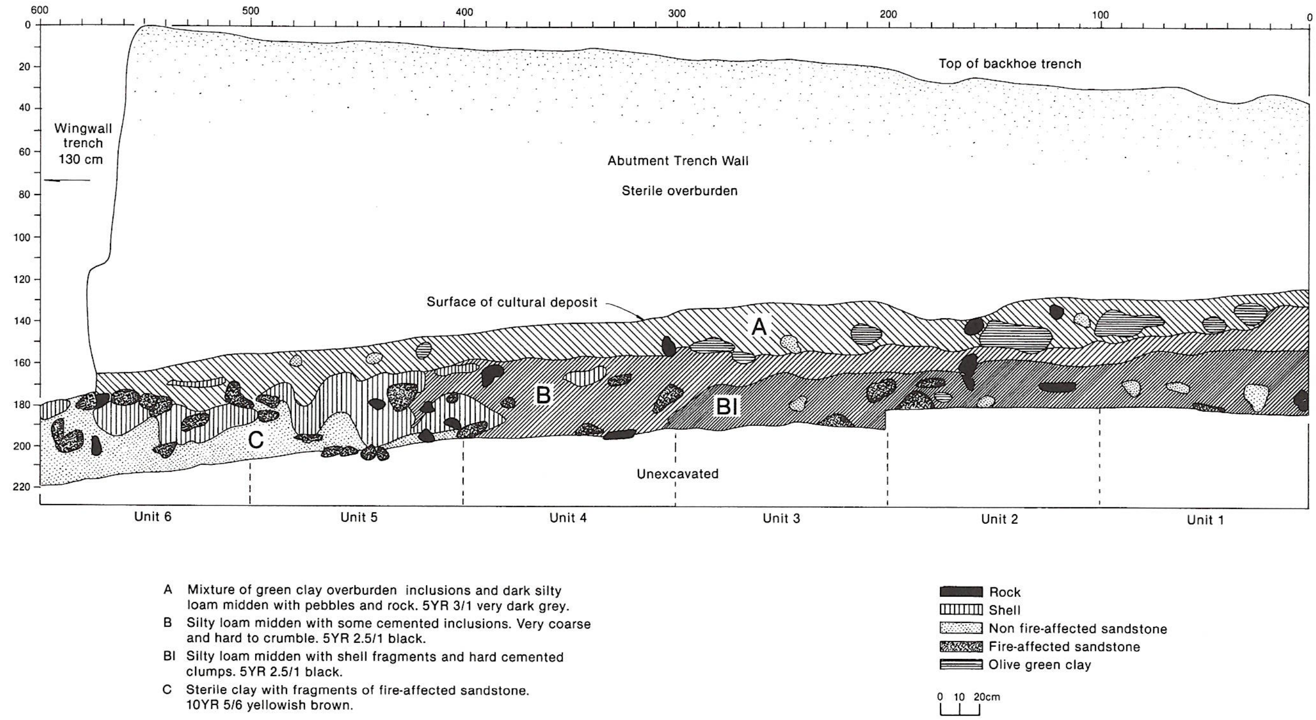


FIGURE 4.3 Profile of CA-SLO-1259 excavation. *Illustration by Rusty van Rossman*

tensive grading and contouring of the north/northeast side of Highway 1 in 1966. During the original construction of the bridge in 1930, clay soils had been trucked in and deposited on the southwest bank of the creek (California Department of Public Works 1932). The overburden was a mixture of soils including light brown sandy loam and green clays, the latter probably a remnant of soil deposited during the original bridge construction. Some contemporary trash from the earlier construction penetrated the midden to depths of 30 cm. Three main strata (A, B, and C; fig. 4.3) and one substratum (B1) were evident along the profile of the midden, although not necessarily in each unit. Particle-size estimates remained constant, with clay predominating at 45 to 55 percent, silt at 35 percent, and sand 10 to 15 percent.

Stratum A, which in all units extended down from the surface of the midden to depths of from 10 to 30 cm, was a mixture of dark, gray-brown sandy clay loam with surrounded inclusions of green clay that also were apparent in the overburden. Fractured pieces of sandstone, some of which were fire affected, and other rock, including granitics, chert, and quartzite, appeared throughout. In the upper 10 cm of all units, this stratum showed some elements or down-mixing of the overburden. The subhorizontal contact between A and B was moderately sharp.

Stratum B, as the context for the rock feature, contained a high concentration of stream and ocean cobbles and fire-affected sandstone associated with that feature (see "Features"). The medium compact and crumbly soils were a dark grayish-brown sandy loam with fewer clay inclusions than the previous stratum. In the southeastern units, commencing with unit 4 and increasing through units 5 and 6, inclusions of fragmented shell and shell lenses were discernible. Pockets or large clods of very dark brown soil were encountered that were permeated with organic carbon and were marked by small rootlet pores. Shell in small compact masses increased in volume in units 5 and 6 to 50 cm below the buried surface of the midden. In unit 4, stratum B was underlain by sterile indurated reddish-brown sandstone at a depth of 60 cm. The contact between B and C in units 5 and 6 was undulating and moderately sharp.

Stratum B1 essentially differed from the preceding stratum on the basis of greater moisture and more pronounced compaction. Appearing in units 1, 2, and 3 at 30 to 35 cm below the midden surface and extending down to 60 cm, this stratum had a vague contact with stratum B and directly overlay the sterile indurated sand and sandstone rock which characterizes the coastal formation.

Stratum C appeared only in units 5 and 6. These soils

Table 4.1 Weight of fire-affected rock at CA–SLO-175 (by unit)

Depth (cm)	*1*	2	3	4	5	6	*Totals*
0–10	*	0.0	0.0	3.2	0.0	*	3.2
10–20	*	0.0	0.0	5.4	*	*	5.4
20–30	4.5	6.8	*	15.4	40.5	41.3	108.5
30–40	62.2	92.1	102.6	84.4	25.9	10.0	377.2
40–50	23.6	25.0	22.1	37.1	23.8	10.0	141.6
50–60	0.0	0.0	14.1	15.9	0.0	0.0	30.0
Totals	90.3	123.9	138.8	161.4	90.2	61.3	665.9

Note: Weights are in kilograms; * = trace.

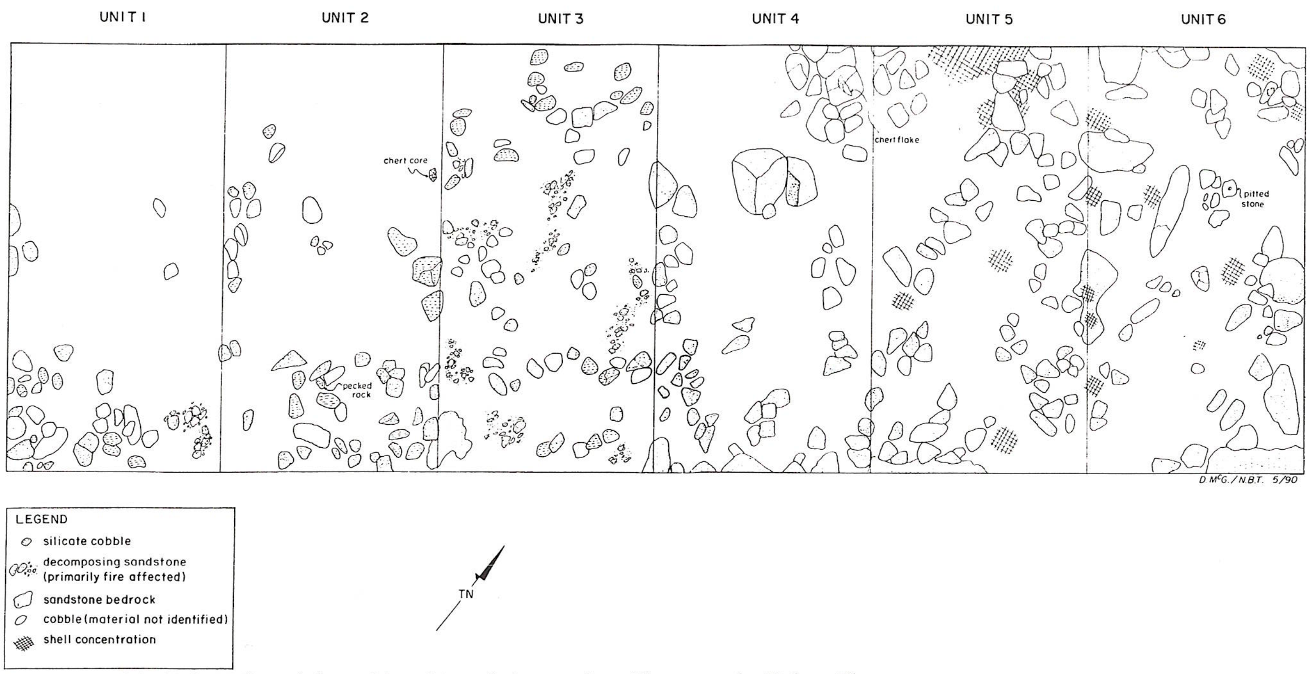


FIGURE 4.4 CA-SLO-1259 rock layer 20 to 30 cm below surface. *Illustration by Nelson Thompson*

were light yellowish to reddish brown, occurring within the crevices of the rock as the decomposing sterile product of the matrix of the sandstone. This stratum was compact.

Although a substantial amount of fire-affected rock was associated with the rock layer, fire-affected cobbles and sandstone were distributed throughout the midden (table 4.1).

FEATURES

Features at CA-SLO-175 include a bedrock milling complex occupying a portion of the rocky outcrop that extends from the northwest bank of the creek, a rock layer that underlies a large part of the area excavated in 1965–66, and all burials (see chapter 6) recovered during the 1965–66 seasons. A rock layer encountered at CA-SLO-1259 is the single feature at that site.

Bedrock milling complex

Located on a rock outcrop that extends south/southeast from the northwest bank of Little Pico Creek, the bedrock milling feature supports a total of thirty-four mortar cups. Recorded and mapped in 1986 (Waldron 1986), mortars are round (N=30) or oval (N=4) in shape. Diameters range from 11 to 33 cm with a mean of 16 cm and a standard deviation of 4.4; depth measurements range from 8 to 30 cm with a mean of 21 cm and a standard deviation of 6.2. The orientation and elevation of the outcrop provides a location that is protected from the northerly and westerly coastal winds.

Substantial stands of oaks are common to the interior valley floors (West and Sekkel 1968), at some distance from the coast, with more limited distribution in the sheltered canyons and stream environs of the Santa Lucia range to the east (Leonard et al. 1968) where coastal fog does not prevail. If the correlation of bedrock mortars to late prehistoric emphasis on the acorn as a subsistence mainstay extends to the feature at CA-SLO-175, the transport of acorns to the site is a matter for consideration. Parenthetically, of the fifty-nine sites identified in the survey of the Piedras Blancas ranch (West and Sekkel 1968), bedrock mortars were recorded for only six sites with a total of twenty-four cups for all sites and a maximum of nine at CA-SLO-349.

Rock layer

CA-SLO-175. One of the more intriguing aspects of the original fieldwork at Little Pico Creek was the identification of a so-called rock layer that appeared to lie under a large part of the site at depths of from 12 to 24 inches below ground surface (Abrams 1968a, b, c). This layer was described as a continuous "pavement" that stretched from the north/northeast southward, under the bridge (Abrams 1968c:15) in an increasingly dense deposit. This conformation was attributed to the "gradient" of the original slope of the aboriginal site. At the southern extremity, the layer was estimated to extend to depths of 30 to 36 inches with a thickness of at least a foot. The unconfirmed existence of two rock layers "in the south" was hypothesized with a depth of 42 inches for the lower layer (Abrams 1968c:15). This premise was probably based on the description of the units excavated by D. Johns at CA-SLO-175, where two rock layers were encountered "separated by a relatively sterile soil" (Leonard 1968:21), and by the existence of two layers at CA-SLO-179 (Leonard 1968).

Rocks within the layer were characterized as broken stream or ocean cobbles that were not derived from the underlying conglomerate (see also Weide and Susia 1968).

Table 4.2 Weight of fire-affected rock by type and unit at CA-SLO-1259

Unit	*Sandstone*	*Cobbles*	*Totals*
1	60.8	29.5	90.3
2	64.4	59.5	123.9
3	93.4	45.4	138.8
4	134.4	27.1	161.5
5	83.2	7.0	90.2
6	59.5	1.8	61.3
Totals	495.7	170.3	666.0

Note: Weights are in kilograms.

Matrix between the rocks consisted of midden and shell fragments; a stratum of impacted midden lay beneath the layer. While the layer consisted mainly of unmodified cobbles and fragments, a number of tools were recovered, including flaked stone, pestle and bowl fragments, net weights and anvils, and a single steatite arrow shaft straightener (Abrams 1968c:51).

Geographic and geologic investigations were conducted by Weide and Susia (1968) concurrently with the 1965 fieldwork. The basic conclusions of the study included results of analysis of "rock concentrations" at Little Pico. The sandstone, quartzite, and leucite-bearing volcanic (that is, probably rhyolite) components of those concentrations made up 49 percent of the specimens recovered. These materials were "imported" rock types that do not occur naturally on site, although sandstone was available from sea cliffs bordering the site. The authors report that few of that sample were considered "worked" in the formal sense, although they did not discount the possibility of use in cooking or food preparation activities of some sort.

During the 1989 fieldwork conducted on units under the bridge, substantial numbers of fire-affected rock fragments, primarily sandstone, were noted. These fragments were scattered throughout the deposit; no evidence of the rock layer was found at this locus.

CA-SLO-1259. On the south side of Little Pico Creek, a virtually continuous rock layer was encountered in all units (fig. 4.4). Commencing at the 20 cm level, this layer extended to depths of from 40 to 50 cm, with the densest concentration occurring between 30 to 40 cm. Components of this layer included whole and fragmented beach and stream cobbles, fire-affected sandstone, flaked stone tools, cores, and anvils or pitted stones. Fire-affected sandstone and fire-fractured cobbles were weighed for the rock layer in each unit (table 4.2). Midden soils that formed the matrix for this layer were highly indurated. In units 5 and 6, these soils were augmented by shell fragments of *Mytilus*, *Balanus*, and chiton, which occurred in pockets at 20 cm in the southeast corner and increased in quantity and distribution with depth to 40 cm. The basal sterile layer of decomposing, indurated conglomerate lay beneath the 40–50 cm level.

The existence of subsurface zones of large stones, or of "rock layers," has been recognized elsewhere, both in archaeological and physical contexts. At CA-SLO-186 at San Simeon Creek (Hines 1986), a similar feature was recorded at an almost identical depth. Several studies (Bocek 1986; Erlandson 1984) systematically have examined the nexus of rodent ecology and archaeological sites in a determination of the cause of subsurface and surface deposition of fire-affected rock, shell, and debitage into "horizons" or layers. Johnson (1989) has focused on "zones" of large stones with diameters >6–7 cm, which occur in gravelly soil on colluvial aprons in Santa Barbara County. According to these studies, Botta's pocket gopher (*Thomomys bottae*) has a major role in the organization of biomantles (Johnson 1989), or horizontal horizons (Bocek 1986), accounting for the distribution of small and large size stones in the soil deposit. Earlier, in analyzing the midden at CA-SLO-175, Weide and Susia (1968) had implicated the pocket gopher as a primary cause in the subsurface mixing of that deposit. According to the Bocek study, middens showing substantial gopher action have more abundant small materials (<3.5 cm) near the surface, with larger materials, particularly 5+ cm, displaced downward. The Johnson analysis showed that where subsurface stone zones occur in the presence of gopher action, the soils above and within the zones are homogeneous in the fine fraction, forming a biomantle. The gopher-churned soils contain only materials 6–7 cm on the long axis—a measurement limited by the diameter of a gopher burrow—with the larger stones gradually subsiding to form a zone or layer.

During the 1991 excavation at CA-SLO-179 at Pico Creek (Waugh 1992), a rock layer was encountered at approximately 70 to 80 cm below the ground surface, extending down to 90 cm in those units tentatively identified as the core of the site. Severe rodent action was noted both above and below the rock layer within midden soils whose pedological base matrix is aeolian sand deposited upon relic dunes. In one unit at approximately 10 to 20 cm beneath the rock layer, a military canteen cup was recovered. The deposition of the cup, together with the components of the rock layer, has been attributed to rodent action (Waugh 1992).

The implication for the rock layer features at CA-SLO-175 and CA-SLO-1259, with their high percentage of imported rock, is that these features are a result of both cultural action and rodent ecology. It does not appear to be a living surface but rather the site of discarded groundstone tools and possibly the remains of some cooking or fire-related activity whose larger components had been subsurficially redeposited as a result of rodent action. Of some consideration, though, is the deposition of burials (see chapter 6), where numerous interments were made in pits excavated through the rock layer. How these factors relate chronologically or functionally remains a matter for future investigation.

5

Chronology

RADIOCARBON DATING, obsidian hydration and source analyses, and typological analysis of temporally sensitive stone, shell, and bone artifacts have been used to date the occupations represented at CA-SLO-175 and -1259. In addition to the simple yet critical objective of defining the temporal parameters of the overall site habitation, chronometric analyses have been directed toward distinguishing temporally discrete components within the overall span of occupation.

CA-SLO-175

Dating of CA-SLO-175 has been accomplished with radiocarbon, obsidian hydration readings, and typological analysis of beads and ornaments that were recovered from both the excavations conducted by Abrams in 1965 and 1966 and those undertaken by Caltrans in 1989. Six radiocarbon dates have been obtained, two by Abrams (1968c:23) and four by Caltrans. Fifty-one obsidian specimens were subjected to hydration and source analysis, and 852 temporally sensitive beads and ornaments have been analyzed.

Radiocarbon

The six radiocarbon dates obtained from CA-SLO-175 range between 5020±80 and 690±80 radiocarbon years BP (table 5.1, appendix B). These dates have been corrected for secular variation in atmospheric ^{14}C and isotopic fractionation (table 5.2). The need for a correction of +410 years on marine shell specimens to offset the effect of $^{13}C/^{12}C$ fractionation has been discussed by Stuiver and Polach (1977). In evaluating dates on marine shell, it is important to consider the difference between ^{14}C in the atmosphere and in the ocean. Because of conflicting opinions on the magnitude of the necessary correction and divergent approaches to calibration, correction for this problem in data from coastal contexts has been troublesome. A recent study (Stuiver et al. 1986) clearly demonstrates that the apparently excessively old dates derived from marine shell may be due to the properties of the physical chemistry of ocean environments, properties far more complex than is generally appreciated by the archaeological community. A solution has been developed by these authors on the basis of a worldwide study of the ^{14}C content of ocean water. Two factors contribute to excessively old marine-shell dates: global discrepancies between atmospheric and oceanic ^{14}C content, and increased variance on a regional basis as a result of areally specific upwelling. Marine and atmospheric ^{14}C levels change through time (Stuiver et al. 1986:982), whereas regional variation is considered relatively constant. After the effects of isotopic fractionation are accounted for, corrections for a given shell-derived radiocarbon date must take both factors into consideration. The regional correction factor developed for the central California coast is -225±35 years, although this increases latitudinally to -390±25 years off the coast of Washington. Determination of the appropriate correction for global marine/atmospheric ^{14}C variance is accomplished through reference to a series of time-dependent age-correction factors that are accessed through the Stuiver and Reimer (1986) computer program. Based on dates obtained from shell/charcoal pairs and historic shells from the central coast T. Jones and D. Jones (1992) have revised the regional upwelling correction factor developed by Stuiver et al. (1986) to -325±35 years.

Because the Stuiver and Reimer (1986) calibration program, along with the -325±35 years correction factor, effectively corrects and calibrates most of the historic shell dates from central California, we have elected to use this program and correction factor to calibrate the dates from Little Pico Creek. When corrected for isotope fractionation and run through the program, the dates obtained from the portion of CA-SLO-175 excavated by Caltrans range between 3507 and 2780 BC (table 5.2). The shell date originally reported by Abrams (1968c: 23) from sample UCLA-1231 can now be recognized to date at circa AD 1527. The other date reported by Abrams from a sample of human bone collagen is changed to 1526 BC because of correction for isotopic fractionation and tree-ring calibration (table 5.2); however, the standard deviation associated with this date, ±600, is large, and the correlating 1 sigma probability spans from 2350 to 820 BC.

The corrected and calibrated radiocarbon dates exhibit strong temporal patterning. The four dates obtained by Caltrans (WSU-4100, -4101, -4102, and -4103) all fall be-

Table 5.1 Uncorrected radiocarbon dates from Little Pico Creek

Site	*Sample*	*Unit*	*Depth*	*Composition*	*Radiocarbon years* (BP)	*Uncorrected date*
CA-SLO-175	UCLA-1092	NW95NE15/burial 5	91 cm b. s.	Human bone collagen	3180±600	1230 BC
CA-SLO-175	UCLA-1231	NW65NE40/rock layer	30-61 cm b. s.	Shell *Haliotis rufescens*	690±80	AD 1260
CA-SLO-175	WSU-4100	3	30-40 cm b. s.	Shell *Haliotis rufescens*	4530±70	2580 BC
CA-SLO-175	WSU-4101	5	20-30 cm b. s.	Shell *Haliotis rufescens*	4430±60	2480 BC
CA-SLO-175	WSU-4102	5	50-60 cm b. s.	Shell *Haliotis rufescens*	5020±80	3070 BC
CA-SLO-175	WSU-4103	6	60-70 cm b. s.	Shell *Haliotis rufescens*	4880±110	2930 BC
CA-SLO-1259	WSU-4104	1	10-20 cm b. s.	*Hinnites giganteum*	2675±70	132 BC
CA-SLO-1259	Beta-36630	1	10-20 cm b. s.	*Haliotis rufescens*	710±65	AD 1260

Table 5.2 Calibrated and corrected radiocarbon dates from Little Pico Creek

Site	*Sample*	*Radiocarbon age*	*Isotopic fractionation correction*	*Marine shell correction(325+35) and calibration*	*1 sigma (68.3%) probability range*
CA-SLO-175	UCLA-1092	3180±600	3260±600	1526 BC	2350–820 BC
CA-SLO-175	UCLA-1231	690±80	1100±106	AD 1527	AD 1450–1660
CA-SLO-175	WSU-4100	4530±70	4940±99	2884 BC	3000–2830 BC
CA-SLO-175	WSU-4101	4430±60	4840±92	2835 BC 2796 BC 2780 BC	2883–2604 BC
CA-SLO-175	WSU-4102	5020±80	5430±106	3507 BC	3630–3360 BC
CA-SLO-175	WSU-4103	4880±110	5290±130	3344 BC	3500–3130 BC
CA-SLO-1259	WSU-4104	2675±70	3085±99	536 BC	710–440 BC
CA-SLO-1259	Beta-36630	710±65	710±65	AD 1955	AD 1854–1955

tween 2780 and 3507 BC, a span of fewer than 800 years. These dates show no meaningful superposition, but they do suggest strongly that the area of CA-SLO-175 excavated by Caltrans in 1989 represents a single component dating between 3500 and 2800 BC This time span falls within C. D. King's (1982) phase Ey (dating 3500–2500 BC). Sample UCLA-1231 can now be assigned to the Late Prehistoric/Protohistoric period circa AD 1527. Sample UCLA-1092, collected from burial 5, approximately 100 m north of the Caltrans excavation, suggests an interment at the beginning of the Middle period.

Obsidian hydration and source analyses

Obsidian source analysis was completed by Paul Bouey of Far Western Anthropological Research Group and hydration analysis by Thomas Origer of the Cultural Resources Facility, Sonoma State University. In 1968 Abrams reported 13 obsidian hydration readings, taken from 11 specimens by the University of California, Los Angeles Obsidian Hydration Laboratory. The current analysis has included recutting 10 of the original specimens, analysis of thirty additional samples, and source determination for all specimens. Of the total specimens analyzed, thirty-eight produced readable hydration bands, one specimen showed no band, and one registered diffuse hydration (table 5.3).

A problematic result of this analysis is the large discrepancy between the earlier hydration readings reported from UCLA and those performed for the present study. Deviations on single specimens range from 0.3 to 2.6 microns with a mean of 0.98 microns. This is a substantially greater discrepancy than the maximum 0.2 micron technician error proposed by Jackson (1984:108–113). This divergence can probably be attributed to inaccuracy in the readings made by the original technicians, who, at the time, were just beginning to conduct hydration analysis. Improvements in measuring techniques have been made since that time. This lack of correspondence suggests, however, that obsidian hydration should not be regarded as a highly precise chronometric technique.

The hydration results exhibit impressive clustering, with fourteen of sixteen (88%) of the Coso readings and sixteen of twenty (80%) Casa Diablo readings falling between 3.0 and 4.1 microns (fig. 5.1). Interpretation of the absolute temporal bracketing of these hydration spans, however, is complicated by differing opinions on the absolute hydration rates for obsidians represented in the CA-SLO-175 sample. Certainly the most thorough treatment of the central coast hydration interpretation problem has been provided by Bouey and Basgall (1991:48–56), who attempted to resolve the issue by developing central coast EHT (effective hydration temperature) corrections and applying those corrections to standardized curvilinear hydration rates developed for each of the obsidians that most commonly occur on the central coast: Napa, Casa Diablo, and Coso. These formulas subsequently were used to produce absolute calendric dates for obsidian specimens derived from central coast sites CA-MNT-101, -108, and -229. The resulting dates were then compared with those produced by radiocarbon assays from the same sites to evaluate the accuracy of the derived hydration rates. For Casa Diablo obsidian, a good match was evident between the hydration and radiocarbon derived dates from CA-MNT-108, but CA-MNT-229 data suggested that

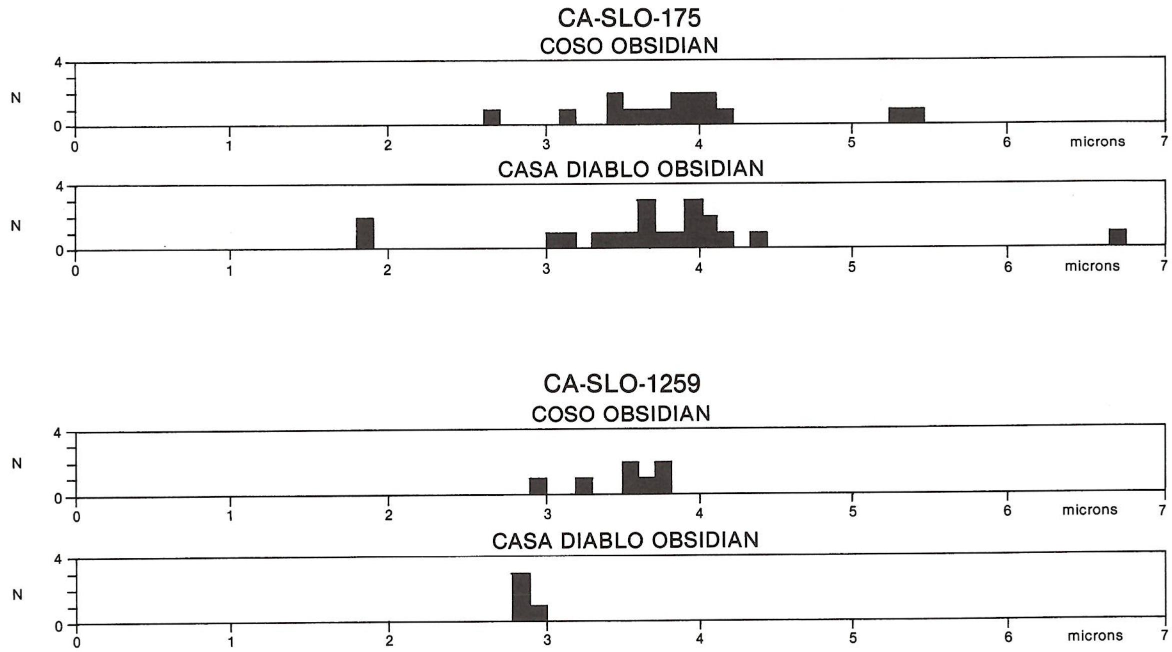


FIGURE 5.1 CA-SLO-175 and CA-SLO-1259 obsidian hydration readings. *Illustration by Rusty van Rossman*

the proposed hydration rate was too fast; findings from CA-MNT-101, however, suggested it was too slow. For Coso glass, a good match was found at CA-MNT-101 but not at CA-MNT-229, where the proposed rate again seemed too fast. Bouey and Basgall (1991:56) admittedly were puzzled by these findings but suggested that the most likely explanation was cultural: the Coso and Casa Diablo rates were accurate, but the more recent dating produced by Coso glass was the result of later arrival of this obsidian into what is now northern San Luis Obispo County, as part of a hypothetical increase in cultural influence from the south after circa AD 500. Using this argument as part of the general support for their absolute rates, Bouey and Basgall (1991:49) then applied the derived rates to hydration samples obtained from four sites from Piedras Blancas, the most significant of which is CA-SLO-267. We offer an alternative dating that we feel better reflects the available hydration and ^{14}C data from this region.

A number of problems arise in the application of a curvilinear or power function rate and EHT corrections to generate calendric dates. First, any curvilinear rate (or linear rate, for that matter) does not reflect nonlinear large-scale fluctuations in Holocene climate, which can be considered for hydration studies as the equivalent of secular variation in ^{14}C. Second, the EHT correction does not seem adequately to account for variability in the contemporary climate, in that results obtained from these calculations do not correspond well with vegetation patterns, which are generally considered to be good indices of climate. Coastal settings seem particularly troublesome in this regard. As a consequence, the calculated difference in EHT (Bouey and Basgall 1991:51) between Piedras Blancas (13.11°) and Monterey (14.89°) is greater than the difference between Monterey and Long Valley (14.35°), which lies at nearly 7000 feet in the eastern Sierra Nevada. Further, the Long Valley EHT is lower than that calculated for Monterey but higher than that for Piedras Blancas. Third, different EHT formulas developed and applied to the central coast produce substantially different dating results. The Lee (1969) formula used by Bouey and Basgall (1991:51) produces an EHT of 14.89° for Monterey, where the formula developed by Michels (1982) produces a value of only 11.49° (Dietz et al. 1988:136). When applied to Origer's (1987) calendric rate, these formulas yield different results; at CA-MNT-229 the former formula suggests that the main site occupation began circa 1000 BC (Bouey and Basgall 1991:54), whereas the latter dates it circa 600 BC (Dietz et al. 1988:136). Finally, and perhaps most significantly, absolute hydration rates cannot account for variability in the hydration band development in surface versus subsurface contexts. Clearly, hydration band development on the surface differs from that in subsurface settings. At this point, there is no way of determining the length of time that any given specimen has spent above ground.

Another problem bearing on the development and application of the Piedras Blancas hydration rates concerns the testing of the hydration-derived chronology with ^{14}C and hydration readings from CA-MNT-101, -108, and -229. Two difficulties are apparent here. Primarily, the archaeological samples available from CA-MNT-101 and -108 are simply too few for this application; the excavation volume from these sites is extremely small, as is the number of radiocarbon dates and hydration readings. The ^{14}C and hydration data for Napa and Casa Diablo obsidian available from CA-MNT-229 are much more substantial, and the corpus of data

Table 5.3 Obsidian hydration and sourcing results from Little Pico Creek

Site	*Specimen*	*Description*	*Provenience*	*1968 mean source*	*1990 mean hydration*	*Hydration*
CA-SLO-175	511-a	Proj. pt. frag.	–	Coso	–	NVB
CA-SLO-175	511-NW140	Flake	NW140NE0–4 46–61 cm	Casa Diablo	–	3.4
CA-SLO-175	511-b	Proj. pt. frag.	–	Coso	–	5.3
CA-SLO-175	484–546	Biface frag.	Surface	Casa Diablo	–	3.9
CA-SLO-175	484–574	Flake	Col. Sam. 30–40 cm	Coso	–	3.4
CA-SLO-175	511-B21a	Flake	Burial 21	Coso	–	4.1
CA-SLO-175	511-B37c	Biface frag.	Burial 37	Coso	–	5.2
CA-SLO-175	511-B126a	Flake	–	Coso	–	3.8
CA-SLO-175	511-126b	Flake	–	Casa Diablo	–	4.0
CA-SLO-175	511-SE20:6	Flake	SE20SW90 76–91 cm	Casa Diablo	–	3.3
CA-SLO-175	511-SE20:12	Flake	SE20SW90 168–183 cm	Casa Diablo	–	6.7
CA-SLO-175	511-SW200	Proj. pt.	200 SW	Coso	2.3	2.6
CA-SLO-175	511-87	Flake	–	Coso	–	4.0
CA-SLO-175	511-106	Flake	Test Pit A 0–10 cm	Casa Diablo	–	4.1
CA-SLO-175	511-198	Flake	NW80NE10 0–15 cm	Casa Diablo	–	3.6
CA-SLO-175	511-229	Flake	–	Casa Diablo	–	3.8
CA-SLO-175	511-250	Biface frag	NW85N15 15–30 cm	Casa Diablo	3.4	4.0
CA-SLO-175	511-311	Flake	NW80NE10 76–91 cm	Coso	–	3.9
CA-SLO-175	511-331	Flake	NW90NE15 15–30 cm	Casa Diablo	–	3.9
CA-SLO-175	511-338	Flake	NW120NE10 15–30 cm	Coso	–	3.9
CA-SLO-175	511-350	Proj. pt. frag.	NW120NE10 76–91 cm	Casa Diablo	2.7	3.6
CA-SLO-175	511-410	Flake	NW220NE0 30–46 cm	Coso	–	3.4
CA-SLO-175	511-442	Flake	NW220NE5 61–76 cm	Coso	2.0	3.1
CA-SLO-175	511-445	Flake	NW220NE5 76–91 cm	Casa Diablo	–	3.1
CA-SLO-175	511-453	Flake	NW25NE30 0–15 cm	Coso	1.4 2.5	4.0
CA-SLO-175	511-499	Flake	–	Casa Diablo	–	4.3
CA-SLO-175	511-539	Flake	NW100NE10 30–46 cm	Mono 2.6	1.8	3.4
CA-SLO-175	511-709	Flake	NW0SW90 30–76 cm	Casa Diablo	–	1.8
CA-SLO-175	511-777	Flake	NW220NE5 46–61 cm	Casa Diablo	3.4	3.9
CA-SLO-175	511-786	Flake	NW120NE10 46–61 cm	Coso	–	3.8
CA-SLO-175	511-826	Flake	NW95NE15 15–30 cm	Coso	–	3.5
CA-SLO-175	511-827	Flake	NW95NE15 15–30 cm	Casa Diablo	–	3.6
CA-SLO-175	511-834	Flake	NW100NE10 61–76 cm	Casa Diablo	3.4	3.7
CA-SLO-175	511-850	Flake	NW100NE10 46–61 cm	Casa Diablo	–	DH
CA-SLO-175	511-866	Flake	NW85NE15 76–91 cm	Napa	2.6	3.6
CA-SLO-175	511-879	Flake	NW90NE15 0–15 cm	Coso	–	3.7
CA-SLO-175	511-902	Flake	NW120NE10 91–107 cm	Casa Diablo	1.1	1.8
CA-SLO-175	511-908	Flake	NW160NE55 61–76 cm	Casa Diablo	–	3.5
CA-SLO-175	511-909	Flake	NW160NE55 61–76 cm	Coso	–	3.6
CA-SLO-175	511-913	Flake	NW80SW90 46–61 cm	Casa Diablo	–	3.0
CA-SLO-1259	Column sample	Flake	Unit 6 40–60	Coso	–	3.5
CA-SLO-1259	485-013	Flake	Unit 1 20–30	Coso	–	3.5
CA-SLO-1259	485-037	Flake	Unit 1 20–30	Casa Diablo	–	2.8
CA-SLO-1259	485-055	Flake	Unit 1 40–50	Coso	–	3.6
CA-SLO-1259	485-070	Flake	Unit 2 0–10	Coso	–	3.7
CA-SLO-1259	485-092	Flake	Unit 2 20–30	Casa Diablo	–	2.8
CA-SLO-1259	485-099	Flake	Unit 2 30–40	Coso	–	2.9
CA-SLO-1259	485-110	Flake	Unit 2 30–40	Coso	–	3.7
CA-SLO-1259	485-111	Flake	Unit 2 30–40	Casa Diablo	–	2.9
CA-SLO-1259	485-112	Flake	Unit 2 30–40	Casa Diablo	–	2.8
CA-SLO-1259	485-127	Biface	Unit 2 40–50	Coso	–	3.2

Note: Frag.=fragment; cm=centimeters; hydration readings are in microns.

available from that location should be weighed more heavily in evaluating hydration rates for the central coast (fig. 5.2). The Coso obsidian sample from CA-MNT-229, however, is inadequate. Moreover, the comparison of readings from all sites was based on peak reading frequencies, but there is no reason to expect that peaks should correspond. It seems more reasonable to compare spans of occupation suggested by clusters of hydration readings, rather than peaks.

A final problem involves the magnitude of the reservoir effect problem on radiocarbon assays from CA-MNT-229. When originally presented, these samples were not corrected for isotopic fractionation, and those composed of marine

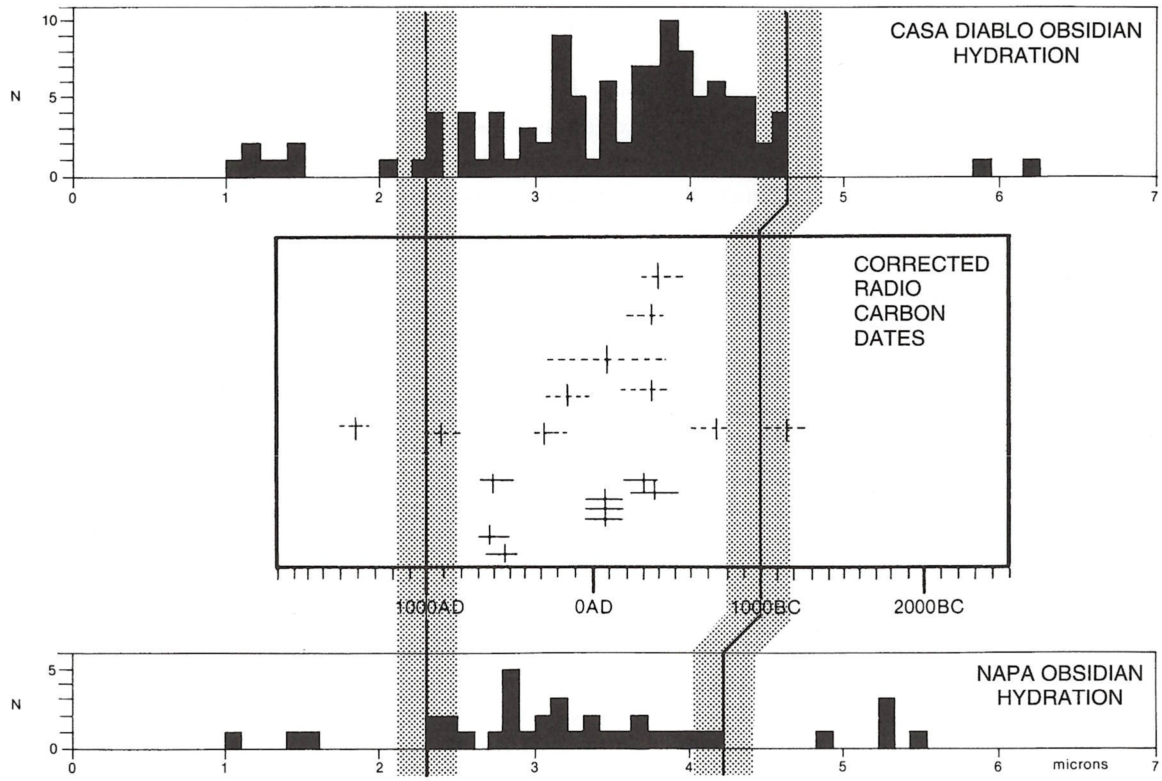


FIGURE 5.2 Obsidian hydration readings and calibrated radiocarbon dates from CA-MNT-229. *Illustration by Rusty van Rossman*

shell were subjected to a -400 year correction for upwelling. Corrected for isotopic fractionation and the Stuiver et al. (1986:995) marine shell correction with local upwelling figure of -350±35, years, the dating of the main occupation at CA-MNT-229 is circa 1000 BC–AD 1000 (T. Jones and D. Jones 1992). These figures differ only slightly from those offered in the original site report, where the beginning of the primary occupation was thought to date to circa 700–900 BC. Evidence for an earlier occupation between 4800 and 6400 BC was also present. Although the existence of this earlier component was discounted in the original report, it has now been recognized (D. Jones and Hildebrandt 1990; T. Jones and D. Jones 1992).

In the original site report on CA-MNT-229 (Dietz et al. 1988), the absolute hydration rate developed by Hall (1984) for Casa Diablo obsidian was applied to the hydration readings to approximate calendric dating in conjunction with the Michels (1982) EHT formula. This provided a dating of circa 100 BC–AD 1300 for the main occupation. Employing a more recent rate developed by Hall and Jackson (1989) with the Lee (1969) EHT correction formula, Bouey and Basgall (1991) date this same occupation circa AD 1–1300. Neither of these represent good correspondence with the time span suggested by the corrected radiocarbon dates. Conversely, application of Origer's (1987) rate to specimens of Napa glass, corrected with the Michels (1982) EHT figure, dates the main site occupation dates circa 600 BC–AD 1000. The Lee (1969) EHT formula provides dates of 1000 BC–AD 1100 for this span (Bouey and Basgall 1991:54).

In the original report on CA-MNT-229, four alternatives were explored as possible explanations for the discrepancies between dating obtained from Napa and Casa Diablo glass, and between Casa Diablo glass and radiocarbon at CA-MNT-229:

- The Napa rate was incorrect and should be modified to reflect the more recent dating suggested by Casa Diablo obsidian.
- The Casa Diablo rate is incorrect and should be altered to reflect the older dating suggested by radiocarbon and Napa glass.
- Both obsidian rates require adjustment.
- Both obsidian rates are correct and the difference in the dating that they provide reflects the later appearance of Casa Diablo obsidian into the Monterey Bay area.

The last-mentioned interpretation was preferred by Bouey and Basgall (1991:56) in explaining the evidently later dates provided by Coso obsidian at Piedras Blancas.

Ultimately, there is little justification for considering obsidian hydration as reliable and precise as radiocarbon dating. Although the latter is not without its own problems, more of the variability associated with ^{14}C dating can be controlled than with hydration dating. Rather than valuating the radiocarbon results relative to the hydration dating, we suggest that the CA-MNT-229 data are indicative of the relative dating of Napa and Casa Diablo obsidians in this

locality. The 2.3–4.5 micron span on Casa Diablo obsidian and the 2.3–4.1 micron span on Napa glass are both most likely representative of the Middle period dating indicated by the radiocarbon dates of circa 1000 BC–AD 1000. This application also provides a parsimonious explanation for the strong similarity in patterning of the hydration clusters among the two obsidians. Furthermore, association of these spans with this block of absolute time is confirmed at both CA-SCR-9 (Hylkema 1991:154–160), and CA-MNT-228 (Jones et al. 1992).

Assuming this correlation is accurate, further approximations of the relationships between calendric time and obsidian hydration on the central coast can be advanced. Most useful in this regard are the sizable chronometric data sets available from CA-MNT-391 (Cartier 1993a; T. Jones and Hylkema 1988:168–169), CA-MNT-170 (Dietz 1991), CA-MNT-73 (T. Jones 1994), and CA-SCL-65 (Fitzgerald 1991). Of lesser utility are hydration and ^{14}C data from CA-SCR-177 (Cartier 1993b), CA-MNT-101 (Dietz 1987), and CA-MNT-108 (Breschini and Haversat 1989). These latter locations are characterized by small chronometric samples and by occupational histories that on the basis of recovered shell beads are longer and more complex than available radiocarbon and hydration samples suggest. This problem is particularly acute at CA-MNT-108, where hydration readings span from 2.2 to 7.1 microns on Casa Diablo obsidian; yet, ^{14}C dates vary by no more than one thousand years (Breschini and Haversat 1989:74). Shell beads available from this location further indicate occupation of much longer duration (Early through Late) than that suggested by either radiocarbon or hydration alone (Breschini and Haversat 1989:79). Idealized hydration spans synthesized from available central coast obsidian and radiocarbon data are presented in fig. 5.3 and table 5.4.

Equation of the 2.3–4.5 micron span with the Middle period in turn suggests that the 17 Casa Diablo hydration readings from CA-SLO-175 spanning the 3.0–4.3 micron range are indicative of occupation within the earlier portion of period 1000 BC–AD 1000. Unfortunately, the paucity of Coso obsidian from CA-MNT-229 prevents a meaningful test of the proposed EHT-corrected rate for that obsidian. Observation suggests, albeit tentatively, that the thirteen hydration readings on Coso obsidian from CA-SLO-175 also indicate occupation between 1000 BC and AD 1000.

Shell artifacts

A total of 852 shell specimens—832 from the Abrams collection and twenty from the 1989 excavation—were classified as beads, ornaments, or fishhooks, based on identifications made by Dr. James A. Bennyhoff. Final conclusions on grave-lot dating are those of the primary authors, however. The beads and ornaments from CA-SLO-175 represent nine species: *Olivella biplicata*, *O. baetica*, *Haliotis rufescens*, *H. cracherodii*, *Haliotis sp.*, *Mytilus californianus*, *Megathura sp.*, *Dentalium sp.*, and *Tresus nuttallii*. With the exception of the *Dentalium*, which is found only on the northern coast, all of these species occur in the central coast nearshore environment. The beads and ornaments represent thirty-five discrete types, with two types of fishhooks and a single shell scraper. An additional five specimens are listed in the site catalog but are missing from the SLOCAS collection (511-117,-763, -867, SE20SW90/10, and B39b). Nomenclature for bead types follows Bennyhoff and Hughes (1987); ornament and fishhook nomenclature is drawn from Gifford (1947).

Beads and ornaments. These types and species are represented in the CA-SLO-175 collection (table 5.5).

A1 Simple Spire-lopped (100). Spire-lopped *Olivella* are nearly complete shells from which the spire has been removed perpendicular to the body axis. One hundred examples of this type were recovered (85 from the Abrams collection and 15 from the 1989 collection), representing three discrete size classes, based on maximum diameter:

A1a	Small	Diameter range = 3.0–6.5 mm	N=42
A1b	Medium	Diameter range = 6.51–9.5 mm	N=15
A1c	Large	Diameter range = 9.51–14.0 mm	N=43

Measurements are presented in tables A.1 and A.2, and examples of the small and large variants are illustrated in figure 5.4a–c. Spire-lopped beads are temporally and spatially ubiquitous. They were relatively abundant at CA-SLO-267 (Bouey and Basgall 1991:59), -186, -187, and -383 (Gibson 1986:124).

A2 Oblique Spire-lopped (2). This type differs from the Simple Spire-lopped in having half of the spire ground off diagonally. Bennyhoff and Hughes (1987:119) attribute this type to the Early period (dating either pre-1300 BC [scheme A2] or pre-500 BC [scheme B1]). C. D. King (1982:56, 192) cautiously ascribes this type to his phases M1 and M2a-b on the south coast, although he considers them most common during M2a. C. D. King (1990:28) dates phase M1 600–200 BC; M2a: 200 BC–AD 200, and M2b: AD 200–400.

A2a Small Oblique Spire-lopped (1). Only a single example was recovered (511-1966-B14o), in association with burial 14 (table A.3; fig. 5.4d). Specimens similar to the CA-SLO-175 examples have been reported from nearby CA-SLO-187, where they were linked to the period circa 1500–200 BC (Gibson 1986:126).

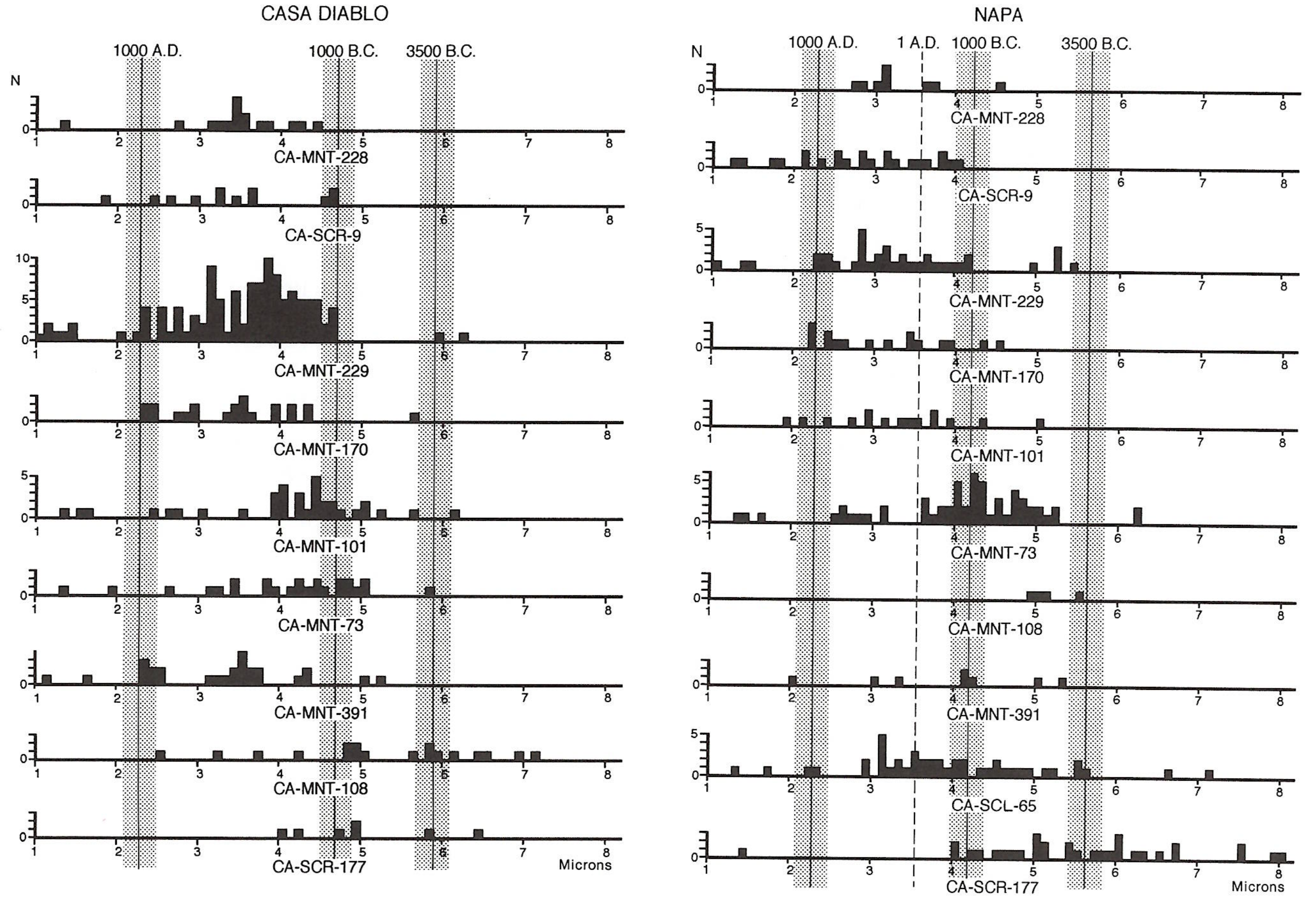


FIGURE 5.3 Proposed calendric age correlation for central coast obsidian hydration spans. *Illustration by Rusty van Rossman*

Table 5.4 Radiocarbon and obsidian hydration spans for the central California coast: data and synthesis

Site	*Radiocarbon* span*	*Hydration spans*	
		Napa obsidian	*Casa Diablo obsidian*
CA-SCR-9	960 BC–AD 808	2.1–4.0	2.4–4.6
CA-MNT-228	AD 100–AD 800	2.7–3.7	2.7–4.4
CA-MNT-229	1000 BC–AD 1000	2.3–4.1	2.3–4.5
CA-MNT-391**	3000 BC*–AD 26*	2.3–5.3	2.3–5.2
CA-MNT-170**	4300 BC*–AD 1000	2.2–4.5	2.4–5.7
CA-SCL-65	5400 BC–Contact	1.5–7.2	
CA-SCR-177**	8000 BC–3000 BC	4.0–8.0	4.0–6.4

Idealized hydration spans synthesized from above data

Radiocarbon span*	*Hydration spans*	
	Napa obsidian	*Casa Diablo obsidian*
AD 1000–1769	0.9–2.4	1.0–2.4
1000 BC–AD 1000	2.0–4.3	2.0–4.8
3500 BC–1000 BC	3.9–5.9	4.4–6.2
Pre 3500–BC	≥5.3	≥5.6

* Based upon recalibration of ^{14}C dates via Stuiver and Reimer (1986) with Delta R value of 325+35 years.

** Later occupation of this site is evident, but obsidian hydration appears to correlate only with the earlier components.

A2c Large Oblique Spire-lopped (1). A single example of this large variant was recovered from the 10–20 cm level of unit 1. Its assignment to the large subtype is based on a maximum diameter of 12.4 mm (table A.3; fig. 5.4e).

A5c Large Appliqué Spire-lopped (1). A single example of this type, specimen 511-NW88NE36-52.06, was recovered from a depth of 80 cm in unit NW88NE36 (table A.4; fig. 5.4f). In addition to spire removal, Spire-lopped appliqué beads have been ground flat on the aperture side. As with specimens reported elsewhere, the example from CA-SLO-175 retains asphaltum on both its interior and exterior, indicating its use with appliqué. A small fragment of an abalone (*Haliotis sp.*) sequin is embedded within the asphaltum, along with a single G1 Tiny Saucer. The temporal significance of this type on the central coast is somewhat unclear, in that Appliqué Spire-lopped beads are definitively associated with the Protohistoric/Historic period in the San Joaquin Valley, but this same type was reported from an Early context at San Nicholas Island (Bennyhoff and Hughes 1987:119). A single side-ground *Olivella* was reported from nearby CA-SLO-157 (Reinman 1961:19), which apparently was occupied during both the Middle and Protohistoric periods. Bennyhoff and Hughes (1987:119) prefer this later dating.

Table 5.5 Shell bead and ornament types from CA-SLO-175

	Type	N	Description	Reference
OLIVELLA BIPLICATA				
	A1a	42	Small Spire-lopped	Bennyhoff and Hughes 1987:117
	A1b	15 [4]	Medium Spire-lopped	Bennyhoff and Hughes 1987:118
	A1c	43 [11]	Large Spire-lopped	Bennyhoff and Hughes 1987:119
	A2a	1	Small Oblique Spire-lopped	Bennyhoff and Hughes 1987:119
	A2c	[1]	Large Oblique Spire-lopped	Bennyhoff and Hughes 1987:119
	A5c	1	Large Applique Spire-lopped	Bennyhoff and Hughes 1987:119
	B2a	65	Small End-ground	Bennyhoff and Hughes 1987:119
	B2b	2 [1]	Medium End-ground	Bennyhoff and Hughes 1987:122
	B2c	[1]	Large End-ground	Bennyhoff and Hughes 1987:122
	B3a	2	Small Barrel	Bennyhoff and Hughes 1987:122
	B3b	2	Medium Barrel	Bennyhoff and Hughes 1987:122
	B3c	1	Large Barrel	Bennyhoff and Hughes 1987:122
	B5c	1	Large Spire	Bennyhoff and Hughes 1987:122
	E3a	1	Full Large-lipped	Bennyhoff and Hughes 1987:132
	G1	630 [1]	Tiny Saucer	Bennyhoff and Hughes 1987:132
	G2b	1	Large Saucer	Bennyhoff and Hughes 1987:132
	G6a	2	Symmetrical Irregular Saucer	Bennyhoff and Hughes 1987:134
	G6b	2	Asymmetrical Irregular Saucer	Bennyhoff and Hughes 1987:134
	G6c	1	Oval Irregular Saucer	Bennyhoff and Hughes 1987:137
	K1	1	Cupped	Bennyhoff and Hughes 1987:137
	K/E	1	Cupped/Lipped	James Bennyhoff, personal communication
OLIVELLA BAETICA				
	O.1a	[1]	Drilled *Olivella baetica*	
HALIOTIS				
	cCA1j	1	Unperforated Large Disk *H. cracherodii*	
	uCA2j	1	Perforated Large Disk *Haliotis sp.*	
	J2aIV	1	Artificial Shell Ring	Gifford 1947:13
	J2bI	1	Artificial Shell Ring with Incised Edges *H. rufescens*	Gifford 1947:71
HALIOTIS				
	J2bII	2	Artificial Shell Ring with Incised Edges *Haliotis sp.*	Gifford 1947:71
		2	Sequin	
		1	Ornament	
		1	Small Disk Bead	King 1990:237
MEGATHURA				
	H2aI	3	Plain Ring	Gifford 1947:11
	H2aIII	17	Flat-ended Ring	Gifford 1947:11
HINNITES				
	D2b	1	Perforated Whole Shell	Gifford 1947:8
LITTORINA				
	F7	1	Spire-lopped	Gifford 1947:9
DENTALIUM				
		1	Section	

[ ]= number of total derived from 1989 Caltrans excavation.

B2 End-ground (68). Class B2 beads were modified by removal of both the spire and base or aperture end by grinding or chipping. Maximum diameter is toward the spire. The same size criteria are used to define subtypes as those used for class A (table A.5).

B2a Small End-ground (65). Twenty-six of the Small (less than 6.51 mm in diameter) variant were recovered in association with burial 12, with the remainder associated with burial 14 (table A.5). Bennyhoff and Hughes (1987:121) state that this type is most common during the Early period

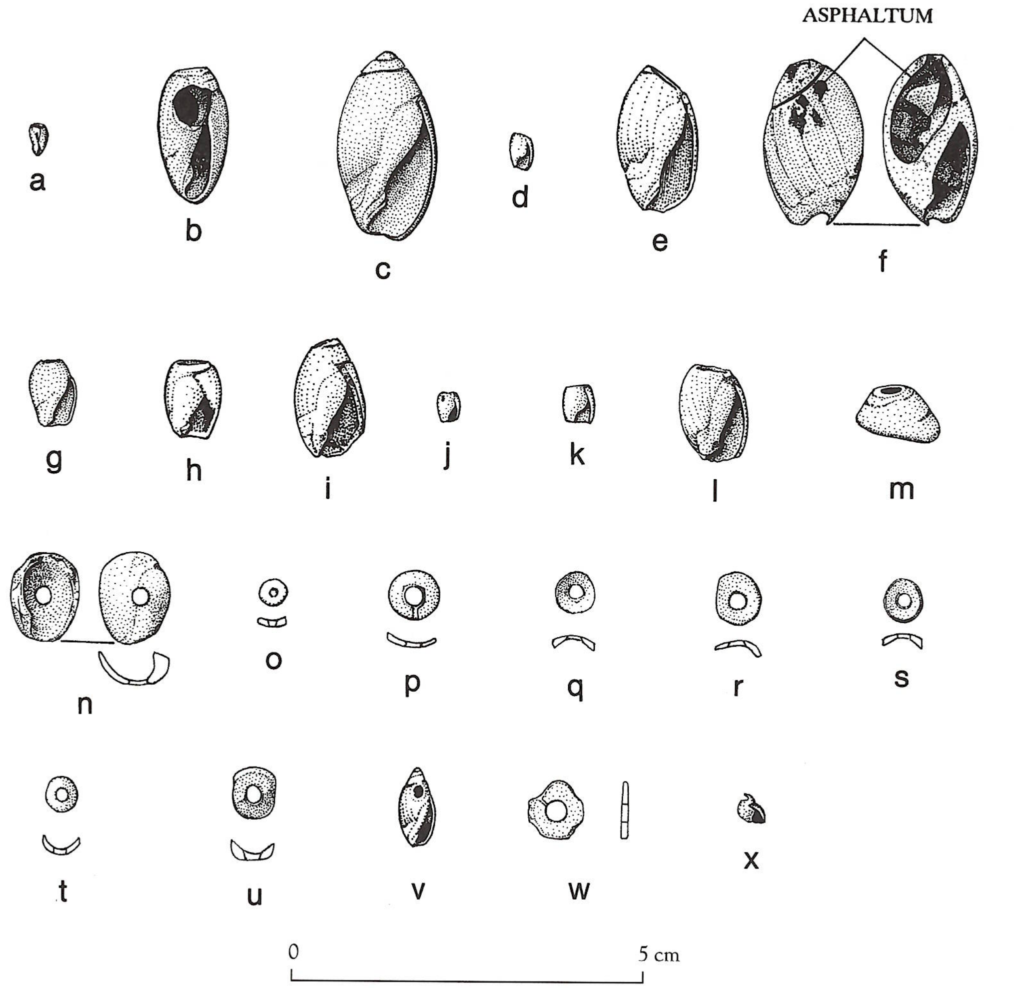


FIGURE 5.4 *Olivella* shell beads from CA-SLO-175: *a*, 511-1966 B14a; *b*, 511-145; *c*, 511-SE20SW90/9; *d*, 511-1966 B14o; *e*, 484-128; *f*, 511-NW88NE36-52.06; *g*, 511-1966 B7c; *h*, 484-148; *i*, 484-302; *j*, 511-1966 B12d; *k*, 511-SE20SW90/10; *l*, 511-SE20SW90-10(2); *m*, 511-520; *n*, 511-460; *o*, 484-115; *p*, 511-851; *q*, 511-1966 B7a; *r*, 511-422; *s*, 511-1966 B7b; *t*, 511-1966 B7b; *u*, 511-905; *v*, 484-577; *w*, —; *x*, 511-1966 B12d. *Drawing by Tammara Ekness-Hoyle*

and during phase 1 of the Late period. C. D. King (1982:174, 1990:28) suggests that on the south coast these beads were common during his phases Ey (4500–3500 BC) and Ez (3500–1400 BC) and were rarely used later. Five examples of the type were reported by Gibson (1988b: 66) from nearby CA-SLO-877.

B2b Medium End-ground (2). One example of a Medium End-ground type (511-1966-B7c) was recovered (table A.5; fig. 5.4h, g) in association with burial 7, and another was found in unit 1 at a depth of 20 to 30 cm. Bennyhoff and Hughes (1987:122) equate this type with both the Early and Late periods. C. D. King (1982:352) limits the span of their occurrence to three discrete periods on the south coast: Ey-M1 (4500 BC–800 BC), M3 (AD 300–700), and M5b-L1a (AD 1000–1250). Examples of this type have been reported from CA-MNT-391 (Gibson 1988a:5) in an apparent pre-AD 100 context.

B2c Large End-ground (1). One large variant (diameter of 11.1 mm) (table A.5; fig. 5.4i) was recovered from unit 3 from the 30–40 cm level. Dating for this subtype is comparable to that proposed for the smaller variants.

B3 Barrel (5). Barrel beads are characterized by removal of the spire and extensive end grinding, which together resulted in a bead with maximum diameter in the middle. They are known almost exclusively from the south coast, where they occur from the Early period through the Protohistoric (Bennyhoff and Hughes 1987:122); however, C. D. King (1982:362) considers them most common during phase Ey-M1 (4500–800 BC).

B3a Small Barrel (2). Two *Olivella* Barrel beads with maximum diameters less than 6.51 mm were recovered: one in association with burial 7, the other (511-SE20SW90/10) from the 137–152 cm level of unit SE20/SW90 (table A.6; fig. 5.4j, k). Three examples of this type were reported from nearby CA-SLO-353 (Gibson 1986:126), one was reported from CA-MNT-229 (Dietz et al. 1988:228), and two from CA-MNT-185/H (Schwaderer 1989:141).

B3b Medium Barrel (2). Two Barrel beads—specimens 511-357 from unit NW120NE10 (76–91 cm) and 511-810 from

unit NW160NE55 (46–61 cm)—with maximum diameters in the 6.51–9.5 mm range were recovered (table A.6). Examples of this type have been reported from CA-SCR-93 (Bennyhoff 1988b:46), CA-SLO-187 (Gibson 1986:126), and CA-MNT-229 (Dietz et al. 1988:228).

B3c Large Barrel (1). A single Large Barrel *Olivella* bead, 511-SE20SW90/10[2], was recovered from a depth of 137–152 cm in unit SE20SW90 (table A.6, fig. 5.4l).

B5 Spire (1). Spire beads consist simply of the spire portion of the *Olivella* shell only. This type has not yet been reported from central California. On the south coast, Spire beads were common late in C. D. King's (1982) Middle period. They continued in use until contact. The single example from CA-SLO-175 (511-520) represents the large variant (B5c), with a diameter of 12.1 mm. This specimen was recovered from unit NW95NE15, from a depth of 46 to 61 cm (table A.6; fig. 5.4m).

E3 Large-lipped (1). This bead was manufactured from the callus and wall of the *Olivella* shell. They are generally oval in outline with a central perforation and large in dimension (Bennyhoff and Hughes 1987:129). This type occurs most commonly during the Historic period, although its initial appearance may be as early as AD 1300 (Arnold 1987). The single example represents the variant E3a, Full Large-lipped, which is essentially a large version of type E2a (Thick-lipped). It is characterized by a significant portion of callus on the exterior, with a top that is flared or scoop-like. Similar specimens have been reported from CA-SLO-186 (Gibson 1986:128). The CA-SLO-175 example, 511-460, came from the 0–15 cm level of unit NW25NE30 (table A.7; fig. 5.4n).

G Saucer (636). Saucers are circular beads manufactured from the wall of the *Olivella* shell, with a central perforation generally drilled from the ventral surface. Bennyhoff and Hughes (1987:132) defined six variants, largely on the basis of size. Tiny saucers (G1) have diameters less than or equal to 5.0 mm and are temporally and spatially ubiquitous. The remaining subtypes are hallmarks of the Middle period in central California. On the south coast, saucers of varying sizes persisted in decreased frequency into the Late period (C. D. King 1982:208, 353, 360; Gibson 1986:127).

G1 Tiny Saucer (630). Tiny Saucers are extremely small, circular beads with precisely ground edges (Bennyhoff and Hughes 1987:132). Most examples of this subtype (536) were recovered in the neck region of burial 14 (511-1966-B14p). A single specimen (511-1966-B39a) was recovered in association with burial 39, and one was found in Caltrans unit 1 in the 0 to 10 cm level (484-115) (table A.8; fig. 5.4o).

Table 5.6 Appliquéd asphaltum plugs from CA-SLO-175

Specimen	*Unit*	*Depth (cm)*	*N (G1)*	*Other associations*
511-868a	NW85NE15	76-91	23	*Haliotis* sequin (511-868c), burial 3
511-869a	NW85NE15	76-91	11	*Haliotis* ring (511-069c), burial 3
511-1003a	NW85NE15	76-91	16	*Haliotis* ring (511-1003c), burial 3
511-1005a	NW95NE15	101	24	*Haliotis* ornament (511-1005c), burial 5
511-1966-B15	NW150NE10	104	18	*Haliotis* sequin, burial 15

The remaining ninety-two were appliquéd on asphaltum plugs (table 5.6). Tiny saucers have been reported from CA-SLO-7 (Gibson 1988c:111), CA-SLO-267 (Bouey and Basgall 1991:61), CA-MNT-391 (Gibson 1986:6), CA-SLO-99 (Bennyhoff 1988a:29), CA-MNT-185/H (Schwaderer 1989:142), and CA-SLO-187 (Gibson 1986 et al.:127).

G2b Large Normal Saucer (1). A single representative of this type (511-851) was recovered from the 46–61 cm level of unit NW100NE10 (table A.8; fig. 5.4p). Normal Saucers are circular and shallow with small perforations. The large class ranges from 7.1 to 10.0 mm in diameter. It was most common in phases M1–5b (1400 BC–AD 1050) in the Santa Barbara Channel (C. D. King 1990:28, 237). Large Saucers have also been reported from CA-MNT-185/H (Schwaderer 1989:142), CA-MNT-229 (Dietz et al. 1988:229), and CA-MER-S94 (Olsen and Payen 1968:fig. 8).

G6 Irregular Saucer (5). Irregular Saucers are shallow, centrally perforated beads which are most often asymmetrical (Bennyhoff and Hughes 1987:133). Unlike Normal Saucers, a lack of standardization in size and configuration indicates that each bead was ground individually, and as a result, edge finish is less precise than that exhibited on Normal Saucers. Lack of attention to finish, as well as common off-center perforation are considered indications of less time expended during manufacture (Bennyhoff and Hughes 1987:134).

G6a Symmetrical Irregular Saucer (2). This variant of the Irregular Saucer, characterized by equal length and width (Bennyhoff and Hughes 1987:134), is represented by two examples (both identified as specimen 511-B7b), both recovered in association with burial 7 (table A.8; fig. 5.4q). Similar examples have been reported from CA-MNT-101 (Dietz 1987:142), CA-MNT-112 (Dietz and Jackson 1981:134), and CA-SCR-93 (Bennyhoff 1988b:50). CA-MNT-101 and -298 are thought to represent major

manufacturing centers for G6 saucers (Bennyhoff 1988b:50). All of these contexts are consistent with Middle period temporal parameters.

G6b Asymmetrical Irregular Saucer (2). Represented by two examples, this subtype is characterized by an oval outline, with length greater than width. Specimen 511-422 was found in unit NW220NE0 at a depth of 76 to 91 cm. Specimen 511-1966-B7c was part of the burial 7 grave lot (table A.8; fig. 5.4r). Similar examples have been reported from CA-MNT-101 (Dietz 1987:142), CA-MNT-115 (Dietz and Jackson 1981:464), CA-SCR-93 (Bennyhoff 1988b:50), and CA-MNT-229 (Dietz et al. 1988:231). With the exception of CA-MNT-116, all of these sites are dominated by Middle period components.

G6c Oval Irregular Saucer. This subtype is defined by length exceeding width by at least 0.3 mm (Bennyhoff and Hughes 1987:134). The single example was found as part of the burial 7 grave lot (table A.8; fig. 5.4s). Others have been reported from CA-MNT-229 (Dietz et al. 1988:231) and CA-MNT-101 (Dietz 1987:142).

K Callus (2). This class consists of small, thick, round beads made from the callus portion of the *Olivella* shell. Use of this portion leads to greater bead thickness.

K1 Cupped (1). This subtype is small (3.0–7.0 mm) in diameter and thick (2.0–3.0 mm), with a central perforation. The single example (511-1966-B7b) was recovered in association with burial 7 (table A.9; fig. 5.4t). Bennyhoff and Hughes (1987:137) consider this type to be on the central coast a reliable marker of phase 1 of the Late period. In the Sacramento/San Joaquin Valley, Cupped beads were replaced by Lipped beads during the Protohistoric period, persisting through to historic contact (C. D. King 1990:239). Bennyhoff (1988a:29) reported five examples of this type from CA-SLO-99, which he equated, on the basis of depth, with Late Prehistoric occupation (AD 1150–1500). Additional examples have been reported from CA-SLO-267 (Bouey and Basgall 1991:60), CA-SLO-7 and -8 (Gibson 1988c) and CA-SLO-186 and -187 (Gibson 1986:127), where dating of the type was correlated with the Santa Barbara Channel (for example, Late period phases 1 and 2 inclusive).

K1/E Cupped/Lipped (1). Class E Lipped beads developed out of the earlier Cupped (K) through enlargement. The K/E variant represents the transition from one size mode to the next. Specimen 511-905 was recovered from unit NW120NE10 from a depth of 0 to 15 cm (table A.9; fig. 5.4u). Dating of this type corresponds with its transitional morphology; it represents the early Protohistoric period circa AD 1500–1600. The shallow depth of this object is consistent with its relatively recent dating. A similar specimen has been reported from CA-MNT-376 (Jones 1994).

O.1a Olivella baetica *Drilled Whole Shell (1)*. A single example of a drilled *Olivella baetica* shell was recovered from the 10–20 cm level of unit 4 (table A.10; fig. 5.4v). It retains a drilled perforation on one side. In southern California, drilled whole *Olivella* are generally considered markers of phase 1 of the Late period (AD 1150–1500) (C. D. King 1990:28).

Haliotis *Disk Bead (1)*. Although not assigned a catalog number, a single *Haliotis* disk bead is included in the CA-SLO-175 collection and was reported by Abrams (1968a:25) (table A.11; fig. 5.4w). It is circular and flat, and was manufactured from the nacreous part of the shell. C. D. King equates this type with his phases M2b-M3 (200 BC–AD 700).

cCA1j Haliotis *Disk Ornament*. Specimen 511-1966-B14e is 30.2 mm in diameter and unperforated (table A.11). Manufactured from *H. cracherodii*, this ornament retains a smear of asphaltum on its dorsal side. It was cemented to whistle 511-1966-B14b as part of the burial 14 grave lot (fig. 9.6).

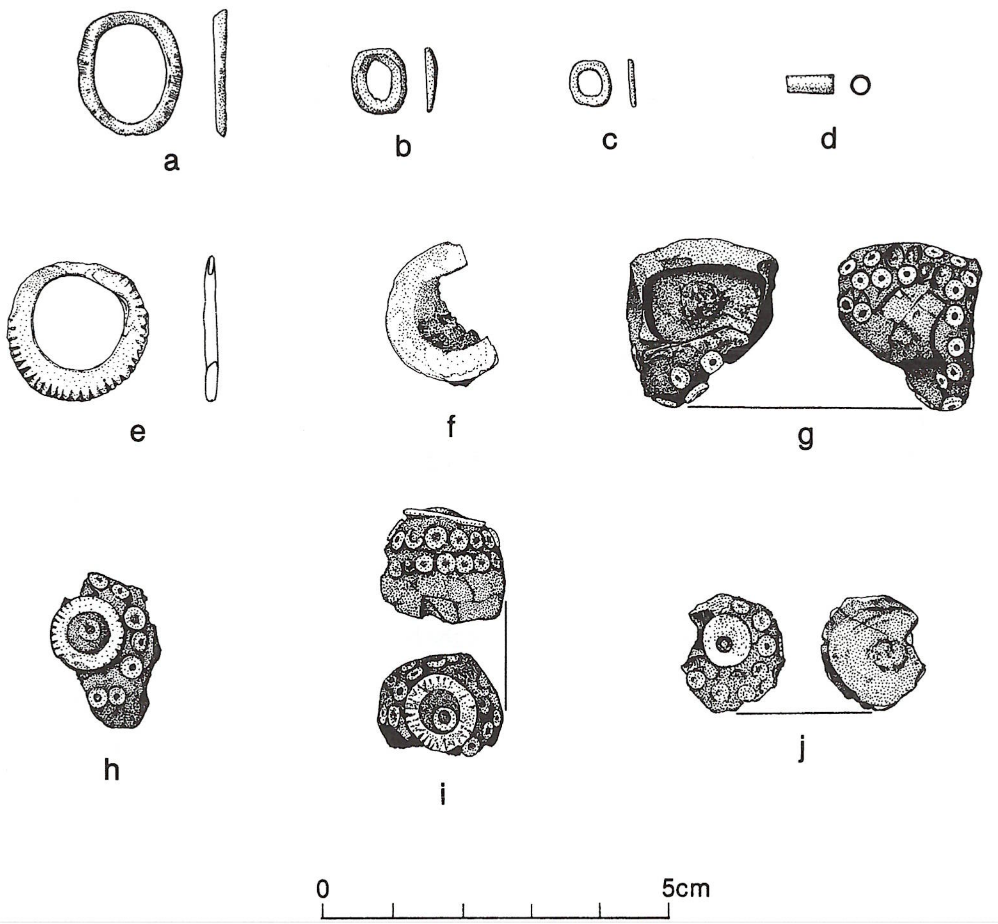
uCA2j Perforated Haliotis *Disk*. Specimen 511-1966-B14j was cemented to the bone whistle with the same catalog number (table A.11; fig. 9.7). Manufactured from the nacreous portion of the abalone shell, the disk is centrally perforated, with a smear of asphaltum plugging the hole. The dorsal surface has been ground. The round outline of this object and its single perforation are suggestive of the Middle period. This artifact was also part of the burial 14 grave lot.

J Artificial Shell Ring (4). This class consists of shell rings cut from the wall of a shell, not including any natural edge. Rings are distinguished from beads by the large size of their perforations (Gifford 1947:13).

J2bI Artificial Shell Ring with Incised Edges. Haliotis rufescens *(1)*. This ring, specimen 511-871, was recovered from the 91–107 cm level of unit NW85NE15 (table A.11, fig. 5.5e) immediately beneath burial 3, suggesting that it was most likely a grave item. While such an association was not noted by the original excavators, several similar items were found with the interment. Serrations occur along three-fourths of the outer edge of the ring. This specimen seems most similar to artifacts that C. D. King (1990:251) assigns to the M2b/M3 transition (circa AD 300).

J2bII Artificial Shell Ring with Incised Edges. Haliotis sp. *(3)*. Three examples of this type were recovered, all as part of appliqué on asphaltum plugs (see table 5.6). Specimen 511-

FIGURE 5.5 Shell artifacts from CA-SLO-175: *a*, 511-1966 B14n; *b*, 511-1966 B7d; *c*, 511-1966B7d; *d*, 511-146; *e*, 511-871; *f*, 511-1005; *g*, 511-868a; *h*, 511-1003a; *i*, 511-869c; *k*, 511-1966 B15. *Drawing by Tammara Ekness-Hoyle*



869c was arranged on a solid plug with 11 Tiny Saucers, in association with burial 3 (table A.12, fig. 5.5f). Specimen 1003c, similarly was cemented on to a solid asphaltum plug, together with 16 Tiny Saucers, and was included among the burial 3 grave items (table A.12; fig. 5.5h). Specimen 511-1005c was associated with burial 5. It resembles 511-871 in retaining minor serrations (table A.12; fig. 5.5f). It apparently was attached to asphaltum plug 511-1005a.

J2aIV Artificial Shell Ring (1). One example of an abalone shell ring without incising, specimen 511-1966-B15b, was also recovered (table A.12). Relatively small (diameter = 7.6 mm), this ring was attached to a hollow asphaltum plug, along with 18 Tiny Saucers (fig. 5.5j), that was associated with burial 15.

Haliotis *sequin (2)*. A tiny fragment of a *Haliotis* shell, presumed to be a sequin (511-868c), was embedded within asphaltum plug 511-868a, along with 23 Tiny Saucers (table 5.6, A30; fig. 5.5g). This object was also associated with burial 3. A sequin was also attached to asphaltum on specimen 511-NW88NE36-52.06.

H2aIII Flat-ended Ring (17). Seventeen Flat-ended rings were recovered. Abrams (1968c:69) reported all 17 as associated with burial 7; however, the collection catalog lists one of these, 511-1966-B13e, as occurring with burial 13 (table A.13; fig. 5.5b,c). All of these examples have been manufactured from *Megathura* and are cataloged under number 511-1966-B7a. C. D. King (1982:375) depicts similar examples used in the Santa Barbara Channel between phases M4 and M5c. As Abrams (1968c:69) notes, the Flat-ended rings are smaller than the plain rings.

H2aI Plain Ring (3). Three plain limpet rings were recovered, all in association with burial 14 (table A.13; fig. 5.5a). These large specimens are most similar to examples representing C. D. King's (1982:376) phase M4.

D2b Whole Perforated Hinnites *(1)*. This whole scallop shell (511-488) retains an irregular punched perforation toward the hinge (table A.14). Recovered from 46 to 61 cm in unit NW25NE30, the specimen is burned, and the perforation is plugged with asphaltum. Temporal affiliations of this item are unclear.

F7 Spire-lopped Littorina *(1)*. This new variant of Gifford's (1947:9) type F, (511-1966-B12d), univalve shell with tip removed, was found in association with burial 12 (table A.15;

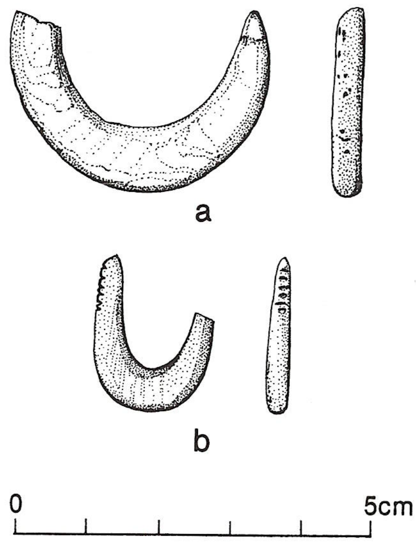


FIGURE 5.6 Shell fishhooks from CA-SLO-175: *a*, 511-1966-Surface-78; *b*, 511-0151. *Drawing by Tammara Ekness-Hoyle*

fig. 5.4x). Dating for this type is unknown.

Dentalium (1). A single *Dentalium* bead, specimen 511-146, was recovered from the 40–50 cm level (table A.16; fig. 21d). This artifact correlates with C. D. King's phase M4.

Scraper. Modifications to the basal edge of one *Tresus* shell (511-898) appear to represent deliberate working for use as a scraping tool. This shell was recovered from unit NW95NE15, 46 to 61 cm below surface.

Fishhooks. Two shell fishhooks were recovered. The first (511-1966-Surface-78) is circular in outline and was manufactured from *Haliotis rufescens*. It has a broken shank to which remnants of asphaltum have adhered (table A.17; fig. 5.6a). The second (511-0151) represents Gifford's (1947:44) type AT2bI, a notched, pointed shank, manufactured from *Mytilus* (fig. 5.6b). Shell fishhooks are restricted to the Middle and Late periods in the Santa Barbara Channel, possibly not appearing until the onset of phase M2 (C. D. King 1982:355). Specimen 511-151 resembles a type that C. D. King (1982: 356) ascribes to phase M4.

Temporal implications. Nineteen of the shell artifact types can be considered temporally meaningful, and their distribution contributes to refined definition of temporal components. Absolute dating of these specimens hinges upon use of one of five potentially applicable bead chronologies: three alternative schemes proposed by Bennyhoff and Hughes (1987:149), and two developed by C. D. King (the first in 1982 and a revision proposed in 1989 and 1990). Except for the G6 saucer, which apparently has not yet been recognized on the south coast, C. D. King's most recent bead chronology is considered most appropriate for the materials from CA-SLO-175. This sequence closely parallels Bennyhoff and Hughes's (1987:149) scheme B1.

It is also convenient to divide CA-SLO-175 into spatially discrete site areas based upon horizontal clustering in unit locations: The "northern site area" is represented by those units excavated on the northeastern side of Highway 1 (fig. 3.1); the six units excavated by Caltrans in 1989 along with test pit B represent the "southern site area"; and the remaining units on the southwestern side of the highway constitute the "southwestern site area." The distribution of temporally sensitive shell artifacts first by grave lot and then by site area is summarized in tables 5.7 and 5.8.

Dating of grave lots. *Burial 3*. The occurrence of a single J2bII ornament with this grave suggests temporal assignment to phases M1–M3 (600 BC–AD 700).

Burial 5. The occurrence of a J2bII ornament with this interment is suggestive of phases M1–M3. A radiocarbon sample obtained from this grave by Abrams (1968c:23) yielded a date of 1526 BC, with a 1 sigma probability of 2350–820 BC. This interment probably dates to 800–600 BC.

Burial 7. This burial yielded 7 time-diagnostic *Olivella* beads representing types B2b, B3a, G6, and K1, as well as 16 Flat-ended limpet rings (H2aIII). Type G6 is a clear Middle period marker; type K marks phase 1 of the Late period. Since the limpet ring appears most diagnostic of the Middle period, the most reasonable dating of this interment is the Middle/Late Transition or C. D. King's (1990) terminal Middle period (phase M5), dating circa AD 1000–1200.

Burial 12. Twenty-six examples of *Olivella* bead type B2a associated with this grave are generally considered markers of the Early period on the south coast, but in central

Table 5.7 Revised absolute dating of the south coast shell bead sequence from King (1990:28)

Phase	*Dating*
L3a	AD 1782-1804
L2b	AD 1650-1782
L2a	AD 1500-1650
L1c	AD 1400-1500
L1b	AD 1250-1400
L1a	AD 1150-1250
M5c	AD 1050-1150
M5b	AD 1000-1050
M5a	AD 900-1000
M4	AD 700-900
M3	AD 400-700
M2b	AD 200-400
M2a	200 BC–AD 200
M1	600-200 BC
Ez	1000-600 BC
Eyb	3000-1000 BC
Eya	4000-3000 BC
Ex	5500-4000 BC

Table 5.8. Summary of shell bead dating from CA-SLO-175

Type	*N*	*Site association*	*Area*	*Depth*	*Central California phase*	*South Coast phase*
A2	1	Burial 14	N	70	Early	M1-M2a
A2	1		S	10-20	Early	M1-M2a
A5	1		N	80	2A,2B	Early, L2
B2a	26	Burial 12	N	67	Early, 1	Ey Ez, L1?
B2a	39	Burial 14	N	70	Early, 1	Ey Ez, L1?
B2b	1	Burial 7	S	73	Early 1	Ey-M1, M3, M5b-L1d
B2b	1		S	20-30	Early 1	Ey-M1, M3, M5b-L1d
B2c	1		S	30-40	Early, Late	Ey-M1, M3, M5b-L1d
B3a	1	Burial 7	N	73	Early, Late	Ey-L2a
B3a	1		SW	137-152	Early, Late	Ey-L2a
B3b	1		N	76-91	Early, Late	Ey-L2a
B3b	1		N	46-61	Early, Late	Ey-L2a
B3c	1		SW	137-152	Early, Late	Ey-L2a
B5	1		N	46-61	Early, Late	L1-L3
E3	1		N	0-15	2B	L3a
G2	1		N	46-61	Middle	M1-5b
G6	4	Burial 7	N	73	Middle	M1-5b
G6	1		N	76-91	Middle	M1-5b
K1	1	Burial 7	N	73	Late1	L1-2
K/E	1		N	0-15	Late 2	L2a
O.1a	1		S	10-20	Late 1	L1
Haliotis	1		—	—		M2b-3
J2bI	1		N	91-107		M2b/M3
H2aIII	16	Burial 7	N	73		M3-M5c
H2aIII	1	Burial 13	N	80-90		M3-M5c
Dentalium	1		N	46-61		M4
AT2bI	1		N	50-60		M4
J2bII	2	Burial 3	N	107		M1-M3
J2bII	1	Burial 5	N	76-91		M1-M3

California they are also representative of phase 1 of the Late period. This interment is probably contemporary with burial 7, dating AD 1000–1200. Double Side-notched arrow points can be ascribed to this time range based on the recovery of a single example from this grave.

Burial 13. The single limpet ring reported from this location suggests C. D. King's phase M5c.

Burial 14. Dating suggested by beads recovered with this grave is somewhat inconclusive, in that the single type A2 is suggestive of phases M1 and M2a–b. Type B2a is more abundant (N=39) and is a marker of both the Early period and phase 1 of the Late period in central California (Bennyhoff and Hughes 1987:121). This burial probably dates to the late Middle period (circa AD 500–1250), which is the equivalent of phase 1 in the Sacramento Valley.

Burial 15. A single J2aIV abalone ring suggests dating of 600 BC–AD 1200.

Burial 21. A hydration reading of 4.1 microns on Coso obsidian dates this interment to the Middle period (600 BC–AD 1000).

Group burial II. The Double Side-notched points associated with this mass grave suggest that these burials were interred the same time as burial 12, circa AD 1000–1250.

In summation, two burials (5 and 14) represent the earliest portion of the Middle period, four (3, 15, 20, and 21) can be ascribed to the Middle period and eight (7, 12, 13, and Group II) can be dated to the Middle/Late Transition, circa AD 100–1250.

Shell artifacts not associated with burials

The spatial distribution of shell artifacts not associated with burials is included in table 5.9.

Southern site area. Dating suggested by the shell artifacts for the southern site area is in itself inconclusive, in that occupation could have transpired anytime between 4000 BC and AD 1500; however, three of the four beads are consistent with radiocarbon dates obtained from the same area, which suggest occupation circa 3500–600 BC (table 5.9). The fourth bead, a single O.1a, indicates inconsequential mixing of later (phase L1) materials into what is predominantly an early component.

Southwestern site area. The paucity of temporally sensitive shell beads recovered from this location leaves dating inconclusive.

Northern site area. Of the eleven temporally sensitive shell artifacts recovered from this area, five are clear indicators of

Table 5.9 Distribution of temporally diagnostic shell artifacts from CA-SLO-175 by site area and depth

N	Depth	Period
SOUTHERN SITE AREA		
1	10–20	L1
1	10–20	M1-M2a
1	20–30	Ey-L1*
1	30–30	Ey-L1*
NORTHERN SITE AREA		
1	46-61	L1-L3
1	0-15	L2
1	80	L2
1	0-15	L2a
1	46-61	M1-M5b
1	76-91	M1-M5b
1	46-61	M4
1	50-60	M4
1	191-107	M2b/M3
1	46-61	Ey-M1
1	76-91	Ey-M1
SOUTHWESTERN SITE AREA		
1	137-152	Ey-M1
1	137-152	Ey-M1

* Excluding M2 and M4.

the Middle period, and three are markers of the Protohistoric period. Dating suggested by the remaining three beads is less definitive but nonetheless consistent with two occupational spans: Middle period (600 BC–AD 1150) and Protohistoric (AD 1500–1800). Two of the Protohistoric beads occurred in the uppermost site level (0–15 cm), but no other indication of superposition is evident.

Dating suggested by the beads not associated with graves is thus largely consistent with that of the burials recovered from that portion of the site; they indicate a predominantly Middle period occupation with a minor Protohistoric/Late Prehistoric occupation.

Summary

The combined radiocarbon, obsidian hydration, and temporally sensitive shell artifacts are relatively congruent with respect to overall site chronology and intrasite distribution of temporal components. Occupation appears to have spanned from 3500 BC to historic contact; however, this habitation was not constant in duration or intensity.

Earliest occupation dating circa 3500–600 BC is represented by a component located in the six units excavated by Caltrans in 1989 (the southern site area). This component appears to be relatively cohesive, but some minor mixing of later materials is evident. This early occupation may mark the lowermost levels of the southwestern site area, which was the deepest portion of the deposit, and where the site's largest hydration reading (6.7 microns on Casa Diablo obsidian) was secured. However, currently available data are insufficient to establish the existence of this component in this portion of the site or concretely characterize the extent and intensity of its usage.

The most substantial occupation of this location occurred between circa 600 BC and AD 1200. Components representing this time period occupy most of the northern site area, and possibly the upper portion of the southwestern site area. At a minimum, burials 3, 5, 13, and 14 date to this period.

Evidence for occupation between AD 1200 and 1500 is largely absent. No radiocarbon dates mark this period, only two hydration readings and one shell bead can be definitively ascribed to that time period. CA-SLO-175 appears to have been largely abandoned during this portion of the Late period.

Three shell beads and a single radiocarbon date, derived from a shell found on the surface of the rock layer, date the use of this location between AD 1500 and 1800. The bedrock mortar outcrop probably dates to this period as well, but aside from this feature evidence for use of CA-SLO-175 during this period is generally found in the northern site area, all at depths no greater than 80 cm below the surface. One burial (12) in the northern site area may date circa 1500 AD. In general the Protohistoric component is relatively minor in comparison to the amount of materials and proportion of the site deposit representing earlier occupation, but it is indisputably present and more substantive than that suggesting occupation during the Late Prehistoric period.

Some of the other types of artifactual materials recovered from CA-SLO-175 are also temporally meaningful (for example, projectile points and bone artifacts). These will be discussed in more detail in subsequent chapters and in our conclusions on site chronology.

CA-SLO-1259

Dating of CA-SLO-1259 has been accomplished with two radiocarbon determinations, eleven obsidian hydration readings and typological analysis of three shell artifacts.

Radiocarbon

The two radiocarbon assays obtained from CA-SLO-1259 have been subjected to the same correction procedures applied to those from CA-SLO-175 (tables 5.1 and 5.2). Sample Beta 36630 was analyzed via the accelerator mass spectrometry (AMS) technique and isotopic fractionation corrections are included within the calendric date. Unfortunately, the modern date produced by this sample (AD 1955) suggests that the shell fragment selected for analysis was derived from the nonprehistoric fill that occurred above and was mixed within the upper levels of the midden deposit. This and the other sample were chosen simply because they were the largest

shell fragments available from the deposit, which was largely devoid of this constituent. The other date, calibrated to 505 BC, suggests Middle period occupation, contemporary with the predominant component identified at CA-SLO-175.

Obsidian hydration and sourcing

Obtained from CA-SLO-1259, the eleven hydration readings exhibit rather tight clustering (table 5.3). The seven readings on Coso obsidian are all between 2.9 and 3.7 microns. The four Casa Diablo readings fall between 2.8 and 2.9 microns. Based on our best estimate of central coast hydration rates as discussed above, we equate these readings with the Middle period (that is, 600 BC–AD 1000).

Shell artifacts

Three shell artifacts, all beads, were recovered from SLO-1259. All were manufactured from *Olivella*, of two types.

A1c Small Spire-lopped (2). Two examples of this temporally non-diagnostic type were recovered. Specimen 485-290 was associated with feature 1 in unit 5 at a depth of 20 to 30 cm. Specimen 485-346 was found in unit 6 in the 30 to 40 cm level (table A.18). The former is bleached; the latter is water worn.

Medium Barrel (1). A single example, 485-345, was recovered from the 30 to 40 cm level of unit 6. C. D. King (1982:362) suggests that these beads are most common during phases Ex-M1.

Summary

With the exception of a single modern radiocarbon assay, derived from down-mixed construction fill, all available chronometric evidence supports the conclusion that CA-SLO-1259 was occupied circa 600 BC–AD 1000.

6

Burial Population at CA-SLO-175

Mortuary Practices and Human Osteology

WITH A CONTRIBUTION BY LARA C. WEINHEIMER

THE ORIGINAL FIELDWORK at CA-SLO-175 identified forty burials, five from the first fieldwork season and the remainder from the mechanical trenching operation in the second season. Both areas were subsequently graded and removed in anticipation of highway construction. Following the initial analyses, the human remains were curated at the UCLA Archaeological Survey, and subsequently at the Fowler Museum of Cultural History, University of California, Los Angeles, except one burial (burial 15), which was housed at the Los Angeles County Museum of Natural History. The latter burial was returned to the Fowler Museum in 1993.

The following discussion is at once a condensation and an elaboration of the original materials and includes new data from the revised inventory of the burial population. In this effort, the UCLA catalog was consulted, as was the collection of slides and photographs and the original burial records. Because of financial constraints at the time of the original fieldwork and report, analyses of the burial population had been limited to age and sex determination and some discussion of pathologies. In the course of the present study, a more complete inventory of the remains and recordation of metric observations, anomalies, pathologies, and trauma have been documented and are based on a complete inventory accomplished at the Archaeological Repository at the Fowler Museum in 1992 by M. Katherine Davidson, a graduate student in Physical Anthropology. Age and sex determinations have been reanalyzed. Stature has been estimated for the male and female adult population. All inventory forms and associated data are included with the original report at the Central Coastal California Information Center. The following discussion summarizes some data sets from that inventory, but all specific descriptive materials are available in the inventory.

MORTUARY PRACTICES

The burials fall into two patterns: individual interments, which number thirty-two, and two group burials, which consist of four and six individuals, respectively. Apparently all were primary inhumations placed in pits that had been excavated through the rock layer, either into the sandy substrate or within the midden area, with the exception of two pits excavated into the underlying rock.

The data for mortuary patterning for all burials is summarized in table A.68, and provenience is identified in figure 6.1. Burials are illustrated in figures 6.2 through 6.7. Consideration of the grave associations is based on a synthesis of the original report findings and the recent reexamination of goods associated with the burials, particularly the shell beads. The latter analysis has resulted in a more secure identification for those artifacts, as well as expanded understanding of the temporal context for the burials.

Mortuary practices for the single inhumations at Little Pico reveal a uniformity with no strong case for statistical variation except in the case of position where burials in the prone position were definitely in the minority. Flexed position was consistent: three in the prone position, seven flexed on the right side, and nine on the left. Eight burials were described as placed in an upright or "sitting" position. The most commonly recorded direction that burials "faced" was west and/or south (N=12). The orientation of the vertebral column for those burials that were not upright was predominantly north/south (N=12). East/west alignment was only clear in four instances. Of the three single prone burials, two were adult females and one was an adult male. Of the seven in a sitting posture, two were males, one a female, and four subadults. For inhumations flexed on the left side, three were adult females, three were subadults, and three were adult males. For those flexed on the right side, four were subadult, two were adult males, and two were adult females.

The posture and form of interment elsewhere in coastal context have been reported by Gerow (1974:39–40) where flexed lateral or seated position is apparently predominant at the Glen Annie, Scripps Estates, and the Little Sycamore sites. A "northerly or southerly" orientation characterized those burials. Rogers (1929) recorded the Hunting or "intermediate" graves as yielding burials in a prone and flexed position with a western orientation. Yet, at another site Rogers cited extended burials for the Hunting peoples. At the Aerophysics site, burials were reported to be both flexed

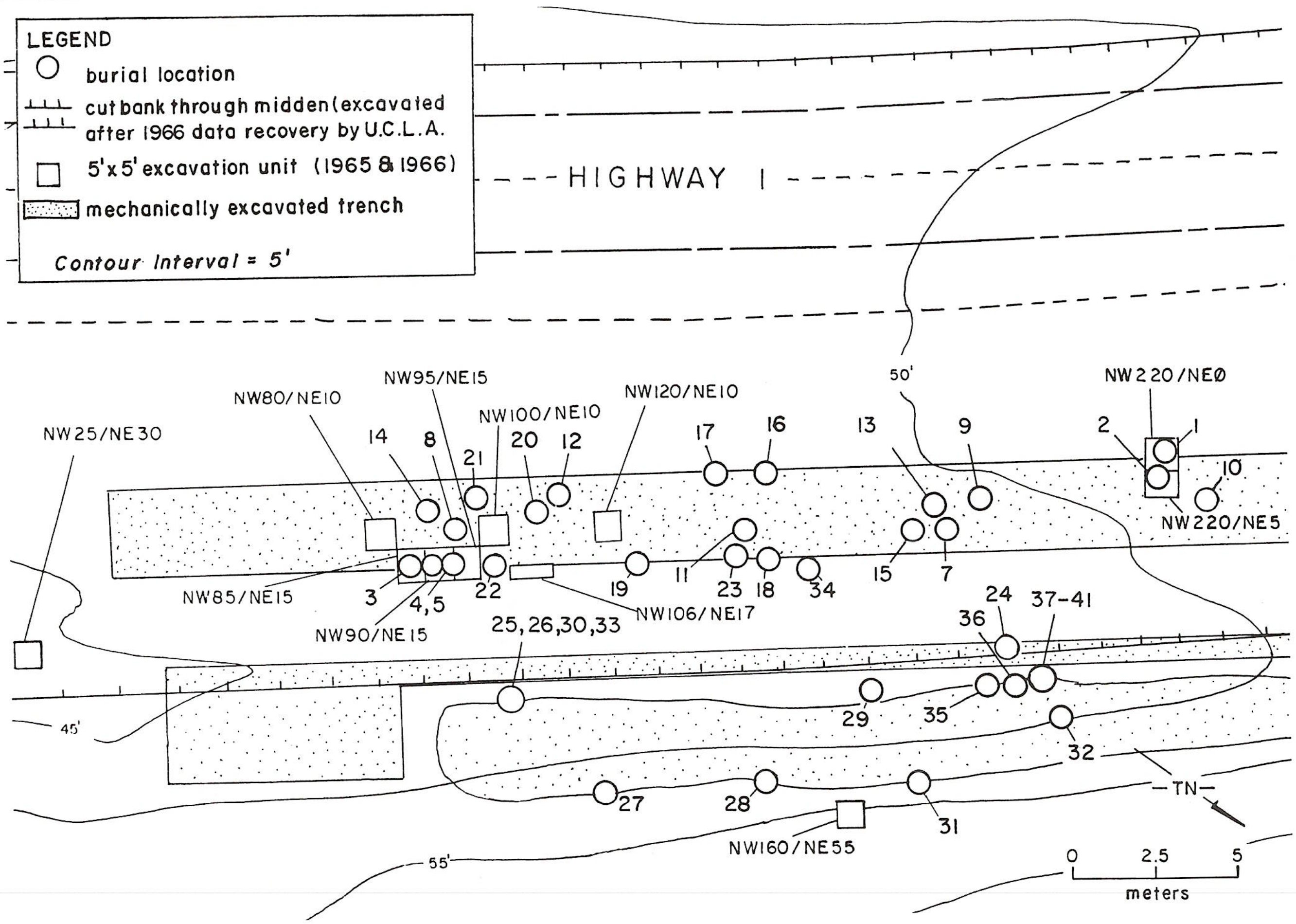


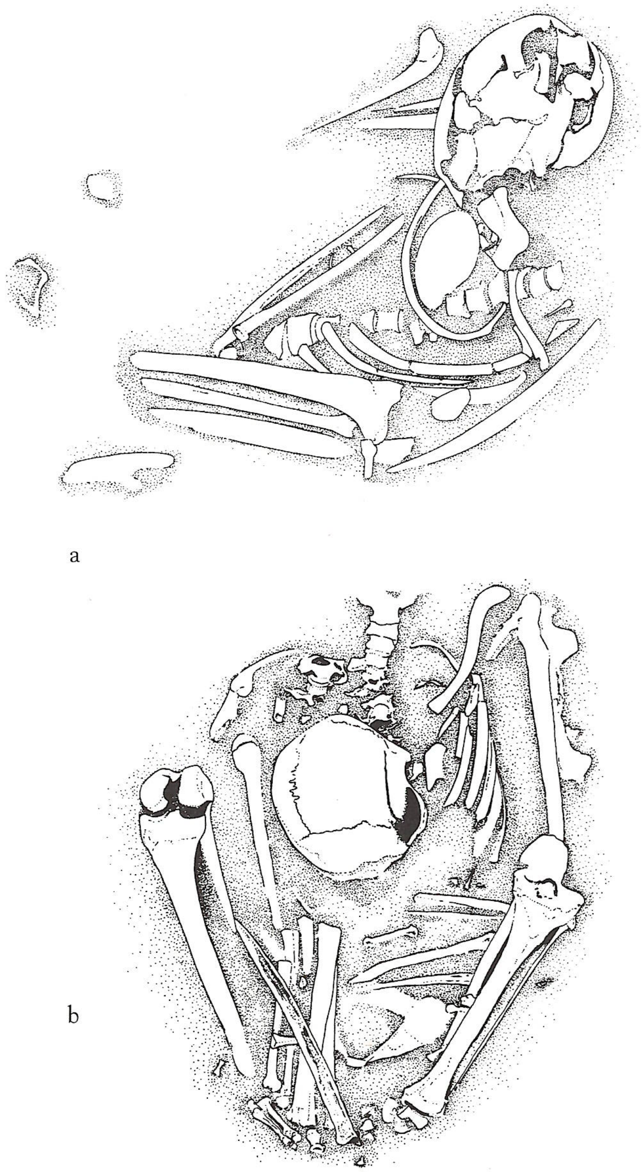
FIGURE 6.1 CA-SLO-175 burial locations

with dorsal and lateral positions and variable orientation, but mainly northern, while at a coterminous time, fully extended burials were reported at another Santa Barbara area site (Harrison and Harrison 1966). For a presumed earlier time, the literature reports extended burials, frequently marked by inverted milling stones or "vessels", although flexed burials were described with similar grave markers at the Aerophysics site (Harrison and Harrison 1966). At the Rincon site (Stickel 1968) near Carpinteria, excavation of a cemetery dated to circa 3000 years BP yielded forty-three burials that predominantly were lateral and flexed with several in a prone or supine "frog" position (that is, flexed). Orientation for those burials was east/west with the head facing west. At CA-SLO-406 (Tainter 1971) one burial lot was radiocarbon dated to 1460 years bp (C.D. King 1990:28). For seventeen of the twenty-one burials where some determination could be made, inhumations were found in sitting positions with variable orientation, although southerly or westerly directions apparently predominated. And finally, at CA-SLO-2, Greenwood suggested that although there was no consistent orientation as to posture or depth for burials, those that were flexed on the right side represented an older "custom" and that the "seated position, flex on the back, and flex on the left...(was) successively more recent" (1972:11).

GRAVE ASSOCIATIONS

Materials associated with the burials fall into two categories: grave "markers" and grave goods, primarily artifacts. Large and generally amorphous-shaped stones, hypothesized by Abrams (1968a, b, c) to be grave markers, were reported with six individual interments and with both group burials (see table A.68). Because of the effect of postdepositional factors, these stones were recovered in varying proveniences, although most commonly the stone was described as being "atop" the burial. These stones weighed from 9 to 13 kg and were shaped in a subangular or subrounded, rectangular form. Two rock cairns were recorded, one over burial 22 and one under burial 35, although neither was described nor cataloged.

Grave goods, generally artifacts, were accounted for with all but eleven inhumations. Artifacts include shell beads and miscellaneous shell, flaked stone, ground and battered stone, bone implements, and miscellaneous pieces of asphaltum and hematite (table A.68). Provenience of these materials



a

b

FIGURE 6.2 Burials from CA-SLO-175: *a*, 5; *b*, 14. *Illustration by Peter Mundwiller*

was variable and dependent in part on postdepositional factors such as rodent disturbance. Moreover, recordation during the original fieldwork in general, particularly during the second season, did not specify or map the exact placement of all but the unusual or striking provenience of those articles. Such specificity was recorded in the second group burial where the positioning of the "eccentric" Double side-notched points was described: "One of the points was in the palm of his right hand [burial 41 (fig. 6.7)]; the left hand probably held an arrow shaft with a double side arrowhead... The fourth double side-notch point was in the hand of burial 40" (Abrams 1968c: 79). Elsewhere it was noted that the bone needles found with burial 2 were recovered in a row from the neck area as if they had been strung as a necklace. And, the placement of the only recovered bone whistles was noted to be in the "lap" of burial 14. In another context (Abrams 1968c: 67), shell beads were described as being most commonly found in the area of the chest or skull, presumably as decorative devices.

Probably because of the small sample size at CA-SLO-175, cultural materials that were recorded as associated with the individual burials reveal no striking pattern, save the amount and variety interred with one individual, burial 14. Moreover, females were as likely to have grave goods as males, and subadults as either. The only bone needles and strigils, except in the case of burial 14, were recovered from female burials. Shell burials occurred with both sexes and with children, as did projectile points.

A meaningful statistical variation in grave placement, as indicated by grave goods, is not evident. There is some indication (fig. 6.1) that those burials in the most southwesterly portion of the excavated area (burials 3, 4, 5, 8, 12, 14, 20, 21, 22) have more grave associations (7:9) than an adjacent group (burials 11, 16, 17, 18, 19, 23, 34) to the northeast (2:7). The latter were buried in proximity to burial 14. Because the quite extensive, immediately adjacent area was not excavated, this consideration is tentative.

Considering burial 14 an individual with a special role among the inhabitants of Little Pico is an almost inescapable conclusion. Bone whistles, hematite, a chalky substance (limonite?), chert flaked-stone tools, and a quantity of shell beads were recovered with this burial. Those materials far exceeded those for any other burial in variety as well as in number. The character of this kind of burial assemblage has been discussed elsewhere as comparable to that of the "whistler" in the *'antap* ceremonies of the Chumash (C. D. King 1982:115–116; Tainter 1971). While this comparison may be temporally disjunct and liable to the error that such leapfrogging can foster, the occurrence of those associations provides the opportunity to propose clear and unique role differentiation for this member of the Little Pico group. Greenwood (1972), however, reported similar grave associations for several burials at Diablo Canyon, and Wallace (1962) described comparable grave goods with a subadult burial recovered during fieldwork in the Arroyo Grande Creek watershed. The latter assemblage included a substantial quantity of mammal bone whistles (N=18) and beads. For burial lots at CA-SLO-406, also in the Arroyo Grande area, whistles were only an occasional inclusion with burials with the exception of a single male who was interred with twenty-two to twenty-seven mammal bone whistles (Tainter 1971).

At Little Pico Creek the group burials appear to differ from the single inhumations. The semiextended position of all but one burial, the context of multiple interment, and the singular "eccentric" (Double Side-notched) projectile points that were associated with those burials all point to a unique pattern in contrast to the individual interments.

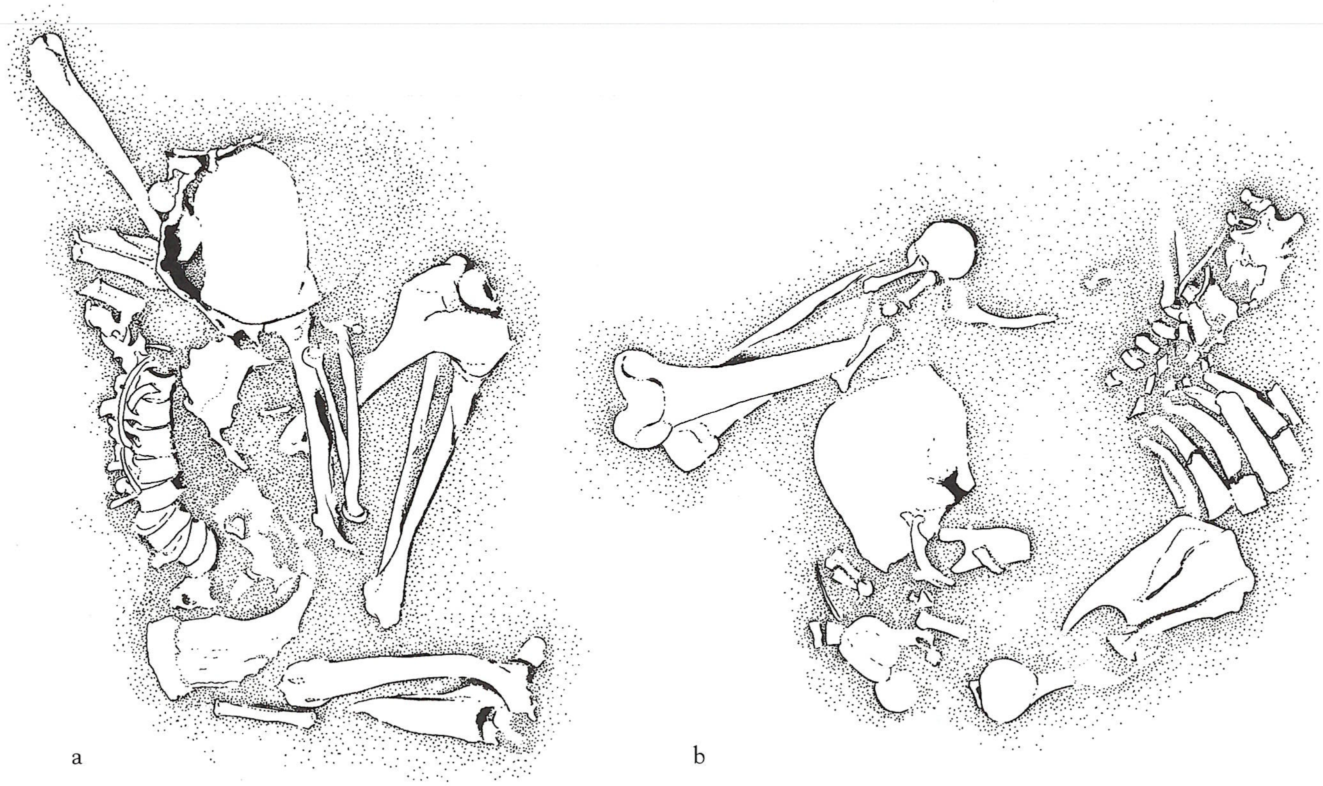


FIGURE 6.3 Burials from CA-SLO-175: *a*, 13; *b*, 15. *Illustration by Peter Mundwiller*

In attempting to correlate materials associated with burials in a comparative framework for the region, the paucity of comparable data indeed is clear. The single inhumations at Little Pico tend to correlate with similar burials for what has been widely known as the "Hunting" cultures. Elsewhere, the limitations on burial goods for those peoples has been assumed (Reinman 1961; Rogers 1929; Thomas and Beaton 1968). While not as rich or varied as those reported for the Channel Islands (Hoover 1971; C. D. King 1982), the burials from Little Pico do reveal that, at least in the context of a particular settlement strategy, such associations were not uncommon.

Whether the interments at Little Pico Creek represent a formal cemetery is not only a matter of considerable importance but also of some uncertainty. While the burials appear to be spatially restricted to the northern portion of the site, this pattern is clearly a reflection of excavation methods, in that the preponderance of interments were revealed by mechanical trenching. Conversely, absence of burials from the southern portion of CA-SLO-175 may well reflect the limited excavation sample and a lack of wide exposure in that area. Burials have been recorded elsewhere on the central coast as occurring within living areas at CA-SLO-239 (Clemmer 1962) and CA-MNT-391 (Cartier 1993a), and the occurrence of the Little Pico inhumations within a matrix of living debris (that is, midden) speaks to a similar practice. Formal cemeteries in other parts of California (for example, the Sacramento and Santa Clara Valleys) are marked by interment in sterile matrices. At Little Pico Creek, however, some limited evidence in support of dedicated burial areas is indicated by the placement of grave markers. The very real possibility exists that a pattern of occupation and reoccupation of the site may have obscured evidence of a designated interment area. As discussed in more detail in chapter 5, these burials can be generally considered contemporaneous, dating to the Middle period, but the group burials with their distinctive pattern of deposition and related artifacts speak to alternative site occupation.

HUMAN OSTEOLOGY

Maximum and minimum numbers

Some mixing of burials or portions of burials has taken place during the almost 30 years since the original analysis. Every effort was made to assign appropriate elements where misplaced or missorted bones appeared to belong to another specimen. Clearly, some commingling may have taken place in the ground with the interment of additional individuals or by dint of bioturbation, which may account for the substantial mixing of some small elements or of bone fragments. As noted previously, no burial numbered 6 was recorded, and the second fieldwork season began with the exhuming of burial 7. In the course of the present inventory, the collection included a burial "42" undocumented in the Abrams discussion and a previously unidentified individual that was

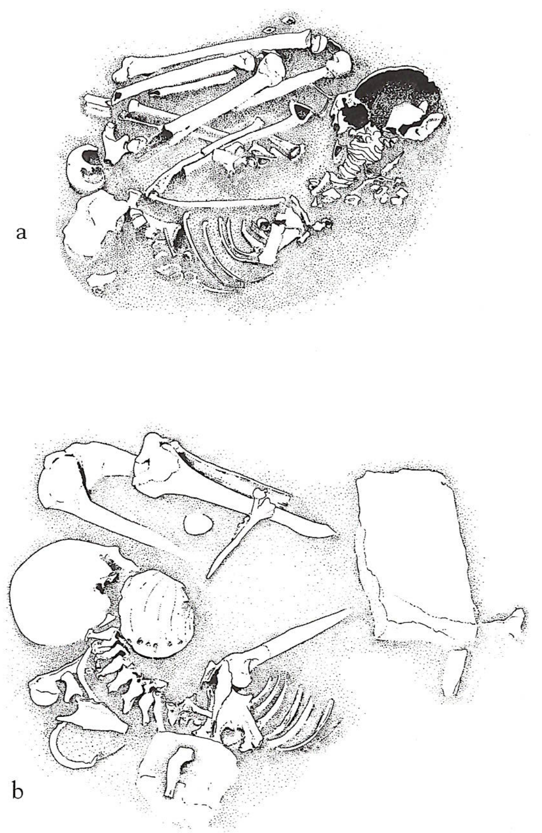


FIGURE 6.4 Burials from CA-SLO-175: *a*, 18; *b*, 34. *Illustration by Peter Mundwiller*

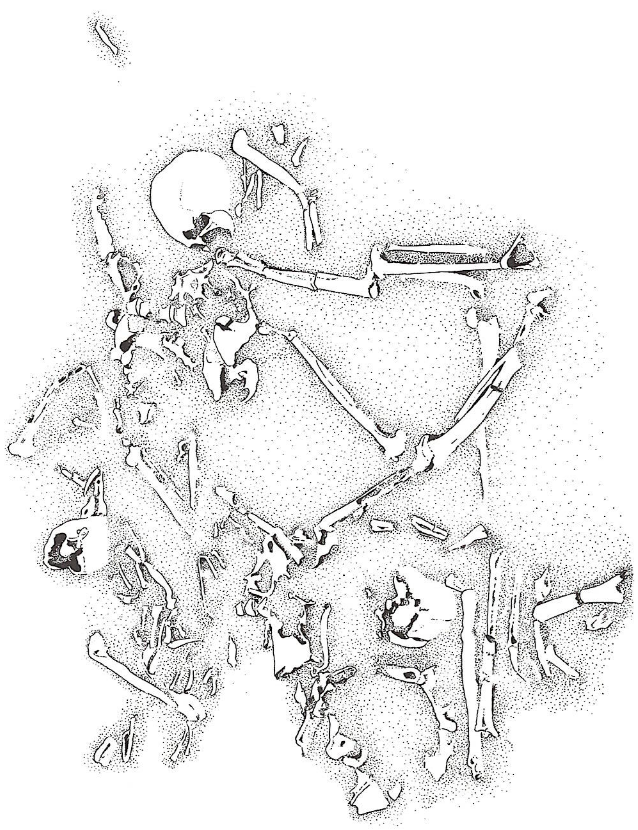


FIGURE 6.5 Burials from CA-SLO-175: 25, 26, 30, and 33. *Illustration by Peter Mundwiller*

included in group burial II. Moreover, a number of extra elements were recovered with burials with which they did not belong (that is, duplication of elements, scale or size, and so on) and represented individuals other than those identified at the site. With the necessary and feasible association of elements considered, the absolute minimum number of burials recovered from CA-SLO-175 was forty-two. The maximum number derived from the expanded inventory was fifty-three (42 + 11). These numbers undoubtedly represent an underestimate of the burial population, considering the limited exposure at the site and underscores a primary caveat for the subsequent analysis: sampling error. Burials were recovered from only a portion of one area of the site. Moreover, the burial area may not represent a single temporal period. Because of the restriction on dating osteological materials and the consequent limits on understanding the size of the population at CA-SLO-175 during any given period, conclusions on demography are considered provisional.

Determination of age and sex

Of the original population that was analyzed by Abrams, several remains have become too fragmented in the intervening years for secure sex determination and rely on the original Abrams identification. Judy Suchey, forensic anthropologist and Professor of Anthropology at California State University, Fullerton, conducted the analyses of sex and age determination for the majority of the remainder in September and October of 1992. Several burials were not available or were not reassembled until later and were analyzed by M.K. Davidson following Suchey's guidelines at the Archaeological Repository at the Fowler Museum in December of 1992.

Sex and age determinations have been incorporated into the previous discussion of the burials; however, a mortality profile by sex and age is presented here to afford some indication of the structure of the population at Little Pico Creek (fig. 6.8).

Subadults are well represented in the burial data (N=10, 24%) and are comparable to percentages reported at CA-SLO-406 (32%; Warren 1971) and at CA-SLO-2 (15%; Greenwood 1972). Subadults have been identified on the basis of both bone and dental indicators and range in age from 3–4 to 14–16 years. The absence of infant burials—that is, individuals younger than 3 years and neonates—is a pattern noted for the cemetery at Rincon on the Santa Barbara coast (Stickel 1968). Similar representation is noted for CA-SLO-406 (Warren 1971) and Diablo Canyon (Greenwood 1972). This underenumeration is not uncommon in burial populations (Hassan 1981) and can be attributed to poor preservation of the more fragile remains of individuals younger than 3 to 4 years, as well as to differential burial treatment for infants and neonates (Ortner and Putschar 1985:34).

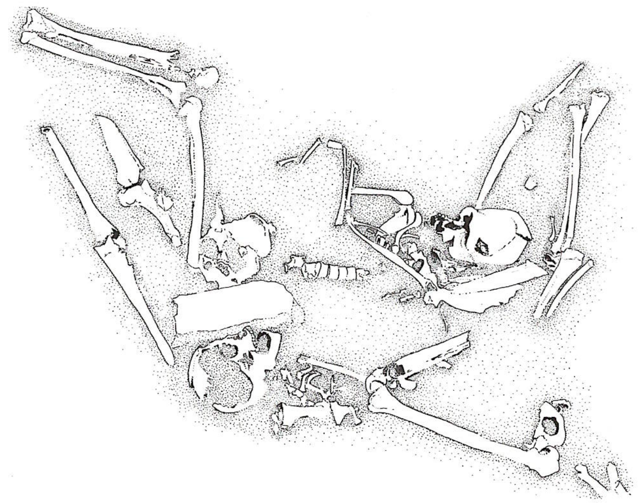


FIGURE 6.6 Burials from CA-SLO-175: *a*, 37; *b*, 38. *Illustration by Peter Mundwiller*

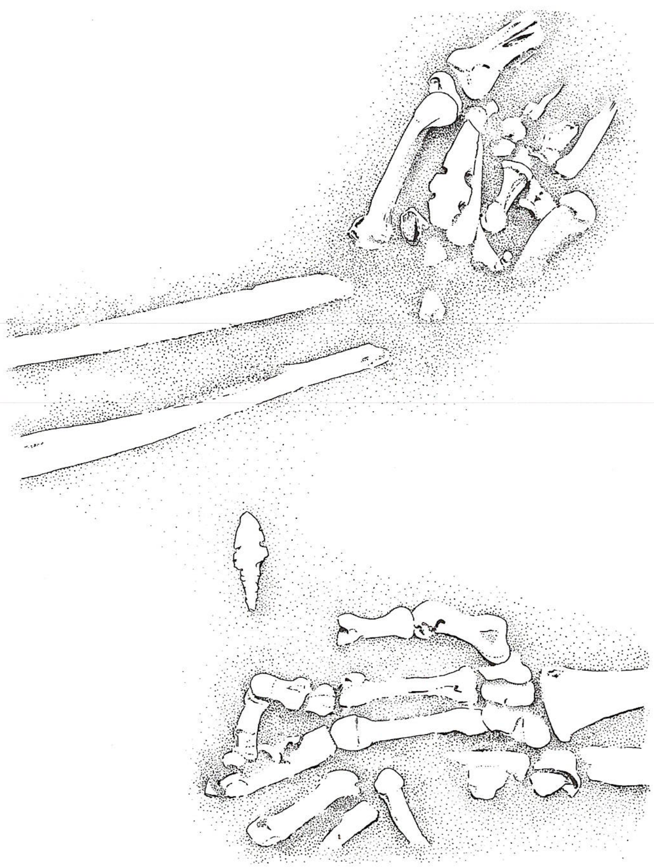


FIGURE 6.7 Burial from CA-SLO-175: detail of 41. *Illustration by Peter Mundwiller*

Adult females (N=13, 31%) and males (N=14, 33%) are equally represented for those skeletal remains that could be reliably sexed. The peaks of mortality (5–10 years for subadults, 25–30 for adults) may be indicative of the prevalence of pathologies, given that archaeological evidence for violence is not present—with the possible exception of burials 8 and 16 (see "Trauma" below). It should be noted that the peak for adult males is influenced by the presence of five males within that approximate age range who were buried together in the second group burial.

The mortality profile for the sample of the Little Pico population (fig. 6.8) indicates that while, as noted previously, subadults were well represented (24%), the survival of adults past the third decade was limited. Of those females whose age could be reliably assessed, only one exceeded 30 years of age. Males, on the other hand, were represented in the 15-to-25–year range of the mortality profile by only one individual, with the majority (N=12) falling into the 25-to-35–year range. The higher frequency of mortality for young adult females may be attributed to death at childbirth. At Diablo Canyon the earlier peak of a bimodal distribution for female mortality, at 15 to 25 years, in part mirrors the evidence at Little Pico Creek. Survivorship of both sexes into the fifth decade at Diablo Canyon, however, contrasts with the relatively early mortality for both sexes at Little Pico Creek.

Stature estimation

Estimation of stature was derived from those individuals with intact long bones. A determination was undertaken of a correlation between estimates of metric observations given for the tibia and femur in determining stature, as well as the accuracy of the Genoves equations in relation to this population (see appendix C).

Male stature ranged from 158.813 to 172.250 cm (approximately 5 feet 2 inches to 5 feet 7 inches). Female stature ranged from 150.821 to 165.101 cm (approximately 4 feet 10 inches to 5 feet 4 inches).

Anthropometrics

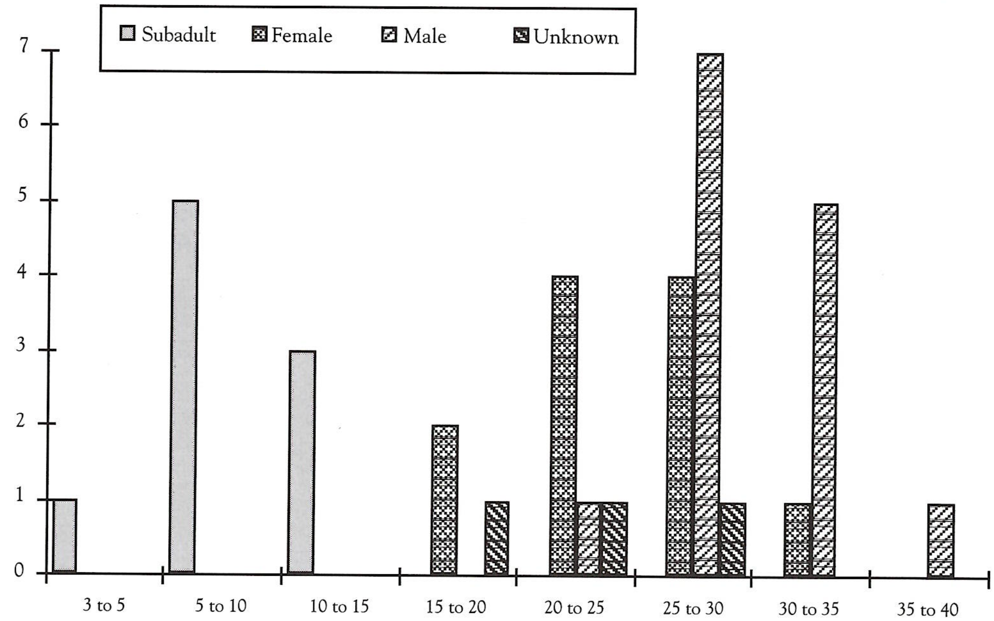
Basic measurements were taken during the inventory (see appendix C). Cranial measurements of males and females are summarized as cranial indices in table 6.1. Nonmetric traits were scored for presence or absence and are noted in the inventory.

PATHOLOGY

Periostitis

Periostitis was differentially evident in the Little Pico Creek population. This pathology on dry bone is characterized in its initial stage by a pitted appearance or in more advanced stages by plaquelike formations or by changes in the cortical bone formation which may in some instances result in the distortion of normal shape of the skeletal element, particularly in long bone shafts, with the tibia being the most commonly affected. Periosteal reaction may be part of a specific disease process or an infection, or may result from trauma. Ortner and Putschar (1985:132) note that periosteal reac-

FIGURE 6.8 Mortality profile from CA-SLO-175 burial population



tion in treponemal disease forms on bones that are near the skin surface, particularly the tibia and the skull vault.

In the Little Pico population, periostitis was evident on all elements of one subadult (burial 1) except the cranium, mandible, and vertebrae. The severity of reaction is especially noted on long bones where periosteal reaction occurred along the entire shaft. Partially healed periostitis was evident on the radius shaft of one male (burial 41), a member of group burial II. The remainder of evidence for this pathology is confined to females (N=6, or 75% of the affected individuals) and consisted of periostitis on the long bone shafts, particularly on the tibia. One female (burial 11) was substantially affected, bilaterally on the proximal and distal tibia shafts, along the right ulna shaft, as well as on hand and foot elements. The pattern of periostitis on those tibia elements suggests a treponemal infection (M.K. Davidson, personal communication 1992).

Degenerative and age-related pathologies

Forms of degenerative pathologies identified in the Little Pico Creek population may have been related to the aging process: arthritis and Schmorl's nodes. Incidence of both pathologies, however, were not extensive and in several cases appeared to be caused by trauma.

Arthritis is characterized by a breakdown of capsules surrounding the synovial joints with a subsequent degeneration of the articular surfaces. In the appendicular skeleton, the hip, knee, and the condyles of the tibia and femur can be affected as well as the fingers and toes. Ortner and Putschar (1985:430) point out that virtually all archaeological skeletal samples will show some degree of degenerative arthritis of the spine, as this is common in the aging process and appears to begin in the third or fourth decade.

Often osteophytes, lesions that consist of shelflike bony protrusions or lipping on cortex of the vertebral body (Ortner and Putschar 1985), can develop and be in contact with osteophytes of adjacent vertebra. Osteophytosis is not arthritis, but it is commonly included in discussions of vertebral pathologies.

Schmorl's nodes are small, circular depressions in the vertebral centra, or foci of pressure erosion on the articular surface of the vertebral body. This form of degeneration has been attributed variously to fracture, compression loading, and osteoporosis. The high frequency of these nodes in the lumbar vertebra can be understood as a hallmark of mechanical stress resulting from highly active hunter-gatherer lifeways.

Evidence of arthritic damage, collapsed vertebral centra, lipping on vertebral bodies, and Schmorl's nodes was recorded for five males (burials 11, 14, 19, 39, and 42) and five females (burials 8, 16, 26, 28, and 37). In two instances severe trauma to the spine was indicated (burials 8 and 14). In both cases, spondylytis of the lumbar vertebra may be attributed more to stress than to defects in the spinal structure. Arthritic damage to hands, feet, arms, and knees was noted in both females (burials 16, 24, 26, and 37) and males (burials 9, 33, 40, and 41).

Porotic hyperostosis

The most pervasive pathology identified in the human remains from Little Pico is porotic hyperostosis, which occurred in 57 percent of individuals with sufficient cranial elements to assess. Normally this pathology is characterized by bone hypertrophy of the skull vault (Ortner and Putschar 1985), which results in thickened bones with a gross appearance that is usually porous. For those remains from Little Pico,

Table 6.1 Cranial indices for skeletal remains from CA-SLO-175

Burial #	2	5	8	16	36	*Summary of female indices*			
Gender	*Female*	*Female*	*Female*	*Female*	*Female*	*Mean*	*Std dev*	*Range*	N
Cranial index	75.5	—	—	—	—	—	—	—	1
Cranial height-length	74.3	—	—	—	—	—	—	—	1
Cranial height-breadth	98.5	—	—	100.0	—	99.3	1.06	98.5-100	2
Auricular height-length	65.6	—	—	—	64.4	65.0	0.85	64.4-65.6	2
Auricular height-breadth	86.9	—	—	—	—	—	—	—	1
Orbital height	90.0	93.4	—	89.7	86.1	89.8	2.98	86.1-93.4	4
Nasal height	41.5	43.0	—	42.6	44.4	—	1.19	34.3-44.4	4
Palatal length	—	84.3	80.8	—	91.6	85.6	5.50	80.5-91.6	3
Cranial module	147.8	—	—	—	—	—	—	—	1
Prognathism index	—	—	—	100.0	—	—	—	—	1
Cranial facial breadth index	—	—	—	—	—	—	—	—	0

Burial #	9	13	14	33	38	40	41	*Summary of male indices*			
Gender	*Male*	*Male*	*Male*	*Male*	*Male*	*Male*	*Male*	*Mean*	*Std Dev*	*Range*	N
Cranial index	—	—	73.4	—	66.2	—	77.3	72.3	5.63	66.2-77.3	3
Cranial height-length	—	—	75.5	—	75.8	—	—	75.7	0.21	75.5-75.8	2
Cranial height-breadth	—	103.3	102.9	—	115.5	—	—	107.2	7.16	102.9-115.5	3
Auricular height-length	—	—	63.0	—	—	—	67.2	65.1	2.97	63.0-67.2	2
Auricular height-breadth	—	82.7	86.3	—	—	—	86.9	85.3	2.27	82.7-86.9	2
Orbital height	83.5	80.2	71.3	82.2	—	—	76.5	78.7	4.93	71.3-83.5	5
Nasal height	—	44.7	—	—	—	47.4	—	46.1	1.91	44.7-47.4	2
Palatal length	100.0	89.9	80.9	76.5	80.0	—	—	85.5	9.51	76.5-100	5
Cranial module	—	—	152.7	—	158.2	—	—	155.5	3.89	152.7-158.2	2
Prognathism index	—	105.6	109.1	—	—	—	—	107.4	2.47	105.6-109.1	2
Cranial facial breadth index	—	100.0	95.0	—	—	—	96.8	97.3	2.53	95.0-100	3

Table 6.2. Porotic hyperostotis, cribra orbitalia, and enamel hyploplasia in skeletal remains at CA-SLO-175

	Frequency	%
POROTIC HYPEROSTOTIS		
Subadults	2/10	20.0
Adults	16/28	57.1
CRIBRA ORBITALIA		
Subadults	0/9	0.0
Adults	4/28	14.3
ENAMEL HYPOPLASIA		
Subadults	3/10	33.3
Adults	12/19	63.2

neither X-ray or cross-section morphology, which might identify the exact extent of involvement of the diploe, was accomplished. In the majority of the cases from Little Pico, however, the porosity occurs along the sagittal suture, sometimes extending to the anterior along the sagittal plane of the frontal bone, and sometimes extending to the posterior along the midline of the occipital. Remodeling of the bone was not noted for the skull vaults from the Little Pico population. Certain infectious diseases, scurvy and rickets, cause lesions on the skull, but porous lesions in those cases tend to be periosteal and do not involve an expansion of the marrow space or destruction of the outer cortex (Ortner and Putschar 1985:263), as is evident on the skull vaults for the individuals at Little Pico.

The cause of porotic hyperostosis is generally attributed to anemia (Ortner and Putschar 1985:258–263). Although there are problems in differentiating various types of anemia in dry bone specimens, it is assumed for the Little Pico population that this condition is not genetic, as hereditary types, such as sickle cell anemia and thalassemia, are distinguished by severe osseous involvement (Walker 1986).

Cribra orbitalia, or the pitting or sievelike character of the roof of the eye orbits, is another traditional indicator of anemia and often accompanies or is subsumed by description of porotic hypertosis. This pathology was evident on only a small percent of the Little Pico population (table 6.2).

Although anemia has been traditionally attributed to deficiencies in nutrition, in many populations chronic anemia can be abetted or even produced by viral, bacterial, and parasitic diseases. Those conditions are stimulated by increased sedentism or density of settlement and sanitation problems (Verano 1992; Walker 1986). In a number of instances, iron-deficiency anemia has been targeted as the specific causal factor in producing porotic hyperostosis. Groups at highest risk for iron deficiency are infants, adolescents, and females between menarche and menopause, particularly pregnant women (Dallman 1990). Studies have identified the incidence of iron deficiency in New World groups that became overdependent upon maize or resources derived from intensive agriculture (Walker 1985). Similar to cause of chronic anemia, however, an increasing amount of evidence supports an alternative determinant contributing to "iron bio-

availability reduction" (Larsen et al. 1992:32–33). As Walker (1985, 1986) has pointed out, trash disposal, sanitation practices, and food preparation techniques play a crucial role. Consequently, in groups that are sedentary or semisedentary and are concentrated in some density, the complex of contributory factors must be considered in understanding response to specific stressors.

Enamel hypoplasia

Enamel hypoplasia, a condition of the enamel surface of tooth crowns, is characterized by pits and grooves of the outer surface and is interpreted as a record of growth disruption during childhood resulting from a host of factors (Schulz 1981). The most commonly considered causes are infectious diseases, developmental disorders, and nutritional deficiencies (Schulz 1981), although hereditary anomaly and localized trauma are also associated with hypoplasias (Larsen et al. 1992). If several teeth that develop at the same time are affected, systemic metabolic stress is probably the prime culprit (Larson et al. 1992).

While measurement and location of individual hypoplasias traditionally have served as the basis for analysis, in the population from Little Pico Creek (table 6.2) documentation included a presence/absence on selected teeth (that is, canines and premolars), which demonstrates the longest growth span and instance of juvenile occurrence—although differential tooth wear may be present.

DIETARY STRESS

While only 33 percent (N=3) of the subadult population showed evidence of enamel hypoplasia, of which two cases were judged to be mild, hypoplasia was identified in 63 percent of the adults. Of that 63 percent, however, 42 percent were members of the group burials, most markedly in group burial II, several of whom displayed severe enamel hypoplasia on all teeth, particularly on the incisors.

TRAUMA

Traumatic injury for four males (burials 9, 13, 14, 33) and five females (burials 5, 8, 11, 16, 28) is evident in the form of differentially healed fractures, particularly of the femur, tibia, radius, ulna, and metacarpal and metatarsal elements. On several individuals, the inventory also identified major remodeling and pitting on the proximal and distal portions of the tibia, femur, and humerus. This trauma may represent degenerative age damage. Traumatic injury for one female, burial 8, who was described as a robust individual with prominent cranial and long bone attachments, included not only the severe spinal trauma noted previously but also fractures of the distal radii, which were poorly healed and possibly abscessed, of the distal left ulna and proximal right ulna, of the proximal left tibia and of several metatarsals. The "parry fracture" of the forearm (ulna and/or radius) can be interpreted as occurring in defense of oneself from a blow. In addition to bilateral fractures of both the proximal ulnas and distal femora, burial 16 showed major trauma to the temporal mandibular fossa with major remodeling and accompanying tooth loss, suggesting force of impact, either from a fall or a blow.

Bilateral preauricular sulcus was documented for four females and is assumed to be related to child bearing.

DENTAL CARIES AND ABSCESSES

A low incidence of dental caries was noted; single caries on the molars or premolars were recorded for two subadults, one male, and two females. Two were documented for one male burial. Dental abscesses were more frequent and were recorded for five females and three males. Burial 16 had tooth loss and abscesses of all upper molars and two lower molars. Undoubtedly because of these abscesses, the maxillary alveolar border was porous, and the alveolar border of the mandible had receded. Reabsorption because of tooth loss was noted. While abscess and pulp exposure can result from carious activity on the occusal surface of the teeth, for at least two individuals these abscesses had resulted from structural abnormalities and crowding. In the case of burial 33, the left first molar had penetrated through to the sinus, and the alveolar border was lipped.

CONCLUSIONS

Osteological studies for skeletal populations from the central coast north of Santa Barbara County are limited. CA-SLO-406 in the Arroyo Grande watershed and CA-SLO-2 at Diablo Canyon provide some data in terms of mortality profiles and anthropometrics, but pathologies and dietary stressors were not investigated in any depth. At a coastal site to the north, CA-MNT-391 (Pierce et al. 1993), an Early period cemetery has supplied some comparative data. The mortality profile for remains from that cemetery shows two peaks: 15 to 19 and 40 to 44 years of age. The median age for both sexes was 40 years, and survival into the fifth decade was not uncommon. Data indicate that the general health of the group was good, and there was no demonstrative evidence for dietary deficiency. Moreover, only a low percentage of periosteal reaction (8%) and limited trauma were recorded.

In contrast, data for the population at Little Pico Creek demonstrated shorter life expectancy, a substantially larger percent of periosteal reaction (19%), and a high incidence of porotic hyperostosis (57% of the adults)—a pathology apparently absent in the population at CA-MNT-391.

For the population at Little Pico Creek, no argument is made for the frequency of pathological evidence as signaling the primary cause of death (Wood et al. 1992), that sur-

vival after the morbidity event is an indication of the general healthy state of the population (Ortner 1991), or that the co-occurrence of stress indicators and the early mean age at death points to less frailty and greater social advantage (Wood et al. 1992). Clearly, though, the subadults from Little Pico Creek do not demonstrate the multiple signs of physical stress that are evident in the adult skeletal remains, and consequently can be considered a relatively healthy group. Adults, on the other hand, do show evidence of multiple stressors—hypoplasia, periosteal reaction, and porotic hyperostosis—as well as an early age mortality rate. In light of the limited evidence among the children for dietary deficiencies and the iron-rich diet indicated by the vertebrate and invertebrate faunal remains recovered from the site, the argument can be made that morbidity in the Little Pico Creek population reflected exposure to infectious disease.

Walker (1986) has proposed that the preponderance of cribra orbitalia, as a form of porotic hyperostosis, among the adults over the age of 18 from the more isolated, smaller islands in the Santa Barbara Channel did not result from dietary deficiency. Instead, he has targeted as causal the parasitism associated with the consumption of raw fish and marine mammals and diarrheal disease. Iin the latter case, poor sanitary conditions on the islands presumably fostered enteric bacteria in a limited water supply. For residents of sites with more plentiful water sources, such as at mainland coastal sites, the occurrence of porotic hyperostosis would be less prevalent (Walker 1986).

Indeed, in the case of the skeletal sample from the coastal site, CA-MNT-391, this conclusion appears valid, given that the population did not display evidence of dietary deficiency, nor was there any more than minor evidence of infectious disease. As representing an Early period habitation, these people are hypothesized to have followed a mobile, foraging lifeway, with a strong reliance on iron-rich marine resources.

Despite an apparently equally iron-rich diet and presumably access to varied and adequate water sources, the young adult and adult population at Little Pico Creek suffered from a variety of pathologies and an early mortality rate, particularly among young females of a childbearing age. Such evidence suggests a relatively less mobile lifeway and more sedentary adaptation where pathogens would be more easily transmitted (Walker 1986) and reduced birth spacing would result from a sedentary adaptation.

7

Flaked Stone

THE FLAKED STONE ASSEMBLAGE from CA-SLO-175 and SLO-1259 includes cores, debitage, and formal and informal tools. These materials have been analyzed from two perspectives. The technology represented by the manufacture of those artifacts—specifically, the stages of core reduction and biface production—has been assessed; and the formal artifacts have been classified according to temporal types. A total of 7,588 items from CA-SLO-175 was analyzed, including 65 cores, 271 bifaces, 47 core tools, 7,128 pieces of debitage, and 77 flake tools. The assemblage from CA-SLO-1259 consists of 13,286 items including 26 cores, 37 bifaces, 13,197 pieces of debitage, and 26 flake tools.

Theoretical perspectives can affect interpretations of stone industries. The type and location of available raw materials, the basic strategies for their procurement and reduction, and the types of tools and residues associated with these strategies are the areas of main concern. Mobility (Bamforth 1991; Bouey and Basgall 1991), exchange (Moore 1989), and craft specialization (Arnold 1987; 1992c) are also of concern. Treatment of these issues is largely dependent upon assessments of the spatial distribution of flaked stone residues. Owing to a greater knowledge of stone source locations, research on these topics is better developed in northern Santa Barbara County (see Arnold 1992c). Based on a review of regional literature and an experiment with locally occurring Franciscan chert, our analysis of the Little Pico Creek flaked stone attempts to document the basics of local stoneworking techniques, as well as to consider trade and mobility.

RAW MATERIAL

A variety of raw material, including Monterey and Franciscan chert and obsidian, is represented among the Little Pico flaked stone materials. Derived from several distant sources, obsidian arrived at Little Pico Creek in the form of finished bifacial implements. Products of discrete geological formations, the two cherts vary in natural distribution and working qualities, which affects reduction strategies, models of exchange, and mobility.

Monterey chert

Sources. In this part of the coast range, the Monterey Formation generally occurs inland, on the eastern flank of the crest of the Santa Lucia Range, although isolated outcrops occur in the Little Pico Creek drainage, only 2 km upstream from CA-SLO-175. Dating to the Miocene, this formation is characterized by sandstone, shales, and other sedimentary rocks, with occasional chert. The chert tends to be banded in appearance, with alternate layers of white, black, brown, or grey. Aboriginally exploited outcrops and cobble sources of Monterey chert have been identified in the Santa Ynez Valley in western Santa Barbara County (Arnold 1992c), where they are the most common lithic material. Another source associated with a quarry/workshop deposit has been identified at CA-MNT-1255, 75 km northeast of Little Pico Creek on the Salinas River (Breschini and Haversat 1986); still others occur 40 km to the northeast in the San Antonio Valley. Monterey chert outcrop sources have not yet been positively identified in the immediate vicinity of CA-SLO-175 and SLO-1259, but there can be little doubt that some of the extensive scatters of Monterey chert debitage recorded in this vicinity (that is, the Piedras Blancas area) reflect the occurrence of nearby source locations. Monterey chert also occurs in cobble form among local conglomerates, where it can be found in low frequencies in cliff faces. A small finger of the Monterey Formation also occurs at San Simeon Point (Chipping 1987: III–12). A profusion of Monterey chert cores and core reduction-derived debitage at CA-SLO-268 at Piedras Blancas may reflect primary reduction of cobbles or pieces derived from that source (Bouey and Basgall 1991). At nearby San Simeon Creek, Rondeau (1986a:98) found evidence for reduction of both round cobbles and tabular slabs of Monterey chert. Monterey chert was not evident in Little Pico Creek itself, although it likely occurs in very small frequencies. The lack of refined knowledge of the locations of Monterey chert sources on the northern San Luis Obispo coast constrains our ability to understand the manner in which this stone was reduced and distributed across the landscape.

Rondeau (1986a) reported a decrease in Monterey chert

relative to Franciscan chert at sites CA-SLO-186, CA-SLO-187, and CA-SLO-383 at San Simeon. Eighty-nine percent of debitage from CA-SLO-383, an Early period site, was Monterey; however, CA-SLO-187 (Middle period), and CA-SLO-186 (Late) were dominated by Franciscan stone. This change in preferred material appeared to correspond with a decrease in biface manufacture and an increase in primary reduction. This shift may have been the result of increased reliance on Franciscan chert because its cobbles require more reduction to create bifaces or may have corresponded with the appearance of the bow and arrow, as arrow point flake blanks were most commonly derived from a simple core/flake technology.

Workability and reduction strategies. A basic reduction sequence for Monterey chert has been proposed by Rondeau (1986b) on the basis of findings from CA-MNT-1255 and CA-MNT-1293. He posits that cobbles and/or quarry slabs were reduced into cores, from which large flakes were produced. These flakes were in turn either slightly modified into flake tools or reduced into bifaces. Because Monterey chert generally occurs in a tabular form, bifacial cores (that is, stage 1 bifaces) could probably be manufactured by direct freehand percussion of long, thin, tabular cobbles.

More research has been devoted to the role of thermal alteration in the reduction of Monterey chert. Use of heat to improve the workability of cherts has been demonstrated to be effective on cherts from other parts of North America by Crabtree and Butler (1964) and Hester (1972). Several replicative experiments applying heat to Monterey chert have confirmed that Monterey chert is more effectively knapped after heat application (Parsons 1987; Moriarity 1988 cited in C. D. King et al. 1989). C. D. King et al. (1989), Parsons (1987), and Rondeau (1986a:97) have all arrived at very similar conclusions regarding the detection of heat treatment among archaeological stone residues, in that the most easily detected signatures of heat application—pot-lidding and crazing—are generally signs of dysfunctional heating. Such characteristics are likely the result of postdepositional exposure to incidental fires. Parsons (1987) further concluded that effective thermal alteration could only be reliably identified through use of scanning electron microscopy. C. D. King et al. (1989) likewise report that surface luster, another trait often attributed to heat application, cannot consistently be detected on heat-treated pieces.

Monterey chert bifaces occur in high densities at several locations on the central coast including Point Año Nuevo (Hylkema 1991) and northern Santa Barbara County (Arnold 1992c). Alternative explanations for the functions of these bifaces include their use as finished tools or preforms intended for transit and use elsewhere (Arnold 1992c; Spanne 1975).

Rondeau (1986a) found no evidence for bipolar reduction of Monterey or Franciscan chert at San Simeon, supporting his (1987) contention that this technique was more common in northern California. However, bipolar debitage and cores of both Monterey and Franciscan chert were reported in low frequencies at Piedras Blancas (Bouey and Basgall 1991: A16).

Franciscan chert

Sources. Franciscan chert occurs either in beds of the Franciscan Formation or in cobble form among more recent conglomerates such as the Sespe, Temblor, or Careaga Sandstone formations (Moore 1989:81). The Franciscan Formation, a melange of volcanics, metavolcanics, sandstone, shales, schists, and occasional chert, occurs on the western slope of the coast range, in a band 10 to 20 km in width. At Little Pico Creek this formation extends to the shoreline, fronting the seacliff for some distance to the north and south. Outcrops of the Temblor Formation occur several kilometers inland from San Simeon State Beach. Franciscan cherts are green, red, orange, yellow, brown, and tan, with frequent mottling of multiple colors. Cobbles of Franciscan chert are abundant in both the Little Pico and Pico creek beds and on the beach adjacent CA-SLO-175 and CA-SLO-1259. Indeed, this type of raw material appears to be available in cobble form in many of the creeks draining the Santa Lucia Range. Cobble sources associated with quarry/workshops have been identified at the mouth of the Big Sur River and along Morro Creek. A prehistorically exploited outcrop of this material has been identified at CA-SLO-1210, 10 km northeast of CA-SLO-175 on Marmolejo Creek (Christian 1987). It is also likely that some of the extensive flake scatters identified by West and Sekkel (1968) on the Hearst property correlate with sources of Franciscan stone.

Workability and reduction strategies. Moore (1989), who derived his conclusions from a quarry site at CA-SBA-828, provides the most thorough description of the properties of Franciscan chert. At that source, Moore noted that Franciscan chert is extremely hard, and when struck with a hammerstone, tended to produce flakes with crazed surfaces rather than clean flake scars. He suggested that a bipolar strategy was probably necessary for reduction and that a lower frequency of production failures and interior flaws was evident with Franciscan as opposed to Monterey chert.

In an attempt to develop an understanding of the most effective reduction strategies for locally occurring Franciscan chert, a simple replication experiment was conducted using cobbles collected from beaches near the outlets of Little Pico and Pico creeks. Reconnaissance of these beaches revealed that pieces of Franciscan stone were ubiquitous and tended to occur in two forms: flattish, strongly rounded cobbles and

pebbles generally no greater than 10 cm in diameter; and larger, more angular, irregular slabs, generally 15 to 20 cm in length and 4 to 7 cm in thickness. Cherts at both beaches were predominantly red, although some green was present as well. In contrast with the description of Franciscan stone found in northern Santa Barbara County (Moore 1989), the material from the creeks proved to be of highly variable quality. Many pieces exhibited highly visible flaws; others exhibited pockets of dense, imperfection-free stone. Flaws were most evident on the larger slabs. The shapes of a majority of the natural slabs and cobbles posed problems in respect to potential reduction, because they were thick and/or blocky. Despite these drawbacks, a large quantity of potentially usable stone was collected relatively quickly from the Pico Creeks beaches. Replicating large bifaces and projectile points found in the Little Pico Creek assemblage was our goal. Although there is no way to be certain that the techniques employed were the same as those used by prehistoric knappers, we were able to replicate the majority of Franciscan chert items found in the Little Pico Creek assemblage with relative ease.

The often poor quality of the material seemed to dictate the logic of reduction. Initial reduction of cobbles and slabs was essentially an attempt to generate flake blanks large and flat enough to serve as cores that could be reduced into bifacial preforms. The most effective technique for producing suitable blanks was bipolar reduction of cobbles. Direct freehand percussion of slabs and cobbles also yielded usable flake blanks, but attempts to reduce slabs bifacially into blanks (see Callahan 1979:10a) failed. Our observations on the value of bipolar reduction differ somewhat from those offered by Rondeau (1987), who suggested that the technique was most suited for generating small flakes to use as informal tools or arrow point flake blanks. We found that round, flat Franciscan chert cobbles were effectively split into large, flat, useful cores and flakes using the bipolar technique and that in many instances bipolar percussion seemed to be the only way to obtain useful flakes from these sources.

To evaluate the usefulness of heat application, we selected a group of large flakes, (derived from both bipolar reduction and direct freehand percussion) and a single small slab for heating. The pieces were covered with sand, baked with charcoal for six hours, and allowed to cool over night. Once cooled, the flakes were retrieved, thoroughly examined, and worked. Consistent with the observations reported by Parsons (1987) and C. D. King et al. (1989), the thermally altered flakes exhibited almost no visual signs of treatment. Their workability was, however, greatly improved. A few flakes exhibited a greater luster but most did not. None showed pot-lidding or crazing, but all were much less prone to crumbling than before heating. The thermally altered flakes were readily knapped into bifacial preforms and pressure flaked into projectile points (fig. 7.1). The single heated slab was unevenly heated and showed no improvement in flaking, as it crumbled after a few blows. From this limited experiment, we concluded that this material is readily improved by heating, although cobbles and slabs are difficult, if not impossible, to heat evenly.

The residues resulting from this experiment have direct implications for the classification employed in the flaked-stone analysis. This was particularly true for the by-products of initial reduction of raw stone, in that attempts to generate flakes from the cobbles and slabs resulted in a significant volume of decortication flakes and large (>50 mm) amorphous chunks. The latter are best described as angular and cortical shatter, but they are so large that they could easily be classified as cores. Bipolar reduction was much more efficient, producing fewer waste flakes and consistently larger and more usable pieces. Some of the bipolar flakes exhibited sheared bulbs of percussion, but much of the shatter was indistinguishable from that derived from direct freehand percussion.

DEFINITIONS AND METHODS

Flaked stone from CA-SLO-175 and SLO-1259 has been classified on the basis of macroscopic observation into five morphological categories: cores, core tools, bifaces, debitage, and flake tools. The length, width, thickness, and weight of all cores, core tools, and bifaces were recorded (tables A.19–A.25). Additional attributes recorded for cores included form, type, and number of platforms. Bifaces were classified according to stage of manufacture, following a modified version of the Callahan (1979) reduction sequence originally developed by Flenniken (1980) and since modified by Gilreath (1989) and Skinner (1986, 1990). Debitage has been classified according to the same reduction sequence.

Cores

Based on the results of the Franciscan chert replication, cores have been defined as any large piece of workable stone, not obviously a biface or tool, that exhibits at least one exposed scar indicative of working. These are essentially the by-products of initial reduction of chert cobbles and slabs. In nearly all cases, these pieces are actually large pieces of debitage. Their classification as cores is based on their large size. Many of these cores are fragments of what Callahan (1979:62) classified as cobble cores (stage 1 bifaces).

Core tools

Core tools are products of a simple core/flake reduction strategy. They are generally cobbles or chunks exhibiting removal of flakes to form a working edge. Many of these could be classified functionally as "choppers," whereas the presence of cutting edges and extensive battering on remaining cor-

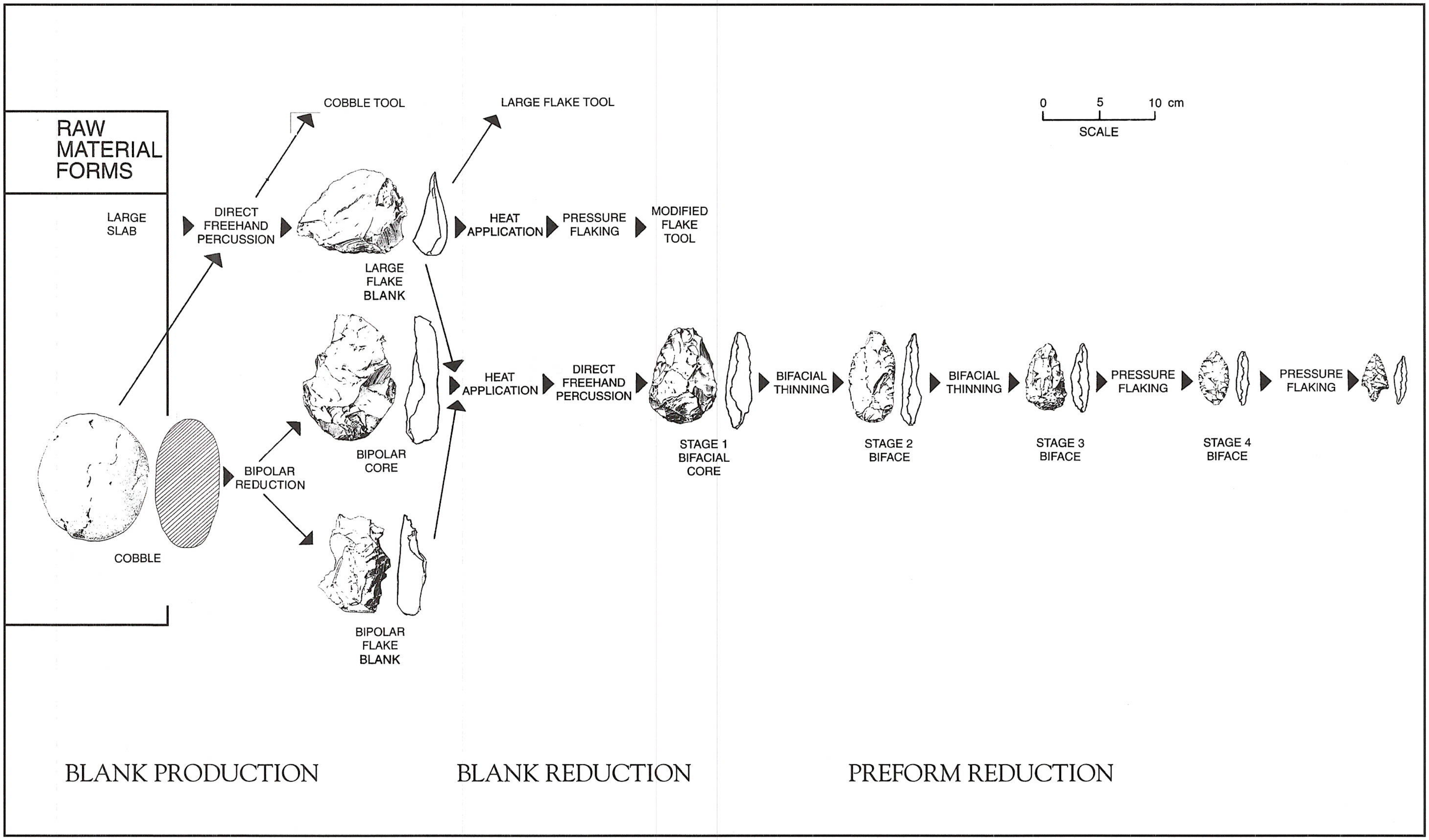


FIGURE 7.1 Experimentally derived reduction sequence for Franciscan chert from Little Pico Creek

tical surfaces on others suggests that they were multifunctional.

Bifaces

The most thorough treatment of central coast bifaces is Arnold's (1992c) analysis of bifacial preforms from the Vandenberg area of northern Santa Barbara County. Arnold's classification follows Callahan's (1979) stage system closely. Our classification employs stages, similar to those of Callahan and Arnold, but with some modifications. These differences are relatively inconsequential, but we have attempted to be explicit in our classificatory terminology to make sure that reasons for our approach are understood.

Building on the earlier work of Muto (1971) and Sharrock (1966), Callahan's (1979) replicative analysis of bifacial tool production provides the most widely accepted system for biface classification. Developed on the basis of an analysis of fluted projectile points from the east coast of North America, Callahan (1979:9) divides biface production into eight stages, of which only the first five are relevant to nonfluted points:

Stage 1	Obtaining the blank
Stage 2	Initial edging
Stage 3	Primary thinning
Stage 4	Secondary thinning
Stage 5	Shaping

The criteria used to define stages in the Callahan system are width/thickness ratios, which are considered indices of cross-section shape. Biface reduction stages were defined by specific ranges of ratios as follows (Callahan 1979:18):

Stage 2	2.00–3.00
Stage 3	3.01–4.00
Stage 4	4.01–5.00
Stage 5	4.01–6.00+

As applied by Arnold (1990, 1992c) and Bamforth (1991), this system has provided a reasonable vehicle for analysis of flaked-stone collections from northern Santa Barbara County, but we encountered difficulties in applying Callahan's width/thickness ratios to the CA-SLO-175 and -1259 materials. Perhaps because of the density of local cherts and the difficulty with thinning, few bifaces from CA-SLO-175 or -1259 produce width/thickness ratios greater than 4.00. Indeed, many complete projectile points yielded ratios less than 3.00. As these measurements show, the use of incompletely or poorly thinned bifaces as finished tools is a characteristic of the local biface industry. Bamforth (1991:221) drew a similar conclusion on the basis of microscopic analysis of biface edgewear, which revealed that stage 2 and 3 Monterey chert bifaces from the Vandenberg area had been hafted as finished tools. Still, there appears to be more morphological and technological variability in the local biface industry than is recognized in the Callahan system. As a consequence, a biface reduction classification employing more qualitative technological criteria has been adopted. This system was originally developed by Flenniken (1980) and has since been modified and applied to California biface industries by Gilreath (1989) and Skinner (1986, 1990). It has been applied locally by Bouey and Basgall (1991:29). We have not undertaken edgewear analysis, but we consider stage 1 to 4 bifaces to be cores/preforms. Edgewear analysis of the Vandenberg bifaces has shown that few early stage bifaces exhibit evidence of use (Arnold 1992c:76). Biface reduction stage definitions are as follows:

Stage 1. In the Callahan system a stage 1 biface is not actually a biface, but a piece of selected, unmodified or minimally modified stone. In our system, stage 1 bifaces are large, thick, and crude bifacial cores, which reflect the initial reduction of flake blanks. With the locally available Franciscan chert, these bifaces were created by bifacially reducing large heat-treated flakes or small thin slabs. Generally thick and crude, lenticular or irregular in cross section, they exhibit sinuous margins and rough bifacial edges. Less than 50 percent of the perimeter edge is shaped, except at the ends, and they are irregular in outline. They correlate with the crudest of Callahan's (1979) stage 2 bifaces.

Stage 2. These bifaces are shaped strictly by percussion and are often semirectangular in outline. Generally lenticular in cross section, with closely to semiregularly spaced flake scars, they exhibit a moderate degree of variability in flake scar morphology. Our stage 1 and stage 2 bifaces would be collapsed into Callahan's stage 2.

Stage 3. Percussion-thinned preforms, flattened in cross section, these bifaces have relatively regularly spaced flake scars and a low degree of variability in flake scar morphology. They tend to be rather regular in outline (Callahan 1979:30).Bifaces can exhibit pressure flaking at either stage 3 or 4 in Callahan's system, but we restrict pressure flaking to stages 4 and 5.

Stage 4. Thin partially pressure-flaked preform, these bifaces reflect intentional shaping to conform with a predetermined outline (Skinner 1990:220).

Stage 5. These are finished, pressure-flaked tools: large projectile points, drills, or knives, complete with notches, serrations, or basal modifications to accommodate hafting (Skinner 1990:220).

Our stages 1 to 4 equate with Arnold's (1992c) stages 2 to 4 preforms.

Debitage

Debitage has been classified into morphological flake types, defined as follows:

Primary decortication flakes. This flake type, derived from removal of cortex from cobbles is characterized by a dorsal surface with at least 75 percent cortex. These commonly result from reduction of cobbles but can occur during any stage of reduction.

Secondary decortication flakes. These exhibit dorsal surfaces with 25 to 75 percent cortex.

Rectilinear flakes. Long, narrow, and rectangular in outline, they resemble, but are not, blades in the classic sense (Crabtree 1972:42).

Bipolar flakes. These retain the traits defined by Flenniken (1980), including a sheared bulb of percussion, steep platform angle, and pronounced compression rings. Bipolar reduction also produces shatter indistinguishable from that generated by direct freehand percussion.

Simple interior flakes. Simple interior flakes have fewer than three dorsal flake scars.

Complex interior flakes. Similar to simple interior flakes, these exhibit three or more dorsal flake scars.

Alternate flakes. Crabtree defines alternate flaking as removing flakes "alternately from the same edge from first one edge then the other" (1972:33). This is also referred to as side-striking and is intended to prepare an edge from an angular or flat surface (Skinner 1990:389). Flakes resulting from this procedure generally exhibit a platform offset from the perpendicular length of the flake. These flakes are commonly associated with early stage reduction.

Early biface thinning flakes. Biface production is represented by biface thinning flakes and pressure flakes. Early biface thinning flakes commonly exhibit a fairly simple dorsal morphology, are relatively thick in cross section, and show little curvature (Skinner 1990:392). Often fairly large, they are usually associated with the early stages of reduction and generally exhibit little or no cortex.

Late biface thinning flakes. Late biface thinning flakes are thinner than early biface thinning flakes, with more dorsal complexity and less curvature.

Pressure flakes. Pressure flakes result from the final thinning and shaping of a tool. Small, generally longer than they are wide, and exhibiting a distinctive punctate platform, they usually are aligned along a single arris. They are associated with reduction of stage 3 bifaces to partially pressure-flaked stage 4 preforms, as well as the reduction of the preform to a finished bifacial tool (stage 5 biface).

Edge-preparation flakes. Edge or platform preparation flakes are small pieces of debitage resulting from a variety of techniques intended to prepare a platform for the removal of larger flakes. They can occur during any stage of reduction.

Edge preparation/pressure. In many instances, particularly in the reduction of chert, pressure flakes cannot be distinguished confidently from edge-preparation flakes. Most of the flakes in this class are probably pressure flakes, and this class can be correlated with biface reduction.

Angular shatter. Shatter consists of blocky, irregularly shaped chunks, lacking any regularized morphology. Shatter can be generated during any stage in the reduction and is considered technologically nondiagnostic.

Indeterminate percussion. Technologically nondiagnostic, these flakes can only be classified as representing percussion as opposed to pressure flaking.

The manner in which these flake types reflect bifacial reduction has been determined by collection and analysis of debitage generated in the replicative experiment with Franciscan chert cobbles. Since this analysis employed only the most abundant flake types, it shows that most flake types are not exclusively representative of any single stage of reduction. Rather, proportional changes in flake types occur through the course of the reduction from cobble, to blank, to preform, to finished bifacial tool. Primary decortication, secondary decortication, bipolar, simple interior, and complex interior flakes, all generally considered core/flake debitage, dominate the early stages of reduction, particularly blank production and reduction (table 7.1). Not surprisingly, biface-derived debitage dominates stage 1–5 reduction (that is, reduction of preforms into finished tools). The total debitage collection, representing the full reduction is dominated by biface-derived debitage. Production failures, which are most common during the earlier stages of preform manufacture, would increase the representation of early reduction debitage in a collection. Resharpening or rejuvenation of stage 5 bifaces would add to the biface-associated debitage.

Flake tools

Flake tools are defined here as flakes which exhibit patterned macroscopic edge modification (that is, continuous along a portion of the flake edge). In some instances flake tools reflect a simple core/flake technology; however, flake tools

Table 7.1 Experimentally derived debitage frequencies from bipolar reduction of Franciscan chert cobble (blank production) and resulting cortical flake blank (blank reduction) into a stemmed projectile point (preform reduction)

	Blank production		*Blank reduction*		*Stage 1–2*		*Stage 2–3*		*Stage 3–4*		*Stage 4–5*		*Total*	
Flake type	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Primary decortication	2	9.5	4	7.0	2	4.3	4	6.3	1	1.4	0	0.0	13	4.3
Secondary decortication	2	9.5	2	3.5	1	2.1	0	0.0	0	0.0	0	0.0	5	1.6
Bipolar	3	14.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	1.0
Simple interior	9	42.9	23	40.4	9	19.1	13	20.6	13	17.7	2	4.5	69	22.6
Complex interior	4	19.0	8	14.0	8	17.0	6	9.6	1	1.4	0	0.0	27	8.8
Subtotal	20	95.2	37	64.9	20	42.5	23	36.5	15	20.5	2	4.5	117	38.3
Early biface thinning	0	0.0	5	8.8	4	8.5	4	6.3	6	8.2	1	2.3	20	6.6
Late biface thinning	0	0.0	5	8.8	13	27.7	4	6.3	15	20.5	6	13.6	43	14.1
Edge preparation/pressure	1	4.8	10	17.5	10	21.3	32	50.9	37	50.8	35	79.5	125	41.0
Subtotal	1	4.8	20	35.1	27	57.4	40	63.5	58	79.5	42	95.4	188	61.7
Grand total	21	100.0	57	100.0	47	100.0	63	100.0	73	100.0	44	100.0	305	100.0

SUMMARY

	Preform production		*Stage 1–5 reduction*	
Flake type	N	%	N	%
Primary decortication	6	7.7	7	3.2
Secondary decortication	4	5.1	1	0.4
Bipolar	3	3.9	0	0.0
Simple interior	32	41.0	37	16.3
Complex interior	12	15.4	15	6.6
Subtotal	57	73.1	60	26.5
Early biface thinning	5	6.4	15	6.6
Late biface thinning	5	6.4	38	16.7
Edge preparation/pressure	11	14.1	114	50.2
Subtotal	21	26.9	167	73.5
Grand total	78	100.0	227	100.0

could be generated at any stage in either core or biface reduction.

LITTLE PICO CREEK COLLECTIONS

Cores

CA-SLO-175. Cores included only those specimens recovered by Caltrans in 1989. The Abrams collection includes a substantial number of cores (146 are identified in the catalog), but a brief visual comparison of those specimens with the items recovered by Caltrans in 1989 suggested that the Caltrans collection is reasonably representative of the site. Sixty-five cores were recovered from CA-SLO-175; forty-two of Franciscan chert, twenty-two of Monterey chert, and one of quartzite. Dimensions range from 31.5 to 109.5 mm in length, 25.5 to 99.5 mm in width, 12.5 to 55.0 mm in thickness, and 29.2 to 466.9 in weight (table A.19), with the following statistical parameters:

length	x = 69.7 mm	sd = 9.4
width	x = 52.6 mm	sd = 13.8
thickness	x = 30.9 mm	sd = 8.5
weight	x = 125.1 gm	sd = 96.0

Types are dominated by assayed chunks and cobbles: twenty (15 Franciscan) and seventeen (13 Franciscan) specimens respectively, fifteen bifacial forms (7 of Franciscan), seven unidirectional (3 Franciscan), one multidirectional (Franciscan), two bidirectional (Monterey), and two bipolar (1 Franciscan and 1 Monterey). All but six of the specimens retain some cortex, which is commonly a weathered rind. Raw forms include twenty-one chunks (15 Franciscan), thirteen flakes (7 Franciscan), thirteen tabular cobbles (5 Franciscan), nine split cobbles (6 Franciscan and 1 quartzite), six globular cobbles (5 Franciscan), and three angular cobbles (all Franciscan). Thirty-six primary platforms are on interior surfaces (22 Franciscan) and the remaining twenty-nine are on cortical surfaces (20 Franciscan). Four cores (specimens 484-005, -298, -353, and -424) were burned, as indicated by extensive pot-lidding and crazing. The number of platforms present on each specimen ranges from one to two. Thirty-nine (32 Franciscan) specimens exhibit a single platform.

CA-SLO-1259. Twenty-six cores were recovered from CA-SLO-1259; eighteen of Franciscan chert, seven of Monterey chert and one of quartzite. Dimensions range from 38.5 to 111.3 mm in length, 28.0 mm to 78.5 in width, 17.0 to 61.0 mm in thickness, and 26.4 to 436.8 g in weight (table A.20),

with the following statistical parameters:

length	x = 72.3 mm	sd = 17.4
width	x = 54.2 mm	sd = 11.2
thickness	x = 35.1 mm	sd = 10.6
weight	x = 165.2 gm	sd = 98.4

Types are dominated by assayed cobbles and chunks: eight specimens each (7 Franciscan chunks and 6 Franciscan cobbles), four bifacial forms (2 of Franciscan), three unidirectional (2 Monterey, 1 quartzite), two nonpatterned (both Franciscan), and one bipolar (Franciscan). All but six of the specimens retain some cortex, which is commonly a weathered rind. Raw forms include ten chunks (7 Franciscan), 6 globular cobbles (all Franciscan), four flakes (2 Franciscan, 1 quartzite), three split cobbles (2 Franciscan), and three tabular cobbles (1 Franciscan). Sixteen primary platforms are on interior surfaces and the remaining ten are on cortical surfaces. Two cores (specimens 485-136 and -287) were burned, as indicated by extensive pot-lidding and crazing. While the number of platforms present on each specimen range from one to three single platforms are most common and are predominantly Franciscan chert (N=13). The remaining single platform core is quartzite.

The abundance of cores in the deposit corresponds with the quantity of Franciscan chert cobbles in the Little Pico Creek streambed and on the adjacent beach, where, however, no examples of Monterey chert were evident at the time of the 1989 excavation. Variation in form probably relates to differences in the form in which these cherts occur. The cobble cortex exhibited on most of the specimens suggests that both Monterey and Franciscan occur as cobbles in this area. Monterey chert, however, tends to occur in tabular cobbles because of its banded structure; Franciscan occurs in a more globular form. Many of the Franciscan chert cores appear to be cobbles that were assayed and rejected because of excessive imperfections.

It is not surprising that Franciscan chert dominates the cores from both sites. These items are best conceived of as the broken remnants from the reduction of locally occurring cobbles and slabs. Presumably the items that were obtained from this reduction—large flake blanks—would have been subsequently reduced into bifaces.

Core tools

CA-SLO-175. A total of forty-seven core tools was recovered from CA-SLO-175, including forty-five reported by Abrams in the collection catalog and two recovered by Caltrans in 1989 (table A.21). The Abrams specimens could not be relocated in 1989. According to catalog entries, fifteen of these implements were made from Franciscan chert, nine of Monterey, and twenty-three are of an indeterminate chert. The two examples recovered by Caltrans are generally rather crude, having been formed by the removal from fist-sized cobbles of several flakes from opposing striking platforms to create a working edge. They have been distinguished from cores on the basis of the presence of shaped working edges. Specimen 484-090 consists of a fist-sized cobble of Franciscan chert, from which three cortical flakes were removed to create a crude working edge. This specimen, recovered during monitoring for abutment 4, measures 85.5 mm in length, 63.5 mm in width, 40.5 mm in thickness, and weighs 289.4 g. Specimen 484-021, a surface find near the abutment, also made of Franciscan chert, exhibits a single broad, blunt projection and can best be classified as a drill or graver (fig. 7.2).

CA-SLO-1259. No core tools were recovered from CA-SLO-1259.

Bifaces

CA-SLO-175. A total of 394 bifaces was recovered from CA-SLO-175: 329 by Abrams in 1965–1966, and 65 by Caltrans in 1989 (tables A.22–A.25). Two hundred and six of the Abrams bifaces were randomly selected for the current study, making a total population for analysis of 271 specimens. One hundred and eighty-three of the analyzed bifaces were Monterey chert, sixty-six were Franciscan, fourteen were indeterminate chert, and eight were obsidian. All five reduction stages are represented in the CA-SLO-175 collection.

Stage 1. Seventeen stage 1 bifaces were analyzed, including fourteen from the Abrams collection and three recovered by Caltrans in 1989 (fig. 7.3). Six of those bifaces were formed from Franciscan chert, and eleven were from Monterey. Summary statistics for the stage 1 bifaces are as follows:

length	range = 51.0–79.5	x = 62.8 mm	sd = 10.0
width	range = 30.5–61.7	x = 42.7 mm	sd = 9.1
thickness	range = 12.0–24.0	x = 15.0 mm	sd = 5.2
weight	range = 24.6–77.5	x = 43.8 gm	sd = 24.6

Stage 2. Eighty-two stage 2 bifaces were identified, including 58 from the Abrams collection and 24 recovered by Caltrans in 1989 (figs. 7.4 and 7.5). Twenty of this class were made from Franciscan chert and 62 from Monterey. Summary statistics for the stage 2 bifaces are as follows:

length	range = 47.0–110.0	x = 60.6 mm	sd = 15.9
width	range = 21.5–59.0	x = 38.1 mm	sd = 8.8
thickness	range = 8.5–29.0	x = 15.9 mm	sd = 4.3
weight	range = 23.3–126.8	x = 47.4 gm	sd = 29.5

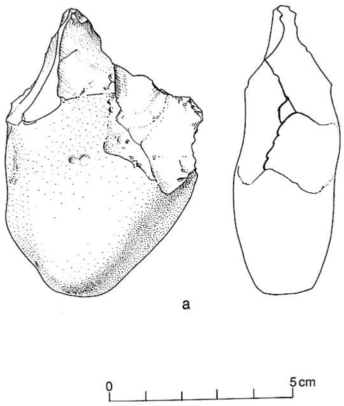


FIGURE 7.2 Core tool from CA-SLO-175: 484-021. *Illustration by Rusty van Rossman*

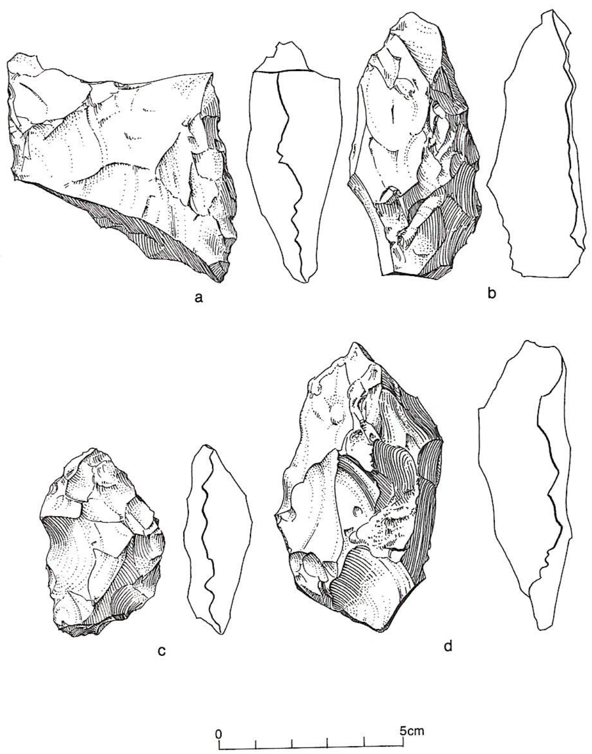


FIGURE 7.3 Stage 1 bifaces from CA-SLO-175: *a*, 511-839; *b*, 511-SE15SW90:4; *c*, 511-462; *d*, 511-NW70NE15:1. *Illustration by Rusty van Rossman*

Stage 3. Twenty-seven stage 3 bifaces include eighteen from the Abrams collection and nine recovered by Caltrans in 1989 (fig. 7.6). Six of these bifaces were made from Franciscan chert and 21 from Monterey. Summary statistics for the stage 3 bifaces are as follows:

length	range = 32.5–100.0	x = 62.0 mm	sd = 20.6
width	range = 22.0–44.0	x = 32.4 mm	sd = 6.5
thickness	range = 5.0–18.0	x = 10.7 mm	sd = 3.1
weight	range = 4.7–55.6	x = 26.2 gm	sd = 16.7

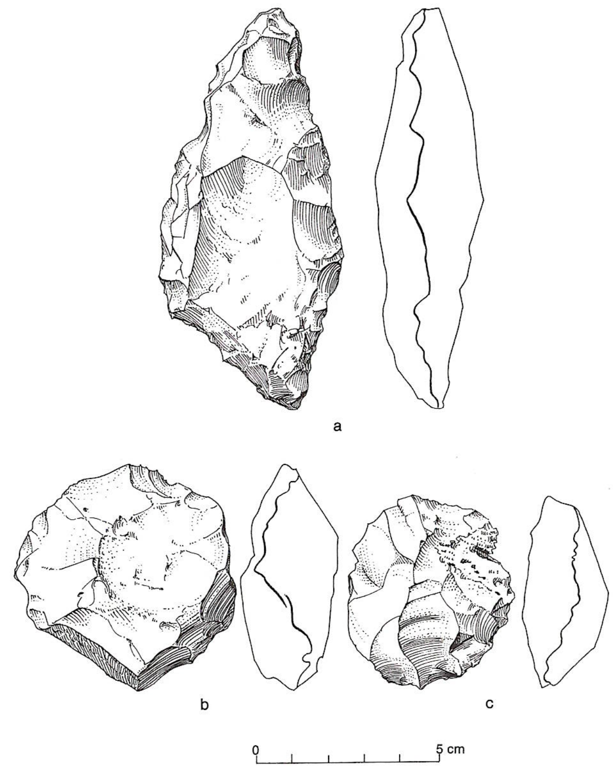


FIGURE 7.4 Stage 2 bifaces from CA-SLO-175: *a*, 511-NW150NE0:3; *b*, 511-041; *c*, 511-924. *Illustration by Rusty van Rossman*

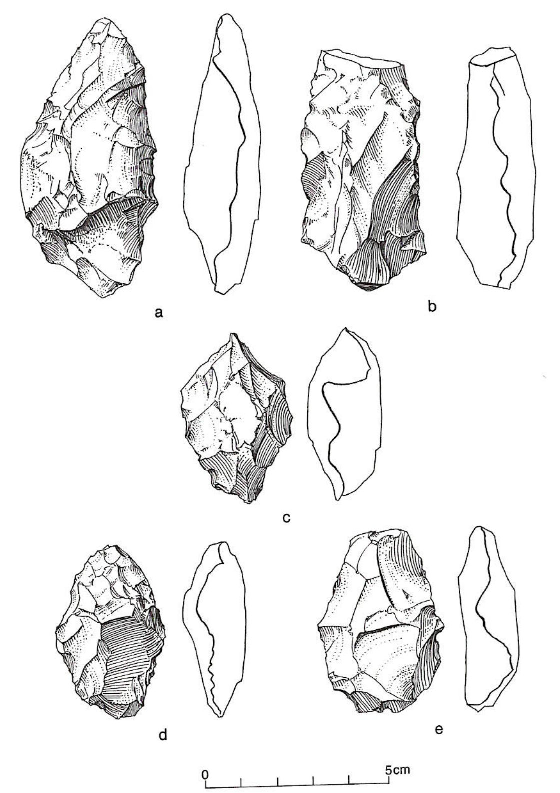


FIGURE 7.5 Stage 2 bifaces from CA-SLO-175: *a*, 511-SE15SW90:8; *b*, 511-140NE-57.40; *c*, 511-967; *d*, 511-SE20SW90:3; *e*, 511-B15a. *Illustration by Rusty van Rossman*

Stage 4. Twelve stage 4 bifaces include nine from the Abrams collection and three recovered by Caltrans in 1989. Three of these bifaces were formed from Franciscan chert and 10 from Monterey. Summary statistics for the stage 4 bifaces are as follows:

length	range = 42.0–48.0	x = 45.0 mm	sd = 4.2
width	range = 21.0–41.0	x = 30.4 mm	sd = 8.8
thickness	range = 7.5–17.0	x = 10.8 mm	sd = 3.4
weight	range = 9.0–23.2	x = 16.1 gm	sd = 10.0

Stage 5. A total of 122 stage 5 bifaces was identified: 119 of which are projectile points, and 3 of which are of indeterminate function (table A.24). One hundred and nine of the points were from the Abrams collection. Seventy of the projectile points were made from Monterey chert, thirty were made from Franciscan, 14 from indeterminate chert, and eight from obsidian.

Miscellaneous. An additional 14 miscellaneous bifaces were recovered from CA-SLO-175, consisting of fragments for which neither stage nor function could be determined (table A.24). Three of these specimens were made from Coso obsidian, ten are of Monterey chert and one is Franciscan chert.

Bifaces manufactured from Monterey chert outnumber those made from Franciscan by a ratio of roughly 3:1, and all stages of reduction are in evidence. Frequencies of stage 3 and 4 bifaces are particularly low for Franciscan chert, and may relate to the higher incidence of primary reduction of that chert (table 7.2). It is also worth noting that the ratio of Franciscan to Monterey chert is reversed between cores and bifaces; Franciscan chert dominates the cores (2:1), but Monterey chert dominates the debitage and all stages of bifaces. This again suggests that the activity most reflected by the debitage and cores was the assaying of natural Franciscan chert cobbles, many of which were probably unsuitable for reduction to bifaces. The high frequency of stage 2 Monterey chert bifaces correlates with the Monterey chert debitage, which shows a high frequency of early biface thinning flakes. In combination with the fact that most of the Monterey chert stage 2 bifaces are broken (table A.23), the occurrence of these materials suggests that Monterey chert most commonly arrived on-site in the form of stage 1 bifaces that subsequently were reduced.

CA-SLO-1259. *Stage 1*. Seven stage 1 bifaces were recovered from CA-SLO-1259, including two made from Franciscan chert and five of Monterey (tables A.25, figs. 7.7 and 7.8). Summary statistics for the stage 1 bifaces are as follows:

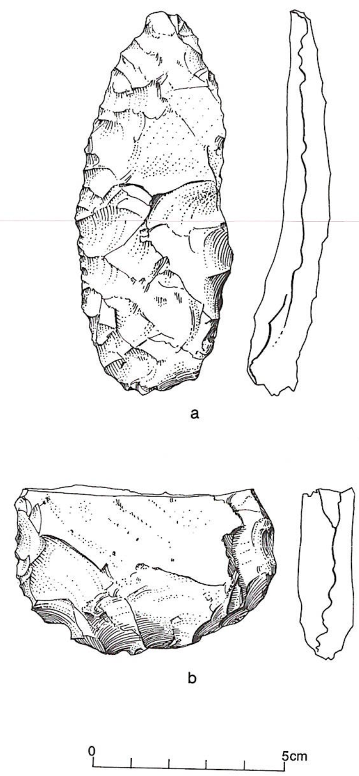


FIGURE 7.6 Stage 3 bifaces from CA-SLO-175: *a*, 511-SE20SW90:10(2); *b*, 511-SE10SW90:6. *Illustration by Rusty van Rossman*

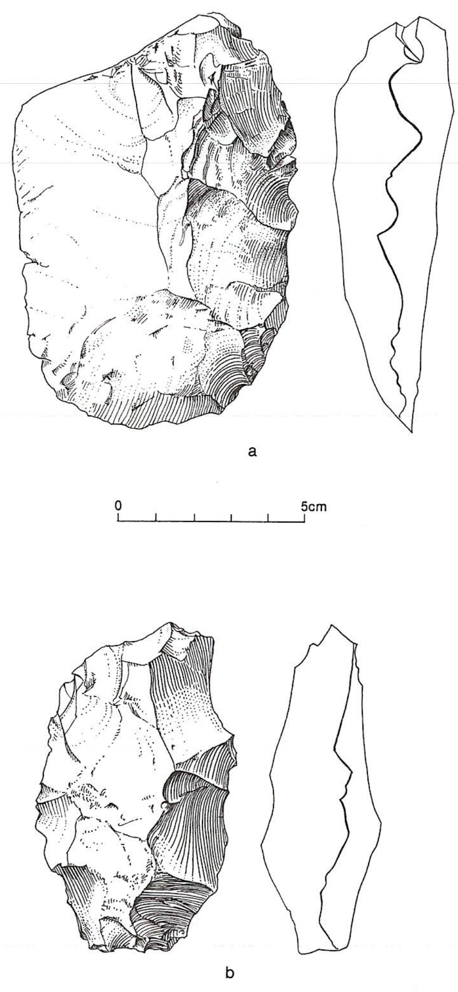


FIGURE 7.7 Stage 1 bifaces from CA-SLO-1259: *a*, 485-046; *b*, 485-135. *Illustration by Rusty van Rossman*

length	range = 57.0–90.0	x = 73.5 mm	sd = 23.3
width	range = 50.0–70.0	x = 60.7 mm	sd = 10.1
thickness	range = 24.5–31.2	x = 27.2 mm	sd = 3.5
weight	range = 55.8–113.0	x = 84.4 gm	sd = 40.4

Stage 2. Ten stage 2 bifaces were recovered, all of which were formed from Monterey chert (table A.25, fig. 7.8). Summary statistics for available metric dimensions of the stage 1 bifaces are as follows:

width	range = 26.4–59.0	x = 47.0 mm	sd = 14.3
thickness	range = 9.6–19.0	x = 13.7 mm	sd = 3.2

Stage 3. Two stage 3 bifaces were identified, including one each of Franciscan and Monterey chert (table A.25). Summary statistics for the stage 3 bifaces are as follows:

width	range = 25.0–26.7	x = 25.9 mm	sd = 1.2
thickness	range = 8.5–8.6	x = 8.6 mm	sd = 0.1

Stage 4. Three stage 4 bifaces were recovered, including one made from Franciscan chert and 2 of Monterey (table A.25). The stage 4 bifaces are all too fragmentary for meaningful summary of metric dimensions.

Stage 5. Eleven stage 5 bifaces were recovered, all of which are projectile points. Six were manufactured from Monterey chert, four from Franciscan chert, and one is obsidian. These are discussed in more detail below.

Miscellaneous. An additional four bifaces were identified at CA-SLO-1259, consisting of fragments for which neither stage nor function (for example, projectile point or drill) can be determined. All of these specimens were manufactured from Monterey chert.

Much of what can be ascertained from the CA-SLO-1259 bifaces is similar to the conclusions drawn from the CA-SLO-175 materials. Monterey chert outnumbers Franciscan by a ratio of roughly 3:1, and all stages of reduction are in evidence (table 7.3). The numbers of stage 3 and 4 bifaces are again low for both cherts, but there are more stage 5 bifaces. Again, the proportion of Monterey/Franciscan cherts manifested in the cores (18 Franciscan, 7 Monterey) is not reflected in the bifaces, which are predominately of Monterey, reflecting more primary reduction of Franciscan chert.

Debitage

CA-SLO-175. A total of 7,073 pieces of debitage was recovered from CA-SLO-175 in 1989, including 5,734 flakes of Monterey chert, 1,307 of Franciscan and 32 of obsidian (18 from the Casa Diablo source, 12 from the Coso source, and 1 each from Mono and Napa; tables A.26, A.27). All of the obsidian flakes are pressure flakes, presumably resulting from the rejuvenation of bifaces. Potential interpretation of the remainder of the debitage is affected by variation in the recovery techniques employed in the field, in that techniques used at some units were intended to sample debitage thoroughly, whereas the objectives at other units were different. Specifically, wet-screening through 3-mm (⅛ inch) mesh, employed only at unit 1, produced the only complete debitage sample. Pressure flakes, indicative of the final stages of biface reduction, are generally lost through larger mesh as employed in units 2 to 6. The fact that unit 1, only 1 x 1 m in dimension, produced 43 percent (3,043 of 7,073 flakes; tables A.28, A.29) of the debitage recovered from the site is indicative of the effectiveness of this technique and its presumed representativeness in comparison to other units.

At CA-SLO-175, reduction of Monterey chert was more common than reduction of Franciscan (81.1% versus 18.5% of the debitage); moreover, there is some indication of variation in the use of these materials. Biface manufacture accounted for 71.3 percent of the Monterey chert debitage, as opposed to 57.8 percent of the Franciscan (table 7.4). Pressure flakes of Franciscan chert comprise only 27.6 percent of the biface residues, compared to 37.1 percent for Monterey chert (table 7.5). A final indicator of a differential production process for these cherts is the predominance of Franciscan chert among the cores, which is also reflected in the debitage: 48.2 percent of the Franciscan debitage from unit 1 is associated with core/flake reduction, most likely the production of preforms from cobbles, slabs and large flake blanks, whereas only 28.7 percent of the Monterey debitage represents this phase of reduction. As a whole, this variability is not overwhelming. Although all stages of reduction are represented in both cherts, Franciscan stone was more frequently reduced from its raw state and much of Monterey chert had already been preliminarily reduced before it arrived at Little Pico Creek. This pattern is further confirmed via comparison with debitage from the replication study, which shows strong similarity between the Little Pico Creek Monterey chert debitage profile and the figures associated with stage 1–5 reduction. Franciscan chert does not match either of the profiles precisely but shows more evidence of preform production. Monterey chert preform production took place elsewhere. This pattern may well relate to the fact that while sources for both cherts are not too distant, Franciscan material was more readily obtainable and frequently was brought to the site in unmodified form.

The proximity of natural Franciscan chert sources to CA-SLO-175 is further indicated by comparison with the material proportions reported from the Piedras Blancas area 20km to the north. Such sites as CA-SLO-267 yielded debitage, 99 percent of which was derived from Monterey chert (Bouey

Table 7.2. Biface stages from CA-SLO-175

	Monterey		Franciscan		Obsidian		Indeter.		Total	
	N	%	N	%	N	%	N	%	N	%
1	11	6.0	6	9.1	0	0	0	0	17	6.3
2	62	33.9	20	30.3	0	0	0	0	82	30.3
3	21	11.5	6	9.1	0	0	0	0	27	9.9
4	9	4.9	3	4.5	0	0	0	0	12	4.4
5	70	38.3	30	45.5	8	100	14	100	122	45.0
Misc.	10	5.5	1	1.5	0	00	0	0	11	4.1
Total	183	100	66	100	8	100	14	100	271	100.0

Table 7.3 Biface stages from CA-SLO-1259

	Monterey		Franciscan		Obsidian		Total	
	N	%	N	%	N	%	N	%
1	5	18	2	26	0	0	7	19
2	10	36	0	0	0	0	10	27
3	1	4	1	12	0	0	2	5
4	2	7	1	12	0	0	3	8
5	6	21	4	50	1	100	11	30
Misc.	4	14	0	0	0	0	4	11
Totals	28	100	8	100	1	100	37	100

Table 7.4 Technologically diagnostic chert debitage from Little Pico Creek

	CA-SLO-175 unit 1				CA-SLO-1259 units 1 & 2			
	Franciscan		Monterey		Franciscan		Monterey	
	N	%	N	%	N	%	N	%
Core/flake debris	54	48.2	139	28.7	71	51.8	157	29.1
Biface debris	58	51.8	345	71.3	66	48.2	382	70.9
Total	112	100.0	484	100.0	137	100.0	539	100.0

Table 7.5 Biface reduction stages represented in debitage from Little Pico Creek

	CA-SLO-175 unit 1				CA-SLO-1259 units 1 & 2			
	Franciscan		Monterey		Franciscan		Monterey	
	N	%	N	%	N	%	N	%
Early biface	17	29.3	78	22.7	27	40.9	104	27.4
Late biface	24	41.4	134	38.8	25	37.8	129	33.9
Pressure	16	27.6	128	37.1	14	21.3	147	38.7
Other	1	1.7	5	1.4	0	0.0	0	0.0
Totals	58	100.0	345	99.0	66	100.0	380	100.0

Table 7.6 Reduction stages represented in flake tools from Little Pico Creek (Franciscan and Monterey chert)

	CA-SLO-175				CA-SLO-1259			
	Franciscan		Monterey		Franciscan		Monterey	
	N	%	N	%	N	%	N	%
Biface	2	6.7	8	16.7	0	0.0	3	15.8
Core/flake	20	66.7	27	56.2	4	80.0	8	42.1
Indeterminate	8	26.6	13	27.1	1	20.0	8	42.1
Totals	30	100.0	48	100.0	5	100.0	19	100.0

and Basgall 1991:91).

The high frequency of early biface-thinning flakes of Monterey chert from both unit 1 (table 7.5) and the site as a whole further suggests that this material frequently arrived at CA-SLO-175 in the form of stage 1 bifaces, which subsequently were reduced to bifacial tools on-site.

CA-SLO-1259. A total of 13,187 pieces of debitage was recovered from CA-SLO-1259 in 1989, including 11,024 flakes of Monterey chert, 2,163 of Franciscan and 10 of obsidian (4 from the Casa Diablo source, 6 from Coso source; tables A.30, A.31). As at CA-SLO-175 the obsidian flakes are most likely by-products of the rejuvenation of bifaces. The use of 3-mm (1/8") mesh wet-screening was restricted to units (1 and 2), and totals from these are most meaningful with respect to reduction stages (tables A.32, A.33). These two units represent only 31 percent of the excavation volume, but they produced 75 percent of the debitage.

Patterning in the CA-SLO-175 debitage is repeated at CA-SLO-1259: 83.5 percent of the debitage is Monterey chert; Franciscan chert shows a higher proportion of early reduction debris (51.8%) than Monterey chert (29.1%); and Monterey chert pressure flakes are more abundant than those of Franciscan (tables 7.4 and 7.5). Again, Franciscan chert appears to have been more heavily subjected to early reduction at this location than was Monterey chert. Since the source of the Monterey chert was apparently farther away than that of the Franciscan chert, some of the Monterey probably arrived at CA-SLO-1259 in the form of bifacial preforms.

Flake Tools

CA-SLO-175. Flake tools were largely overlooked during the excavation of CA-SLO-175 in 1966. As a consequence, the present sample is derived entirely from the 1989 Caltrans excavation. At that time 77 flake tools were recovered including four unifaces, one formal flake tool, two bifacial tools, and 70 simple or casual flake tools (table A.34). Forty-five flake tools were made from Monterey chert, 30 were Franciscan chert, and 2 were of indeterminate material (table A.34). Most of the flake types represented in the overall debitage are seen in the flake tools, although more core/flake than biface debris is evident (table 7.6). As with the debitage, more of the Franciscan chert flake tools were products of core reduction (66.7%) than were, while those of Monterey chert (53.3%; table 7.6).

Formal flake tool. The single specimen (484-167) of Franciscan chert retains a heavily worked perimeter (at least 40% modified, with modification resulting in reshaping of flake base) and shape that appears reflective of a preconceived template. Made from Franciscan chert, this specimen is

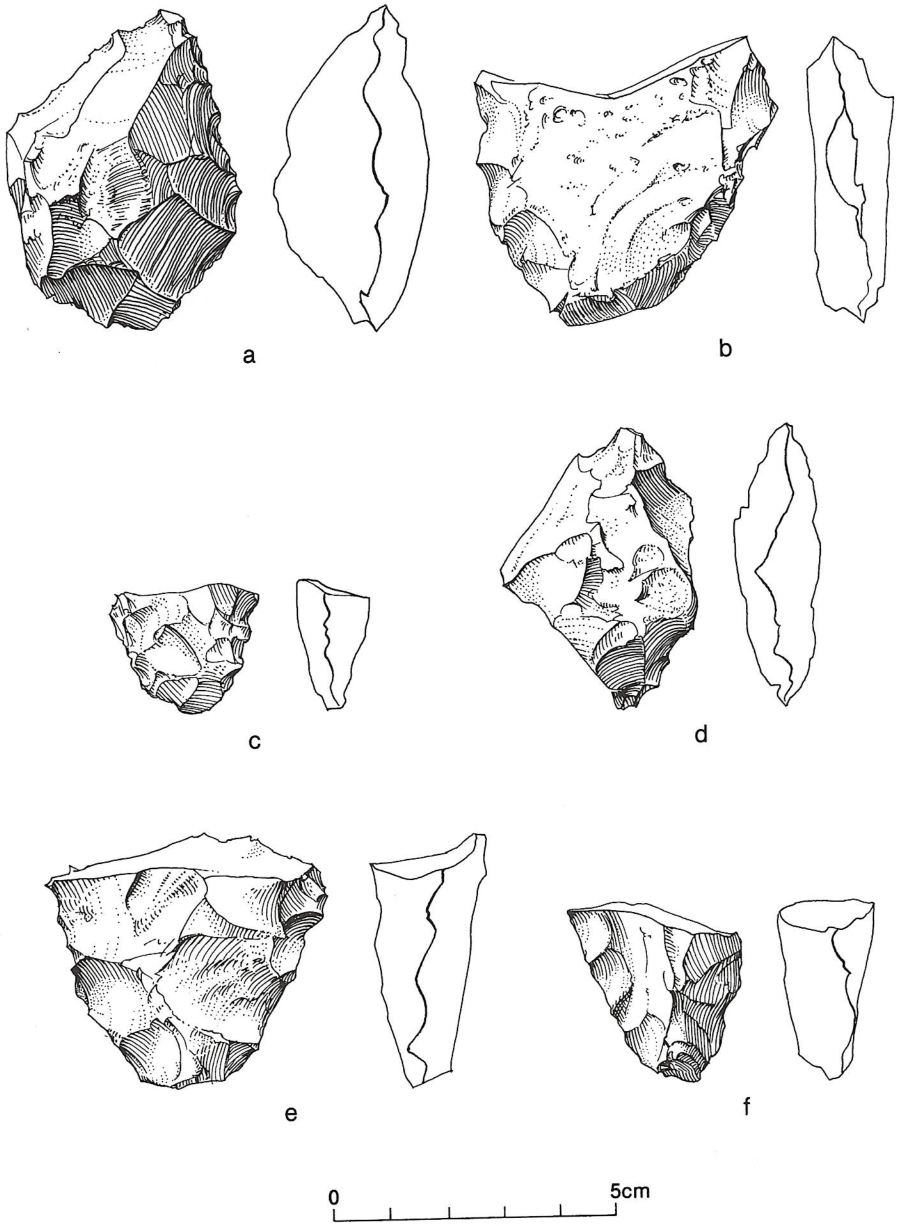


FIGURE 7.8 Stage 1 and 2 bifaces from CA-SLO-1259: *a*, 485-080; *b*, 485-053; *c*, 485-097; *d*, 485-077; *e*, 485-224; *f*, 485-249. *Illustration by Rusty van Rossman*

triangular in shape with heavy unifacial retouch along one edge.

Drill. Formed from Franciscan chert, this artifact (484-547) is distinguished by a single narrow, pointed, and attenuated projection.

Unifaces. This flake tool type is defined by the presence of percussion edge flaking, which does not intrude or actually thin the object but occurs on the margins of what are most commonly thick flake bases: three specimens were made from flakes of Monterey chert (484-069, -328, and -329), and one of Franciscan (484-230).

Casual flake tools. This class consists of simple, informal edge-modified flakes. Of the 74 specimens recovered, 53 show edge modification consisting of microchipping from use (utilized flakes), and the remainder exhibit modification by percussion flaking (N=9), or pressure flaking (N=7).

CA-SLO-1259. Of the 26 flake tools recovered from CA-SLO-1259, 2 are unifaces, and 24 are casual flake tools (edge-modified flakes; table A.35). Of the specimens, 19 are Monterey chert, 5 Franciscan, and 2 indeterminant.

Unifaces. Unifaces include artifacts 485-023 and-330, the former of Monterey chert and the latter of Franciscan. Both are percussion edge-flaked, and both exhibit a convex configuration of the modified edge.

Casual flake tools. Edge-modified flake tools numbered twenty-four, including eighteen of Monterey chert, four of

Franciscan, and two indeterminate. On twenty-one of the specimens, eighteen show edge modification by unifacial microchipping from utilization, two exhibit percussion edge-flaking, and 1 shows pressure flaking of the edge.

The most common flake types represented among the tools are complex interior and rectilinear flakes (table A.35). All of the Franciscan chert specimens are products of early reduction, while 15.8 percent of the Monterey chert specimens are products of bifacing (table 7.6).

TECHNOLOGICAL SUMMARY

The flaked stone industries represented by the materials from CA-SLO-175 and SLO-1259 are very similar; both reflect the assaying and primary reduction of locally occurring Franciscan and Monterey cherts and the reduction of stage 1 bifaces into finished tools. Both simple core/flake and bifacing industries are evident, but most of the stoneworking is related to biface production. Indeed, the Little Pico Creek stone assemblage reflects a heavy emphasis on bifaces. A bipolar industry is sparsely represented among the cores and debitage, but this is probably an underrepresentation related to the efficiency of the technique, and the low retention of technologically distinctive traits on poor quality Franciscan cherts. Franciscan chert cobbles occur immediately adjacent to Little Pico Creek; however, they seem to be of lower quality than Monterey cherts, which are found farther from this location, probably 2 km inland in the vicinity of the nearest Monterey Formation outcrops. Most of the Franciscan chert cores recovered from CA-SLO-175 and SLO-1259 are chunks and large shatter with cobble cortex, which are by-products of attempts to produce large flake blanks from cobbles and slabs or cobbles that were assayed and rejected. A greater proportion of Monterey chert cores were bifacial (7 of 22 specimens as opposed to 7 of 42 Franciscan specimens), having been roughed out at the source before transport to these sites. In general, over 55 percent of the Franciscan residues from both sites are associated with early reduction, but no more than 30 percent of the Monterey chert debitage represents this stage of reduction. Bifaces and debitage are dominated by Monterey chert. At Vandenberg Air Force Base in northern Santa Barbara County, Bamforth (1991:223) also noticed an overrepresentation of Monterey cherts, but attributed an inordinately high proportion to small sample size. The sample available from CA-SLO-175 and -1259, however, is of ample size to suggest that Monterey chert was preferred for the production of bifaces. With an abundant supply of Franciscan stone immediately available, a preference for Monterey stone casts serious doubt on Moore's (1989) conclusion that Franciscan stone was a valuable trade commodity. Furthermore, the proportion of Franciscan to Monterey stone does not change through time, as shown by the proportional values from CA-SLO-175 and -1259. If Franciscan Chert were a significant trade item, its representation in the assemblage would be expected to change across these components since obsidian profiles indicate that interregional exchange increased through the phases of occupation identified at these sites.

The debitage and tools further indicate that a full range of reduction activities was carried out at both Little Pico Creek sites. Franciscan chert cobbles were reduced into flake blanks, which were subsequently reduced into bifacial tools. The overrepresentation of core-flake debitage in the Franciscan core-flake debitage suggests that some of the Franciscan preforms were transported elsewhere for further reduction and use. This also may reflect a high incidence of assaying and rejection of low-quality Franciscan cobbles. Monterey chert arrived on-site as preforms, which were subsequently reduced into tools. The range of reduction among the two materials suggests this location served as a combined residential base/quarry workshop. The high density of flaked stone at CA-SLO-1259 and the absence of other constituents suggest that during the Middle period, flaked stone tool manufacturing was undertaken in a specifically designated area away from the primary residential area at CA-SLO-175. Gibson (1993) has documented spatial segregation of flaked stone and shell deposits at many other sites in ethnographic Chumash territory, further attributing this pattern to a separation of male and female activity areas (Gibson 1993:9). Not to disparage Gibson's perceptive recognition of an apparently legitimate pattern in the local archaeological record, we are less inclined to attribute the segregation of materials to gender. In some instances this separation of materials is clearly a reflection of diachronic variability in site use, but this is not the case at Little Pico Creek, where CA-SLO-175 and CA-SLO-1259 were occupied contemporaneously. We attribute the pattern to a restriction of stoneworking activities away from the main settlement, as a reflection of a more structured site use stemming from longer term occupation, beginning at the onset of the Middle period.

PROJECTILE POINTS

CA-SLO-175

Of the stage 5 bifaces recovered from CA-SLO-175, 119 are classified as projectile points based upon the presence of hafting elements and/or pointed distal elements. Of these, 105 of these artifacts were recovered by Abrams and the remaining fourteen during the 1989 excavation. The points have been divided into these types, four of which—Contracting-stemmed, Long-stemmed (Año Nuevo), Square-stemmed (Rossi), and Concave Base Stemmed—are subsumed within a proposed Central Coast Stemmed series (N=80). The other types include Large Concave Base (N=4),

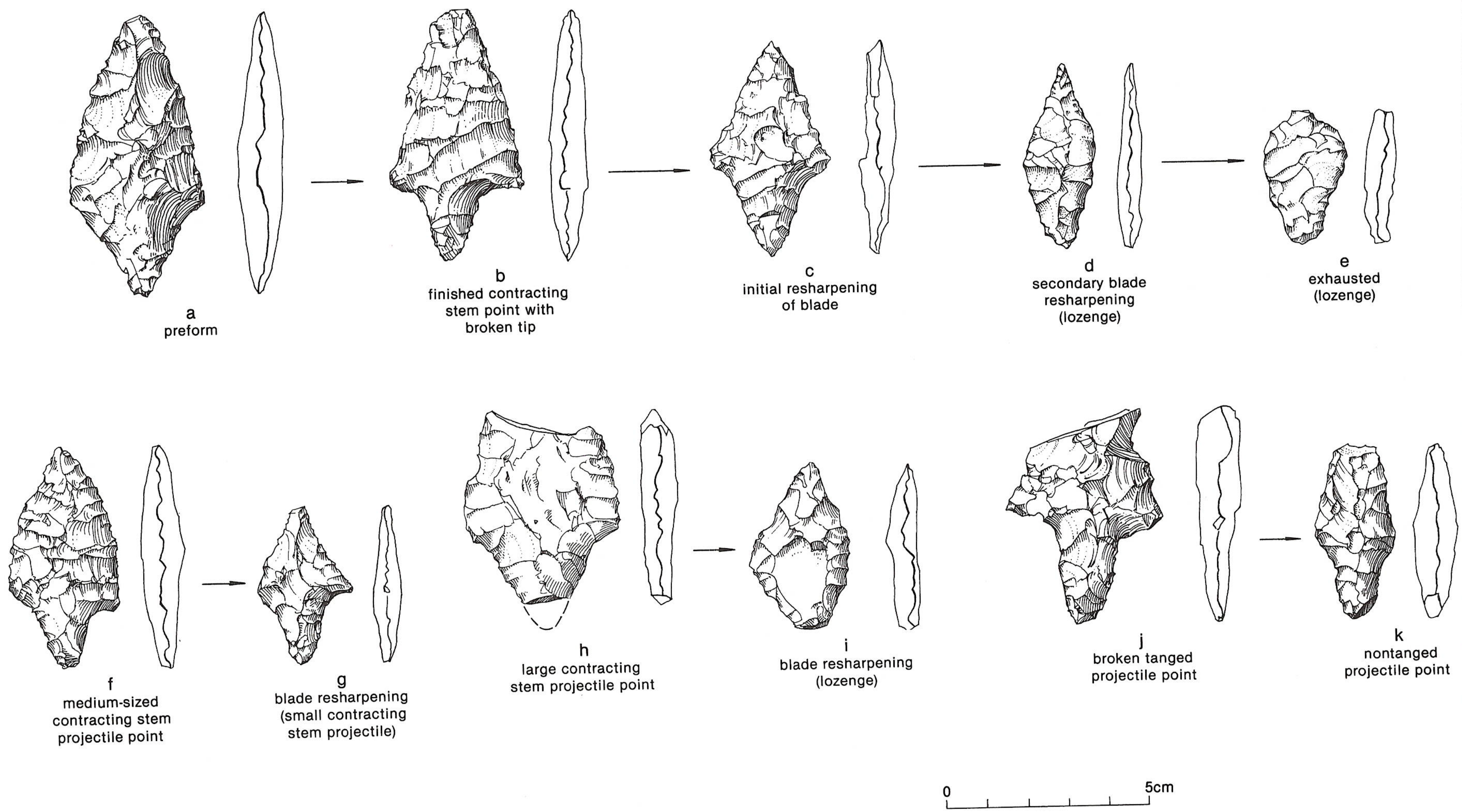


FIGURE 7.9 Projectile point resharpening trajectory suggested by specimens from CA-SLO-175. *Illustration by Rusty van Rossman*

Large Side-notched (N=5), Lanceolate (N=5), Double Side-notched (N=5), and Small Concave Base (Coastal Cottonwood or Canaliño; N=2).

Central Coast Stemmed series. The most ubiquitous type represented in the CA-SLO-175 collection is the large stemmed point, of which eighty examples were recovered. In general, these and other stemmed points found on the central coast manifest a wide range of variation in size and stem configuration, and there have been a number of attempts to define culturally and temporally meaningful attributes within this spectrum of variation on both a site-specific (Bouey and Basgall 1991, Gibson et al. 1976, Greenwood 1972, Leventhal 1979) and regional basis (Hoover 1971; T. Jones et al. 1989, T. Jones and Hylkema 1988). Those attempts have met with limited success mostly because of the small populations of points recovered in coastal settings and the chronic lack of dating associations. The sample of stemmed points available from CA-SLO-175 is one of the largest available in the region and provides an excellent opportunity to clarify regional typologies. Equal sized, if not larger, point samples were obtained from Diablo Canyon (Greenwood 1972), Whale Rock Reservoir (Reinman 1961), and Vaquero Reservoir (Smith and La Fave 1961), but these collections have never been reported in sufficient detail to accommodate meaningful typological comparison.

The first generalization that can be drawn from the CA-SLO-175 sample is that variation in stemmed points falls within a definable typological spectrum; that is, stemmed points are readily distinguishable from other types simply by the presence of a distinct stemmed basal configuration and by their size, which is generally larger than that of arrow points (Thomas 1978).

The second, and perhaps more significant observation, is that the points can be segregated into a series of stem variants that do not separate distinctly, but rather grade imperceptibly from one to another. In other words, these distinctions are more apparent than real and can only be defined heuristically. A similar gradation is apparent in size of specimens. There is a wide range (maximum length ranges from 40.0 to 72.5 mm and weight from 8.0 to 20.0 g) of size recognizable in the collection, but distinct size classes are not reliably constituted.

Much of the variation in size and overall configuration certainly appears to be the product of the reworking of points during the course of their use life, particularly the resharpening of blade elements, apparently often while the point was still within the haft. The problem of reworking and its implications for typology have been addressed by Flenniken and Raymond (1986) and Flenniken and Wilke (1986), but those authors go to the extreme in claiming that completely different point types could be and were formed from other, larger types as part of the reworking process. They further argue that because one type could be reduced into another, reworking compromises the definition of temporally meaningful types. This argument is made on strictly theoretical grounds with no support from an actual archaeological collection. Certainly, if one type was resharpened into another on a regular basis, the process should be recognizable in broken specimens representing failures at different stages in the reduction. The collection of points from CA-SLO-175, because of its large size, allows for the effects of blade resharpening to be recognized and documented and the implications for regional typology explored (fig. 7.9).

Clearly much of the variation that has been previously proposed as culturally meaningful should more correctly be attributed to point reworking, specifically of the blade elements of initially large stemmed points. Perhaps the best example of the relationship between reworking and illusionary morphological types is seen in the type previously identified as the Little Pico Creek Nippled Bipoint. Originally identified by Abrams (1968a:11) as type 7 (Nippled) in the CA-SLO-175 collection, this type has subsequently been proposed as temporally meaningful on the central coast (T. Jones et al. 1985:116). Specimen 511-446 (fig. 7.11n) served to illustrate the type in the original site report on CA-SLO-175. It has since been recognized at CA-MNT-101 (Dietz 1987:103), CA-MNT-108 (Breschini and Haversat 1989), CA-MNT-254/266 (T. Jones et al. 1989:197), and CA-MNT-1270/H (T. Jones et al. 1989:58). The point type has been described as follows:

> The "nipples" are small tangs that occur at the juncture between the blade and the stem. These tangs are invariably asymmetrical. It is frequently difficult, if not impossible to determine which end was the actual point and which was the base, for in some instances the stem appears to have been longer than the blade. This attribute is accentuated on specimens that have been resharpened. These points differ from University Village Bi-points in that they have distinct shoulders. They appear to be diagnostic of the 3,000-1,000 B.P. period, based on their absence from both earlier (MNT-391) and later (CA-MNT-480/H) assemblages (T. Jones et al. 1985:116)

Abrams classified seven specimens from CA-SLO-175 as representing this preliminary type, but only 1 (511-446) was identified by catalog number. This artifact does exhibit a pointed base and distinct "nipple-like" tangs at the stem/blade junction; however, this configuration could easily have been created by resharpening of the blade element in the area between the point tip and the tangs. Reworking the portion of the point at the stem/blade junction and below could easily have been restricted if the artifact was still in the haft, leading to the creation of small projections at the

juncture of blade and stem what appear as tangs (fig. 7.9c). Further resharpening could eventually lead to elimination of these projections (fig. 7.9d, e), creating a shape that has commonly been referred to as a lozenge-shaped point (Greenwood 1972:14).

Blade reworking also negates any attempt to define morphological types on the basis of overall dimension (Thomas 1978), particularly any attempt to employ maximum length, width, or specimen weight. Although there is a great size range represented in the CA-SLO-175 stemmed points (for example, specimen 511-547 in fig. 7.12c and 511-446 in fig. 7.11n), morphological similarities between the stems of both small and large specimens suggest strongly that at least in some instances, they originate from the same large template (fig. 7.9f–i).

Similar arguments can be made for de-emphasizing the distinction between tanged and nontanged stemmed points, an issue to which attention has been directed since at least 1929 when Rogers noted that "wickedly barbed" points were a trait characteristic of his "Hunting People" (1929:358). Rogers also illustrated nontanged stemmed points as part of the Hunting Culture assemblage, and it is likely that some nontanged forms could have resulted from resharpening of broken points, given that the projecting barbs appear particularly vulnerable to impact-related breakage (fig. 7.9j–k).

Using this proposed breakage and resharpening trajectory as an organizing framework, we place the eighty stemmed points from CA-SLO-175 into a single temporal series, provisionally named the Central Coast Stemmed series. The following is a description of eighty specimens assigned to this proposed series.

Contracting-stemmed. This class includes 76 specimens: 70 collected by Abrams in 1965/66 and 6 recovered in 1989 (figs. 7.10-7.13, table A.36). Of these, 48 are Monterey chert, 18 are Franciscan chert, and 10 are of indeterminate chert. This is the most common type found on the central coast, and the large number of specimens recovered from Little Pico Creek compares with samples from Diablo Canyon (Greenwood 1972), Whale Rock Reservoir (Reinman 1961), Willow Creek (Pohorecky 1976), and MNT-101 (Dietz 1987; Pritchard 1984). Variation in size is readily apparent among the Little Pico collection, much of which can be attributed to blade reworking. The largest, most complete examples are greater than 80 mm in length, 30 mm in width, and 10 mm in thickness (table A.36). Some of these are tanged at the base of the blade element (fig. 7.12c, d, e, f, and h). More modest-sized points (figs. 7.11–7.13) reflect a mix of specimens that were originally manufactured according to a slightly smaller template, and others that have been reworked. Among the latter are examples with "nippled tangs" (fig. 7.11m–s). The smallest Contracting-stemmed points (fig. 7.12) show a high frequency of blade reworking. Several of these specimens (fig. 7.12i–m) conform with a type referred to by Greenwood (1972:16) as a Lozenge. When compared with the rest of the Little Pico collection, however, these specimens seem to represent a final stage of blade reworking.

In addition to the collections mentioned above, points similar to those in the CA-SLO-175 collection have been reported from CA-SCR-7 (Hylkema 1991; D. Jones and Hildebrandt 1990), CA-MNT-101 (Dietz 1987:108), CA-MNT-391 (Cartier 1993a), CA-MNT-1270/H, -1228 (T. Jones et al 1989:58–68), CA-MNT-282 (Pohorecky 1976:225), CA-SLO-267 (Bouey and Basgall 1991:83), CA-SLO-2, -51 (Greenwood 1972), CA-SBA-205 (Lathrap and Hoover 1975:39) and Santa Cruz Island (Hoover 1971:61). Summary dimensions of the Contracting-stemmed points from CA-SLO-175 are presented in table 7.7.

Long-stemmed (Año Nuevo). Two examples of Long-stemmed points were recovered from CA-SLO-175 (fig. 7.14a, b; table A.37). Both conform with the original type definition (T. Jones and Hylkema 1988), exhibiting long tapering stems (maximum width position greater than or equal to 45 percent) and similar dimensions (table 7.8). These specimens share many traits with the other Contracting-stemmed points, and there can be little doubt that blade reworking can create points that conform to this template. Several recent discoveries, however, indicate that some Long-stemmed points may correlate more closely with the Lake Mojave type; two examples have been associated with a newly recognized component dating 6200–4000 BC at CA-MNT-229 (T. Jones and D. Jones 1992). Another specimen (classified as a Lake Mojave) was recovered from an early Holocene context at CA-SON-348/H (Schwaderer 1992:62). This type is provisionally included in the Central Coast Stemmed series, but more comparative analysis is needed.

Square-stemmed (Rossi). Two examples of the Rossi Square-stemmed point type (T. Jones and Hylkema 1988) were recovered from CA-SLO-175 in 1989 (fig. 7.14c, d, table A.38). Specimen (484-229) conforms nicely with the description provided as part of the type definition: "large, thick, often excurvate blades, with short stems that range from square to slightly expanding" (T. Jones and Hylkema 1988:177). Specimen 511-584 represents a variant of this type resulting from major reduction of the blade by rejuvenation. This reduction in form is reflected in several metric attributes (table 7.9) that do not fall within the ranges established as part of the type definition (for example, maximum width, thickness, weight, and maximum width position). These points were originally thought to date circa 2000 BC to AD 1, but findings from CA-MNT-1228 and CA-MNT-1233 on the

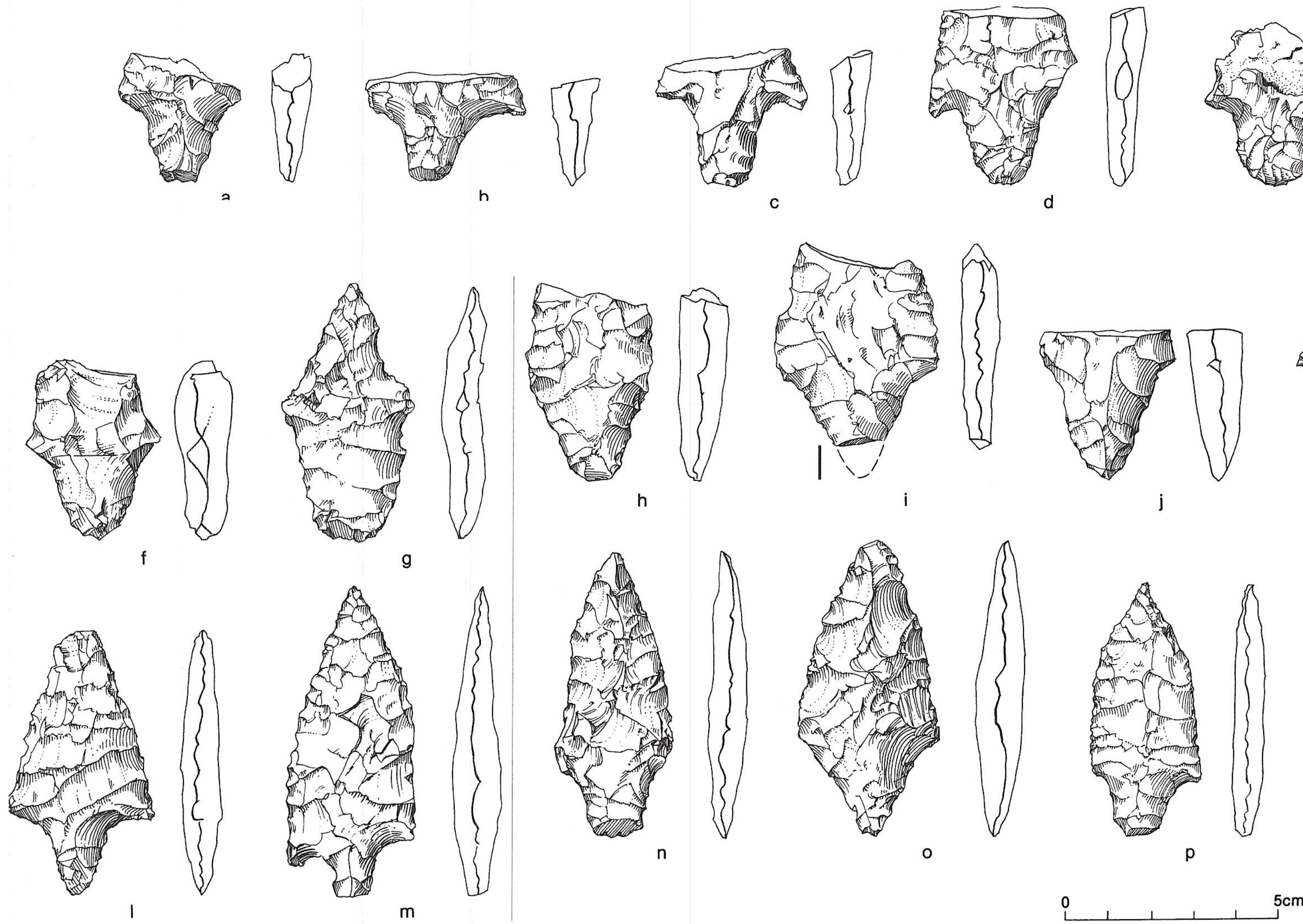


FIGURE 7.10 Projectile points from CA-SLO-175: *a*, 511-NW30SW90:2; *b*, 511-NW58NE33-50.65; *c*, 511-SE20SW90:13; *d*, 511-44; *e*, 511-612; *f*, 511-687; *g*, 511-SE15SW90:7; *h*, 511-SE10SW90:5/B; *i*, 511-662; *j*, 484-222; *k*, 511-545; *l*, 511-801; *m*, 511-NW39NE5-47.26; *n*, 511-SE20SW90:6/C; *o*, 511-1966Surface30; *p*, 511-1966Surface76; *q*, 511-1966Surface79. *Illustration by Rusty van Rossman*

Big Sur coast (T. Jones and Haney 1992) indicate their use between 3500 BC and AD 1200. The lack of major variation between this type and other large stemmed examples from CA-SLO-175 suggest it is best considered as another type within the Stemmed series.

Concave Base Stemmed.. The Concave Base Stemmed was not identified at CA-SLO-175.

Large Concave Base. Four Large Concave Base projectile points were also recovered from CA-SLO-175, three reported by Abrams and one by Caltrans in 1989 (fig. 7.15a–d, table A.39). The low representation of this type at Little Pico Creek is consistent with the fact that this is not a common type on the central coast. Its dating is not well defined. Specimen 511-358 appears to have been made by reworking a stemmed point. Specimen 511-481 is the only symmetrical, triangular-shaped specimen in the group; it resembles those reported from CA-SLO-2 (Greenwood 1972:14) and CA-MNT-3 (Breschini 1975). See table 7.10.

Large Side-notched. Five Large Side-notched points were recovered from CA-SLO-175, three by Abrams and two by Caltrans in 1989 (table A.40, fig. 7.15e–i). Three of the specimens were formed from Monterey chert, one from Franciscan, and one from indeterminate chert. Their length (≥48 mm), thickness (≥8.5 mm), and weight (≥9.6 gm; table 7.11) show the robust size of these points. Two subvariants can be recognized in the sample: the first, represented by specimens 511-323,-663, 686, and 484-160, retains a convex base and corresponds somewhat with Greenwood's type 5b, the Side-notched Narrow Stem (1972:16). Specimen 484-280 corresponds more closely with her type 5a, the Side-notched Wide Stem; however, the meaning and definition of these two subtypes are extremely unclear since Greenwood did not report the trait used to define the type (that is, stem width relative to blade width) in a quantitative or otherwise thorough fashion for all examples.

Large Side-notched points have been reported from CA-SCR-20 (Roop 1976) and the Stanford Man II site in northern Santa Clara County, where two examples were directly associated with a human burial radiocarbon dated older than 2000 BC (Gerow 1991). Other specimens from possible Early contexts have been reported from SCL-65 (Fitzgerald 1991) MNT-88 (Howard 1976), and MNT-254 (T. Jones et al. 1989:225). Other examples from more recent contexts are from CA-MNT-759/H, CA-MNT-1277/H (T. Jones and Haney 1992), and CA-MNT-1486/H (Breschini and Haversat 1992:80c). Although this type seems to have been most common on the central coast prior to 600 BC, these more recent findings suggest that it also persisted, perhaps in reduced proportions, until the Middle/Late Transition.

Table 7.7 Statistical summary of Contracting-stemmed projectile points from CA-SLO-175

Attribute	*Range*	*Mean*	*Standard deviation*	*Sample size*
ML	30.0–96.0	52.1	12.4	46
MW	17.0–38.5	26.5	6.0	66
TH	6.0–14.0	8.5	1.6	71
WT	2.4–20.0	9.1	4.0	42
NW	7.0–25.0	15.3	4.1	61
DSA	150.0–180.0	168	21	110
PSA	60.0–90.0	75.0	7	118
LW	1.0–5.7	2.0	0.4	35
MWP	13.0%–78.0%	33.7%	12.6	32

ML=maximum length; MW=maximum width; TH=thickness; WT=weight; NW=neck width;DSA=distal shoulder angle 1 and 2; PSA=proximal shoulder angle 1 and 2; LW=length width ratio; MWP=maximum width position; length, width, and thickness in millimeters; weight in grams.

Table 7.8 Metric dimensions of Año Nuevo Long-stemmed projectile points from CA-SLO-175 and the Monterey Bay area

	Monterey Bay		*CA-SLO-175*	
Attribute	*Range*	*Mean*	*Range*	*Mean*
ML	40.0–79.0	57.8	64.0–65.0	64.5
MW	17.0–36.62	5.8	21.0–31.0	26.0
TH	6.3–16.0	10.3	9.5–15.0	26.0
WT	4.8–23.2	13.6	10.9–20.7	15.8
MWP	45.0%–75.0%	57.5%	45.0%–75.0%	15.8%

ML=maximum length; MW=maximum width; TH=thickness; WT=weight; MWP=maximum width position; length, width, and thickness in millimeters; weight in grams.

Table 7.9 Metric dimensions of Rossi Square-stemmed projectile points from CA-SLO-175 and the Monterey Bay area

	Monterey Bay		*CA-SLO-175*	
Attribute	*Range*	*Mean*	*Range*	*Mean*
ML	40.0–81.0	58.9	45.0–57.0	51.0
MW	23.0–41.0	29.1	22.0–39.0	30.5
TH	10.0–15.0	11.6	7.0–11.0	9.0
WT	8.6–38.8	16.4	6.2–20.1	13.2
MWP	22.0%–40.0%	28.8%	28.0–48.0%	38.0%

ML=maximum length; MW=maximum width; TH=thickness; WT=weight; MWP=maximum width position; length, width, and thickness in millimeters; weight in grams.

Table 7.10 Statistical attribute summary of Large Concave Base projectile points from CA-SLO-175

Attribute	*Range*	*Mean*	*Standard deviation*	*Sample size*
ML	39.0–45.5	42.8	3.4	3
MW	21.0–29.0	25.0	4.0	3
TH	6.0–9.0	7.5	1.3	4
WT	5.0–9.9	7.7	2.5	3
WB	21.0–25.0	22.7	2.1	3
LW	1.5–1.8	1.6	0.1	3

ML=maximum length; MW=maximum width; TH=thickness; WT=weight; WB=basal width; LW=length width ratio; length, width, and thickness in millimeters; weight in grams.

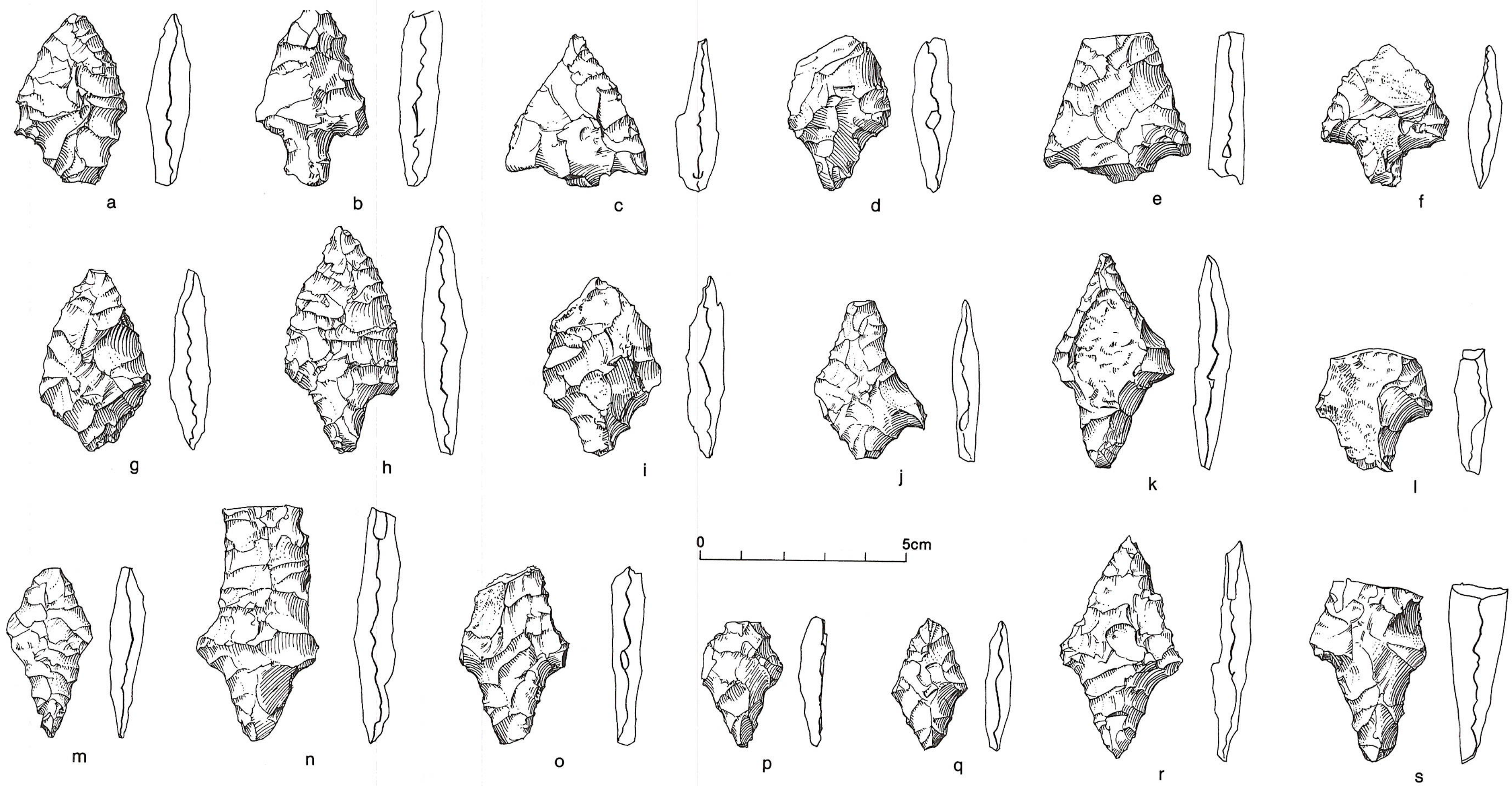


Figure 7.11 Projectile points from CA-SLO-175: *a*, 511-497; *b*, 511-585; *c*, 511-726; *d*, 511-NW86NE49-53.29; *e*, 511-NW140NE0:3; *f*, 511-NW155NE01B; *g*, 511-SE10SW90:7; *h*, 511-SE20SW90:9; *i*, 511-1966Surface31; *j*, 484-099; *k*, 484-210; *l*, 484-313; *m*, 511-230; *n*, 511-446; *o*, 511-579; *p*, 511-702; *q*, 511-892; *r*, 511-NW175NE67; s, 484-399. *Illustration by Rusty van Rossman*

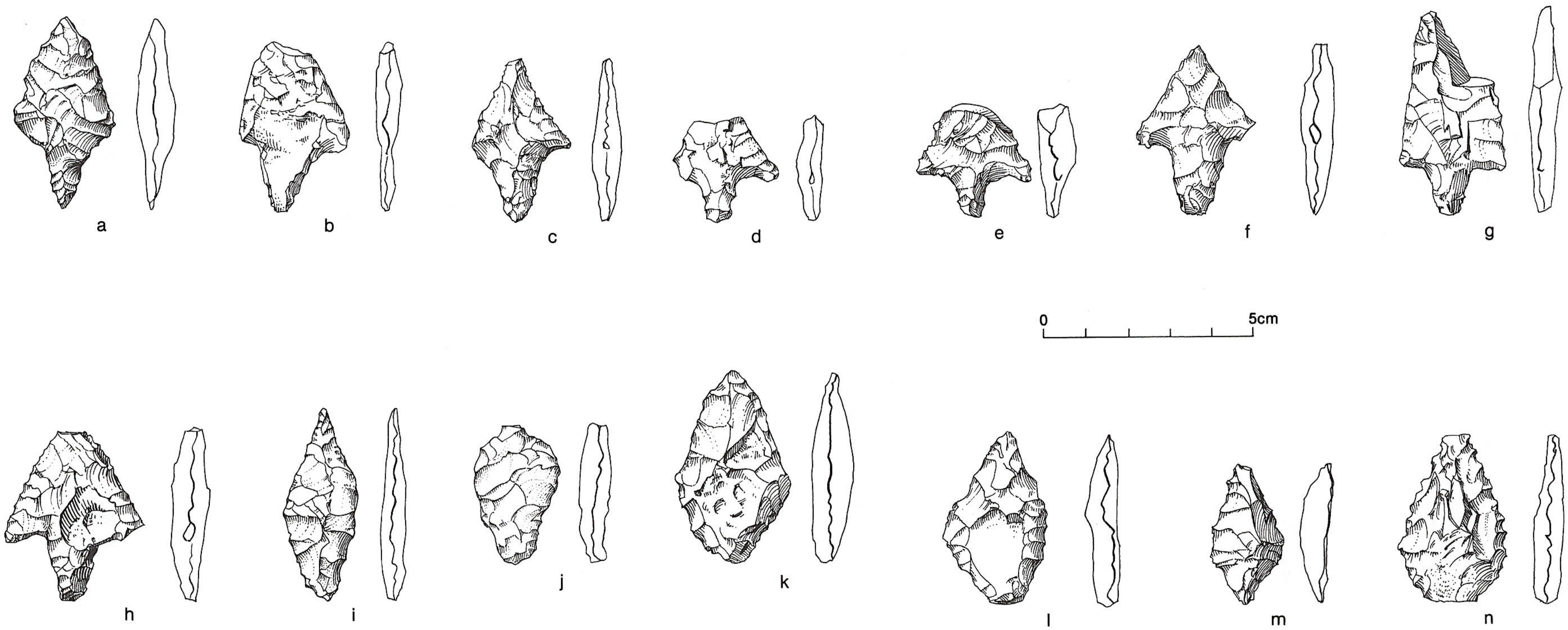


FIGURE 7.12 Projectile points from CA-SLO-175: *a*, 484-084; *b*, 511-546; *c*, 511-547; *d*, 511-NW150NE0:1; *e*, 511-785; *f*, 511-SE10SW90:2B; *g*, 511-B13a; *h*, 511-B20a; *i*, 511-472; *j*, 511-652; *k*, 511-NW30SW90:5; *l*, 511-SE20SW90:4; *m*, 511-SE20SW90:3/B; *n*, 511-1966Surface71. *Illustration by Rusty van Rossman*

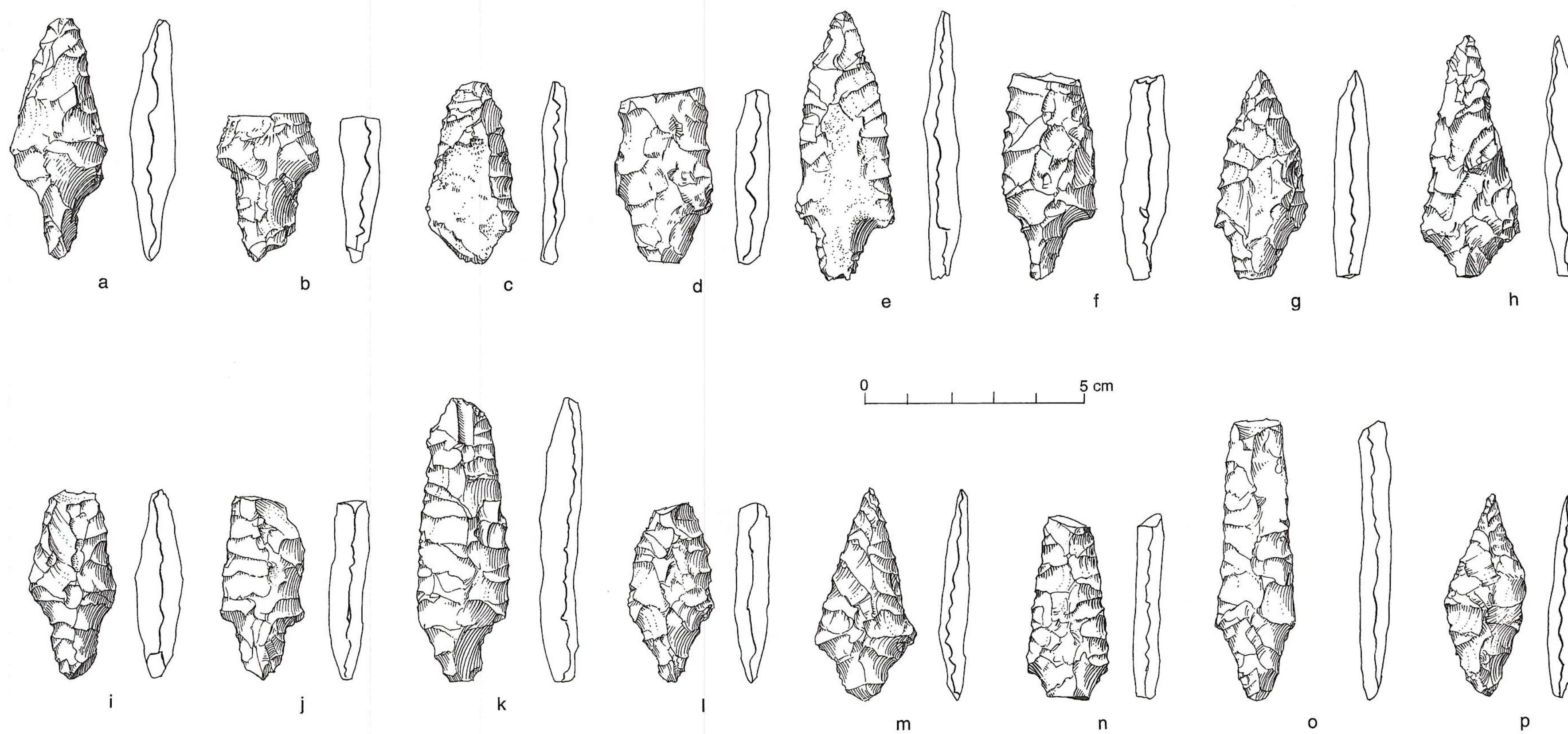


FIGURE 7.13 Projectile points from CA-SLO-175: *a*, 511-200; *b*, 511-492; *c*, 511-689; *d*, 511-962; *e*, 511-989; *f*, 511-NW150NE0:5; *g*, 511-SE10SW90:5A; *h*, 511-SE15SW90:8; *i*, 511-SE20SW90:5; *j*, 511-855; *k*, 511-SE20SW90:6B; *l*, 511-1966Surface26; *m*, 511-1966Surface33; *n*, 511-1966Surface77; *o*, 511-13b; *p*, 511-14c. *Illustration by Rusty van Rossman*

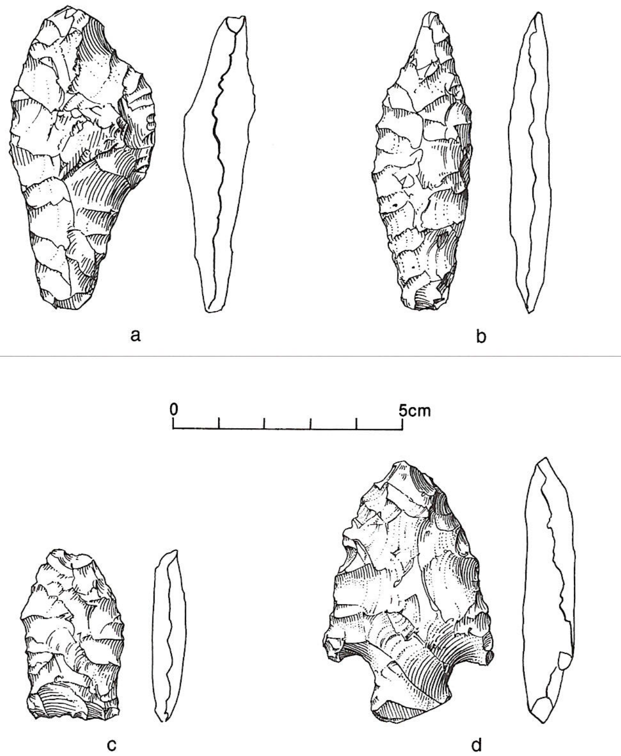


FIGURE 7.14 Projectile points from CA-SLO-175: *a*, 511-45; *b*, 511-473; *c*, 511-584; *d*, 484-229. *Illustration by Rusty van Rossman*

Large Side-notched points with bifurcated bases, similar to specimen 484-280, seem to have a more restricted temporal and spatial distribution, which prompted Lathrap and Troike (1984:107) to propose them as a distinctive Jalama Side-notched type. Although this designation may be premature, these points are restricted to San Luis Obispo and Santa Barbara counties, where they are markers of the Early period (C. D. King's 1990 phases Ey and Ez). The depth distribution of examples from CA-SLO-2 (Greenwood 1972), suggests they could have been in use earlier, but the single most important collection of these points from CA-SBA-53 was part of a clear single component dating circa 3500–2500 BC (Harrison and Harrison 1966:17). Harrison and Harrison drew comparisons between this type and some variants of the Pinto point reported by Harrington (1957:51–2), while Greenwood (1972:90) regarded them as synonymous with the Borax Lake Wide Stemmed type of northern California. Other important examples have been reported from CA-SBA-205 (Lathrap and Hoover 1975:35), CA-SLO-177 (Pierce 1979:89), and CA-SLO-877.

Lanceolate. At CA-SLO-175, 5 of what are presumed to be lanceolate-shaped projectile points were recovered; 10 were found by Abrams. These artifacts may represent preforms, knives, or scrapers, but they do retain pointed distal ends and are relatively well finished. The apparent lack of stage 4 bifaces in the CA-SLO-175 collection may reflect the classification of these lanceolate specimens as points rather than as bifaces. These points are relatively robust with maximum length greater than 55 mm and maximum width greater than 19 mm (tables 7.12, A.41, fig. 7.16). Specimens similar to 484-196 were reported by Rogers as "knives of the Hunting People" (1929: Plate 60).

Double Side-notched. From CA-SLO-175, five of what Abrams (1968c:30) referred to as Double Side-notched points were recovered. All five were associated with burials (fig. 7.17a–e; table A.42), one from burial 12, and four from group burial II. The small dimensions of these points (table 7.13) indicate that they were used with the bow and arrow; as such, they postdate AD 500. Their co-occurrence with type B2 beads in burial 12 and steatite disk beads in group burial II suggests they date AD 1000–1500. These are a distinctive type that seems unique to this region, although a complete review of all of the south coast literature has not been undertaken. Similar specimens have been reported by Pierce (1979:89) from CA-SLO-177 and Gibson (1979a: Fig. 17) from CA-SLO-178 and CA-SLO-648. For the time being, this type seems to be restricted to the Cambria area. It shows some limited similarity with the so-called Sonoran point type from the south coast (Koerper and Drover 1983:18) or the Dos Cabezas type (McDonald 1992:181–188). Neither of these provide a thoroughly convincing match. This type also resembles serrated arrow points found in Late period sites in the Sacramento/San Joaquin Valley, although again the similarity is not strong. At the very least, the association of this type with a mass grave, in which individuals were interred in a configuration very different from the other Little Pico burials, suggests that this type is associated with an intrusion of a different cultural group.

There is also an interesting resemblance between the Cambria Double Side-notched points and some of the finely made points recovered from Hohokam sites in Arizona, particularly specimens reported by Gladwin et al. (1937: Plates 87–89) and Haury (1976:297) from Snaketown. Connections between the Pueblos and the Chumash apparently reached their climax during the late Middle and/or Middle/Late Transition in California (Wilcox 1993), so that typological affiliation may lie in that direction.

Small Concave Base (Canaliño or Coastal Cottonwood). Two Small Concave Base points were recovered by Abrams in 1966 (table A.43, fig. 7.17). Both are of Coso obsidian. Specimen 511-SW200 produced a hydration reading of 2.6 microns; the other (511-a) produced no visible band. An additional example of this type was reported by Abrams (1968c:33) as specimen 511-297, but this artifact was not found in the collection in 1989. These points have been classified variously as Canaliño (C. D. King 1978:68),

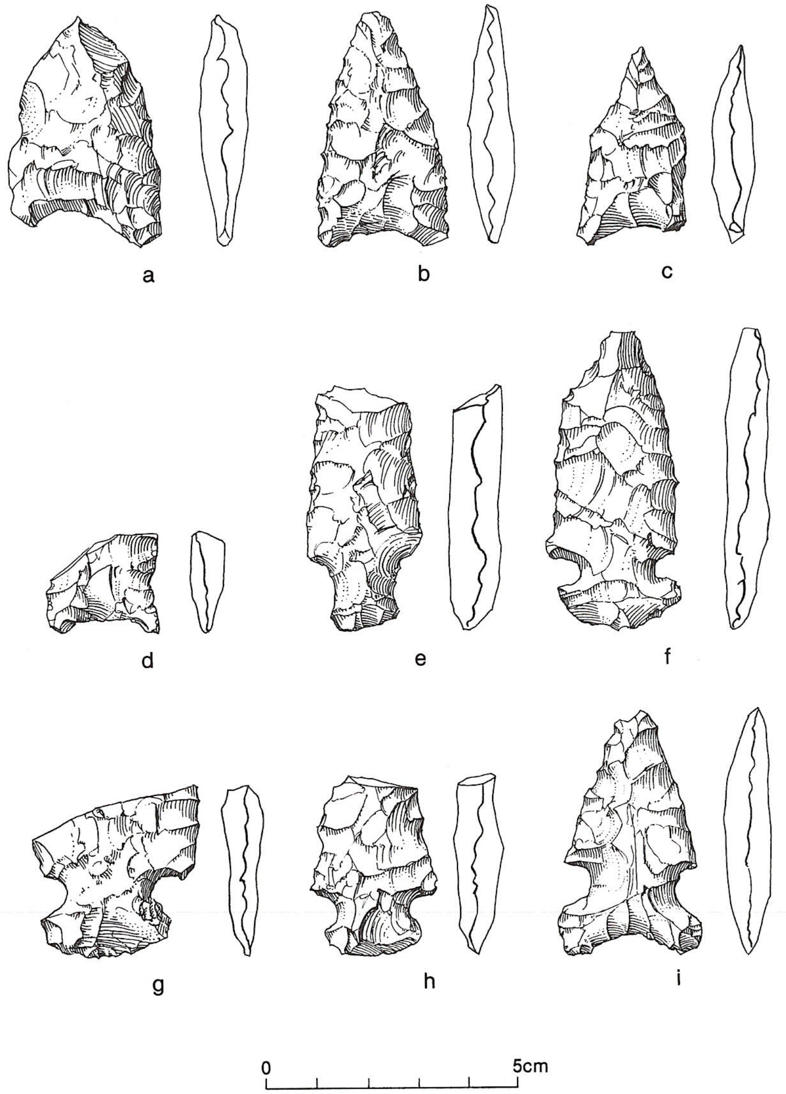


FIGURE 7.15 Projectile points from CA-SLO-175: *a*, 511-358; *b*, 511-481; *c*, 511-SE20SW90:10; *d*, 484-503; *e*, 511-323; *f*, 511-663; *g*, 511-686; *h*, 484-160; *i*, 484-280. *Illustration by Rusty van Rossman*

Cottonwood (C. D. King 1978:68), and Coastal Cottonwood (Koerper and Drover 1983). They clearly date to the Late period and C. D. King (1978:68) feels that they are generally restricted to his phase 2a and b (circa AD 1500–1782). The weights and neck widths of these points are consistent with those associated with the bow and arrow (table 7.14; Fenenga 1953; Thomas 1978).

Fragments. An additional eighteen stage 5 biface fragments (N=18) can be classified as projectile points remnants (table A.44): eleven of these are of Monterey chert, four are of Franciscan chert, and three are obsidian.

CA-SLO-1259

Ten projectile points were recovered from CA-SLO-1259, including seven complete enough for comparative analysis. Types all represent the Central Coast Stemmed series, including Contracting-stemmed (4), Square-stemmed (2), and the Concave Base Stemmed (1). The Concave Base Stemmed was not identified at CA-SLO-175, but a similar example was reported from CA-MNT-282 (Pohorecky 1976:225, specimen 1-124797) and another from CA-MNT-254/266 (T. Jones et al. 1989:205), where it was provisionally distinguished as a discrete type. We include it within the proposed series. Attributes of the CA-SLO-1259 points are summarized in table A.45; they are illustrated in fig. 7.18.

Comparative analysis of the large sample of points recovered from the sites at Little Pico Creek allows for improved resolution of temporal and morphological parameters of regional types. The temporal parameters suggested by the points generally support the overall dating of both sites sug-

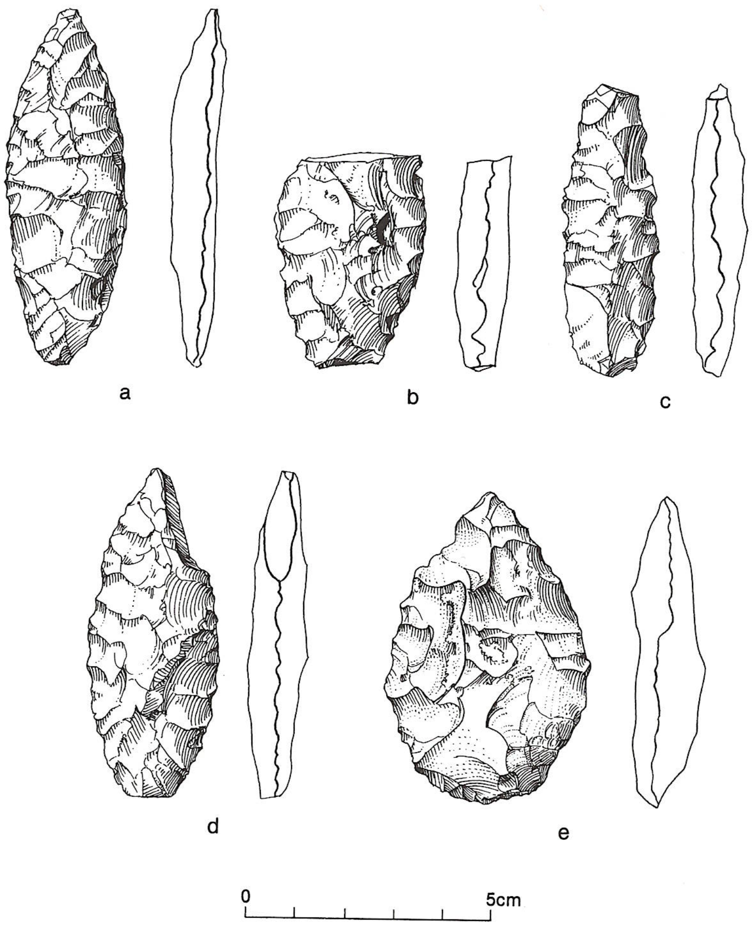


FIGURE 7.16 Projectile points from CA-SLO-175: *a*, 511-735; *b*, 511-806; *c*, 511-886; *d*, 511-1966Surface28; *e*, 484-196. *Illustration by Rusty van Rossman*

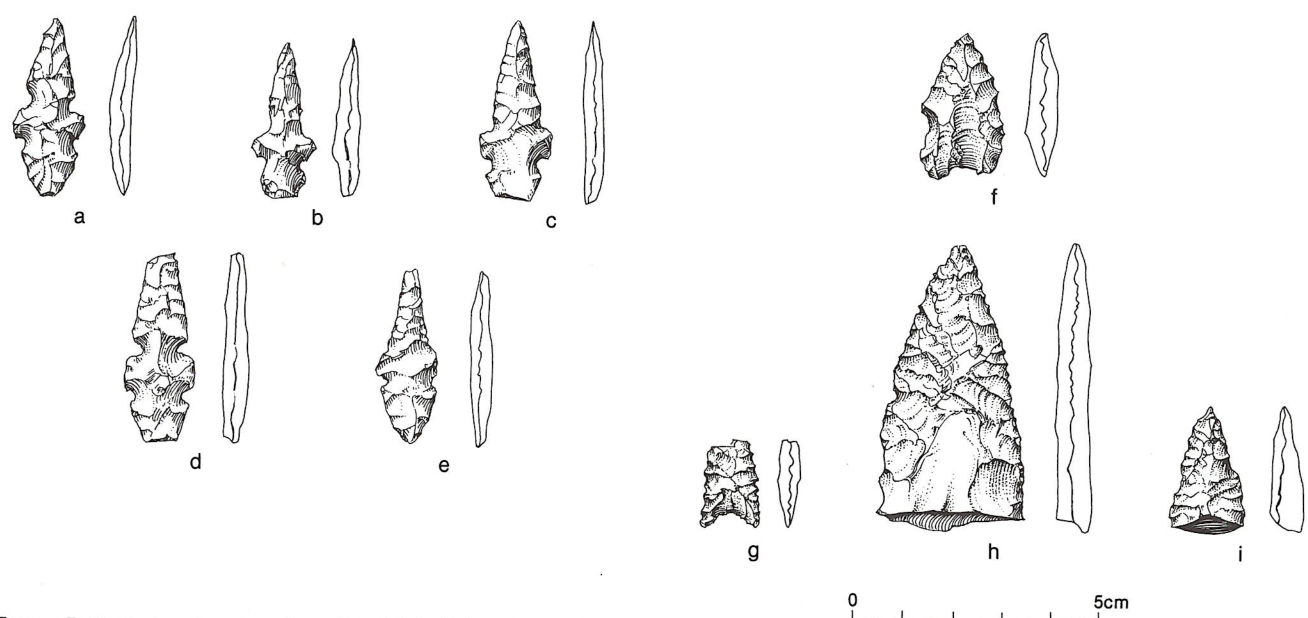


FIGURE 7.17 Projectile points from CA-SLO-175: *a*, 511-B12a; *b*, 511-38a; *c*, 511-40a; *d*, 511-41a; *e*, 511-41b; *f*, 511-200SW; *g*, 511-a; *h*, 511-b; *i*, 511-350. *Illustration by Rusty van Rossman*

Table 7.11 Statistical attribute summary of Large Side-notched projectile points from CA-SLO-175

Attribute	*Range*	*Mean*	*Std dev*	*Sample size*
ML	48.0-58.0	58.0	5.0	3
MW	23.0-26.5	26.7	3.8	5
TH	8.5-11.0	9.3	1.2	4
WT	9.6-12.6	11.1	2.1	2
WB	13.0-26.5	19.7	5.4	5
NW	14.0-25.0	17.1	4.6	5
DSA	160.0-188.0	175.3	9.8	10
PSA	90.0-180.0	140.6	28.3	10
LW	1.8-3.6	2.4	0.8	4
MWP	11.0%-29.0%	21.3%	7.6	4

ML=maximum length; MW=maximum width; T=thickness; WT=weight; WB= basal width; NW=neck width; DSA=distal shoulder angle 1 and 2; PSA= proximal shoulder angle 1 and 2; LW=length width ratio; MWP=maximum width position; length, width, and thickness in millimeters; weight in grams.

Table 7.12 Statistical attribute summary of Lanceolate projectile points from CA-SLO-175

Attribute	*Range*	*Mean*	*Std dev*	*Sample size*
ML	58.0–71.0	63.9	5.5	4
MW	19.0–40.5	27.5	9.2	4
TH	9.5–12.0	10.7	1.0	5
WT	11.2–29.7	17.6	7.1	5
LW	2.4–2.9	2.7	0.4	2

ML=maximum length; MW=maximum width; TH=thickness; WT=weight; LW=length width ratio.

Table 7.13 Statistical attribute summary of Double Side–notched projectile points from CA–SLO–175

Attribute	*Range*	*Mean*	*Std dev*	*Sample size*
ML	33.0–46.0	38.4	5.0	5
MW	12.0–15.0	13.7	1.4	5
TH	4.0–10.0	6.6	2.9	5
WT	1.6–2.4	2.0	0.6	2
WB	—	—	—	—
NW	7.0–9.5	8.4	1.0	7
DSA	165.0–180.0	172.4	5.2	14
PSA	70.0–90.0	72.9	9.0	14
LW	2.4–3.1	7.4	10.4	5
MWP	34.0%–42.0%	38.4%	3.6%	5

ML=maximum length; MW=maximum width; TH=thickness; WT=weight; WB=basal width; NW=neck width; DSA=distal shoulder angle 1 and 2; PSA= proximal shoulder angle 1 and 2; LW=length width ratio; MWP= maximum width position; length, width, and thickness in millimeters; weight in grams.

Table 7.14 Statistical attribute summary of Small Concave Base projectile points from CA–SLO–175

Attribute	*Range*	*Mean*	*Std dev*	*Sample size*
ML	33.0–46.0	38.4	5.0	5
MW	10.0–16.0	13.0	4.2	2
TH	4.5–10.0	5.8	3.9	5
WT	1.6–2.4	2.0	0.6	2
NW	7.0–9.5	8.4	1.0	7
DSA	165–180	172.1	5.7	7
PSA	70–90	78.6	8.9	7
LW	2.4–3.1	2.8	0.3	5

ML=maximum length; MW=maximum width; TH=thickness; WT=weight; NW=neck width; DSA=distal shoulder angle 1 and 2; PSA=proximal shoulder angle 1 and 2; LW=length width ratio; length, width, and thickness in millimeters; weight in grams.

gested by radiocarbon, obsidian hydration, and shell bead analysis. At CA-SLO-175, types mark three discrete phases of occupation.

One of the more distinctive and perhaps most temporally meaningful point types represented in the CA-SLO-175 collection is the Large Side-notched type with bifurcated base, which seems to be restricted to the period between circa 3500 BC and 600 BC The point recovered by Caltrans from CA-SLO-175 supports this dating, inasmuch as the radiocarbon results from the Caltrans excavation area indicate occupation during that span. Two of the other Large Side-notched points were recovered by Abrams from the lower levels (107 to 168 cm below surface) of test pit B, which was located close to the Caltrans block (fig. 3.1). Clearly, the recovery of these points confirms the presence of an older site component in the deepest levels of the southern portion of CA-SLO-175, as represented by test pit B and Caltrans units 1 to 6. The absence of similar specimens from CA-SLO-1259 supports restriction of Large Side-notched points to pre-600 BC temporal contexts.

Stemmed points are the most ubiquitous type in the Little Pico Creek collection. The Central Coast Stemmed series is proposed as a synthetic typological structure subsuming earlier provisional stemmed types. Four closely related types make up the series: Contracting-stemmed, Square-stemmed (Rossi), Long-stemmed (Año Nuevo), and Concave Base Stemmed. Originally ascribed to the 2000 BC–AD 1000 period, the Rossi Square-stemmed and the Año Nuevo Long-stemmed may need to be reassessed. Long-stemmed points have been reported from contexts dating 7000–6000 BC at CA-MNT-229 and CA-SON-348/H, while others are common in Middle period components in the Monterey Bay area. Whether these occurrences reflect a long use history for one type or multiple types employed during several discrete periods remains to be resolved. Aggravating this problem is the fact that reworked blades appear short relative to stems when points have been heavily resharpened.

Square-stemmed points have been positively dated as early as circa 3500 BC at CA-MNT-1228 (T. Jones and Haney 1992:239–285) and as recently as 1200 AD at CA-MNT-1233 (T. Jones and Haney 1992:359–418). Their occurrence at CA-SLO-175 marks an Early period occupation; the specimens found at CA-SLO-1259 confirm their use during the Middle period. Although they clearly were present between 3500 BC and AD 1200, they seem to have been most common before 600 BC, based on their low frequency among the Middle period assemblage at CA-SLO-175, as well as their absence from CA-MNT-282.

Contracting-stemmed points mark both the Early and Middle period occupations at Little Pico Creek, and indeed they can be dated circa 3500 BC–AD 1250 on the central coast. The Concave Base Stemmed type is provisionally ascribed

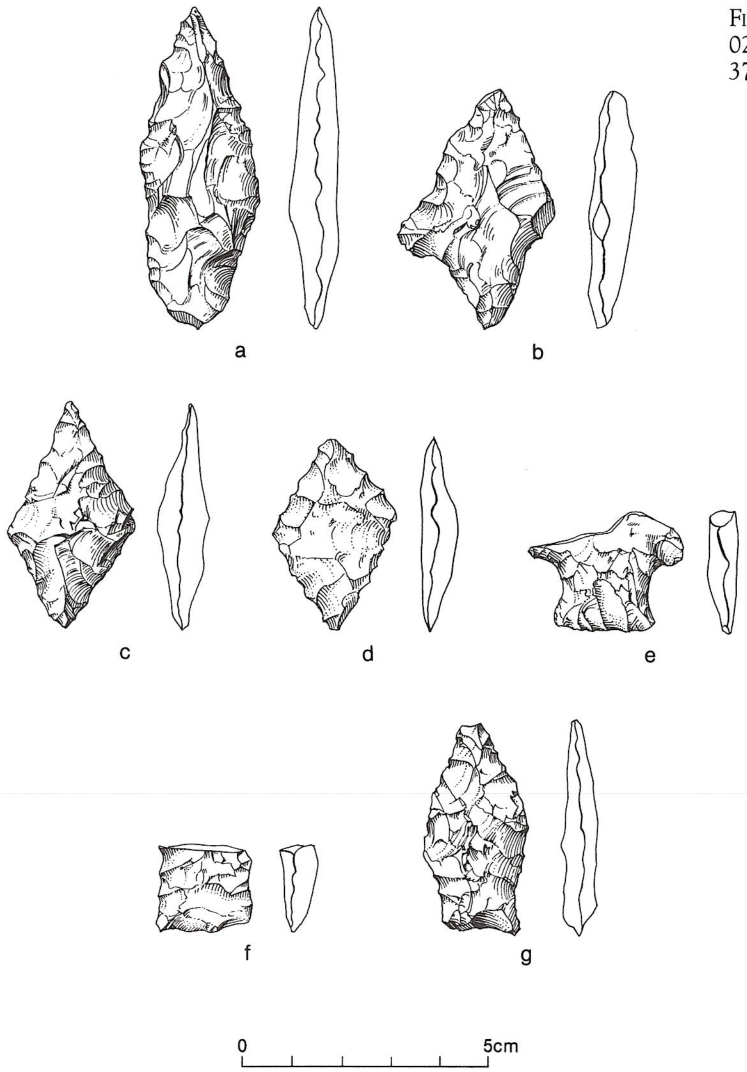


FIGURE 7.18 Projectile points from CA-SLO-1259: *a*, 485-027; *b*, 485-048; *c*, 485-115; *d*, 485-321; *e*, 485-167; *f*, 485-371; *g*, 485-304. *Illustration by Rusty van Rossman*

to the Middle period, based on its presence at CA-SLO-1259 and CA-MNT-282 and its absence from the older component at CA-SLO-175.

The Lanceolate and Large Concave Base types remain problematic with respect to time. Lanceolate points are stylistically simple and can be confused with point preforms, but some clearly occur in early contexts. Large Concave Base points do not occur frequently on the coast. Some variants resemble types from northern and central California that predate the Middle period (for example, points associated with the Windmiller and Borax Lake Patterns). To the east, Sierra Concave Base points appear to date circa 300 BC to AD 300 (Moratto 1984:317).

The Double Side-notched point, so far known only from the Cambria area, appears to be an intrusive element on the central coast during the Middle/Late transition. Small Concave Base points referred to as a Canaliño, Coastal Cottonwood, or Cottonwood (C. D. King 1978; Koerper and Drover 1983) are associated with minor, ephemeral use of CA-SLO-175 after AD 1250.

8

Ground and Battered Stone

GROUND STONE

Ground stone tools are represented at CA-SLO-175 and at CA-SLO-1259 by milling equipment such as milling stones, bowl mortars, handstones, and pestles, and by net weights, or grooved stone, and miscellaneous pieces that include stone "balls," tarring pebbles, ornaments, and fragments that are only recognizable by dint of "ground" or pecked facets and surfaces. There is little doubt that this sample, particularly of the more visible artifacts, has been skewed by surface collection accomplished over the years (Hines 1986:15) and by ongoing retrieval from a variety of evidently recent unauthorized small excavations, particularly in the area west of the highway.

Milling equipment

Two categories of ground stone are the portable milling implements used for the processing of vegetal and certain noncomestible materials: milling stones (or *metates*) and bowl mortars. A complementary bedrock milling feature at CA-SLO-175, where thirty-four mortar cups were recorded, is located overlooking the most southwesterly extension of the northeast bank of Little Pico Creek (Waldron 1986).

Milling stones. Descriptive attributes for milling stones include exterior dimensions, exterior shaping, the conformation and dimensions of the dorsal or working surface, and any evidence of wear patterns or organic residue. Two types of working or grinding surfaces are represented: a flat, shallow concavity that extends from margin to margin, and a basin surface surrounded by a rim. The general expectation is that configuration of the milling surface itself was a functional characteristic. Shaping of all surfaces was accomplished by a variety of techniques, either singly or in conjunction: grinding, pecking, and, in some instances, chipping.

CA-SLO-175. Nine specimens were located in the collection housed at the SLOCAS facility. Three of those had been identified in the UCLA catalog as *metates*; the remainder had been classified as mortars, or *mano*, fragments. Because of the incomplete nature of many of the milling slab fragments, only tentative comparisons are suggested, particularly as exterior dimensions were not complete enough to be meaningfully measurable except in two cases (see table A.46 for metric measurements and attributes). Six of the total number recovered from both excavations feature shallow concave working surfaces, three are flat, and one retains a rimmed basin. Thickness is the most readily comparable measurement with seven of the 1965-66 collection averaging 57.8 mm and ranging between 40 and 79 mm; the single fragmented granite milling stone recovered in 1989 (484-030) falls within the range of the earlier sample. The concave surface is 7.6 mm deep while thickness of the piece is 48 mm. The two almost complete milling stones from the Abrams fieldwork are considerably thicker at 109 mm (511-NW148NE20-55.76, fig. 8.1) and 123 mm (511-NW280SW-65.75) and are virtually unshaped on their ventral surfaces. Five of the Abrams sample are minimally formed on the ventral surfaces or margins by grinding, pecking, or flaking, as is the single specimen from the 1989 excavation. Given the small sample, there does not appear

FIGURE 8.1 Milling slab from CA-SLO-175: 511-NW148NE20-55.76

to be any correlation between working surface conformation and exterior shaping. Five specimens from the Abrams collection show evidence of fire or heat, although it is not clear whether this effect was sustained before or after fracture.

Of the original collection, three milling stones were located on the surface during the initial survey, and six were recovered from the trench excavation at varying depths. The Caltrans specimen was uncovered during excavation for the abutment.

CA-SLO-1259. One granite milling-stone fragment was recovered from the rock feature in unit 2 at a depth of 20 to 30 cm. This specimen (485-374) is a virtual cross section of a flat-surfaced slab whose margins and single grinding surface have been lightly pecked and slightly polished. With a width of 240 mm and a thickness of 55.6 mm, this piece falls within the range of the thinner specimens from CA-SLO-175. The fractured surface shows evidence of fire-produced crenation; the margins were apparently burnt and blackened before fracture.

Milling stones occur in restricted numbers and generally in fragmented and/or fire-fractured condition in sites along the coast in the immediate region (Bouey and Basgall 1991; Clemmer 1962; Hines 1986; Leonard 1968; Reinman 1961; Wallace 1962, among others). At sites along the southern Monterey County coast, milling stones were absent from the Willow Creek sites (Pohorecky 1976) but were present at Big Creek sites, CA-MNT-1228, MNT-1233, and MNT-1277/H (T. Jones and Haney 1992). The most sizable collection of milling stones in the area was recovered from Diablo Canyon at CA-SLO-585 (Greenwood 1972) where both "flat slab" and "shallow basin" types were identified, with the latter predominating. Thickness dimensions are strictly comparable between milling slabs from Diablo Canyon and the sites at Little Pico. Similar to specimens in the Little Pico collection, exterior surfaces of milling stones at Diablo Canyon were described as lightly pecked or flaked to remove "excess stone."

Bowl mortars. *CA-SLO-175*. A hallmark in central California coastal archaeology, the ground-stone bowl, or bowl mortar, is well represented at CA-SLO-175. Of the original fifty-six entries in the UCLA catalog for this artifact form, fifty-one items (fragments and whole bowls) were located in the SLOCAS facility. The following description is derived from the nine complete mortars whose measurements and material are reported in Abrams (1968a, b, c), together with those fragmented specimens that afford meaningful measurement. As reported by Abrams, two complete mortars are unique tools. One hopper mortar (511-NW58NE36-51.12, fig. 8.2), unshaped with the exception of the shallow grinding area, clearly shows asphaltum

FIGURE 8.2 Hopper mortar from CA-SLO-175: 511-NW58NE36-51.12

FIGURE 8.3 Bowl mortar from CA-SLO-175: 511-NW189NE58-57.42

surrounding the cup. The second (511-NW390SW-61.50) was described as an "incipient bowl" and is an unshaped consolidated sandstone cobble with a barely ground cup, 6 mm deep.

The morphology of the remainder of this class appears generally uniform. All are cobble-based and globular, with an elliptical-to-round exterior conformation. For the majority of the collection, exteriors were generally ground smooth; none could be characterized as finely dressed although one specimen is very well ground (511-NW189NE58-57.42, fig. 8.3). Pecking, grinding, and occasional flaking are evident on bases which may have increased the stability of the piece. No flower-pot–shaped forms or fragments were identified. Of the fifteen specimens where rim shape is clear, all are plain and rounded (for example, 511-NW155NE0-4, fig. 8.4; 511-SE15SW90/6) except one mortar (511-NW108NE18-53.65), which has a ground and flaked rim, and five, which have scalloped rims (for example, 511-

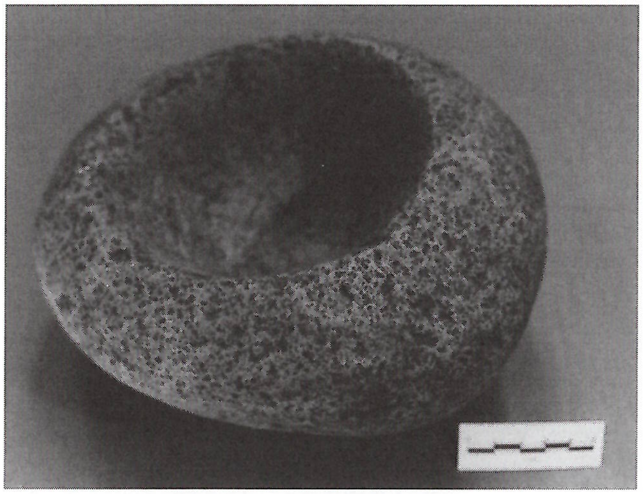


FIGURE 8.4 Bowl mortar from CA-SLO-175: 511-NW155NE0.4

FIGURE 8.5 Bowl mortar from CA-SLO-175: 511-NW71NE18-51.33

NW109NE41-54.17; 511-NW189NE58-57.42, fig. 8.3; 511-NW71NE18-51.33, fig. 8.5). The interior concavities are similarly ground and pecked, but conformation varies from concave or gently parabolic (N=10) (for example, 511-NW71NE18-51.33, 511-NW155NE0-4, fig. 8.4) to more sharply angled v-shaped interiors (N=4) (for example, 511-NW189NE58-57.42, fig. 8.3). Mortars with thin excurvate walls or beveling associated with the rims are absent in the collection. The shape of the interior cavity may have been related to particular processing activities rather than stylistic consideration.

Originally the general distinction made between large and small complete bowl mortars—based on weight and to a lesser extent on depth of the mortar cup—differentiated the two types (Abrams 1968a, c). Two specimens (511-NW71NE18-51.33: Plate 19 and 511-NW189NE58-57.42, fig. 8.3) register as larger size, and two others are small, with diameters under 100 mm. A larger sample, which excluded the hopper mortar and the "incipient" mortar, gave a range for diameter measurements of from 95.8 to 302.5 mm for thirteen specimens. The majority (N=8) registered between 152.2 to 203.0 mm. Variance in interior mortar dimensions is less striking. Of the eighteen measurable specimens, the majority (N=13) have interior dimensions between 71 and 135 mm in diameter and 41 to 115 mm in depth.

During the Abrams fieldwork, bowl mortars and fragments were recovered in surface survey and throughout the trench at varying depths. In units south of the highway, one fragmented mortar was found at 91 cm (511-SE15SW90/6: Plate 15). In the 1989 fieldwork, one bowl mortar fragment (484-074) was recovered during the monitoring for abutment 4. This remnant of a heavy sandstone mortar wall measures in thickness from 44.6 to 71.8 mm, probably representing the thickening of the wall near the bowl base. Several other fragments discussed under "Miscellaneous ground and modified stone" below may be pieces of mortars. One very small granitic cobble mortar (484-412, fig. 8.6) from the 20–30 cm level of unit 5, is ground over the dorsal side with a slightly flattened "base." This specimen registers 115.8 x 96.9 mm in diameter and 35.2 mm in exterior depth. Cup dimensions measure 82.1 x 70.6 x 22.3 mm.

It is tempting to assign some particular function, such as paint mortar, to this diminutive specimen, but no residue was discernible on its surface. In the Abrams collection, however, hematite was clearly visible on the interior of one mortar (511-155NE0-4: Plate 12), on the exterior base of another (511-NW109NE41-54), and on the interior surface of several fragments. Several specimens were also marked by a blackened substance on the interior (511-155NE0-4: Plate 12; 511-NW280NE59.49: Plate 14). A variety of uses is suggested for these pieces, including storage and processing and probably cooking.

Discussion. Wallace (1962) recovered both bowl-shaped and flaring-sided (that is, flower-pot) mortars from survey and excavation in the Arroyo Grande watershed, south of Diablo Canyon. A schematic comparative illustration (Wallace 1962: Figure 3a–d) resembles the globular bowl mortar shapes recovered from Little Pico. Further, the parabolic and V-shaped interior cavities are clearly differentiated in those figures. No depositional context was recorded for the various forms.

At CA-SLO-239 in Morro Bay, Clemmer (1962) distinguished between several boulder mortars and a single mortar of finely finished sandstone; a hopper mortar was also recovered. At Whale Rock Reservoir near Cayucas

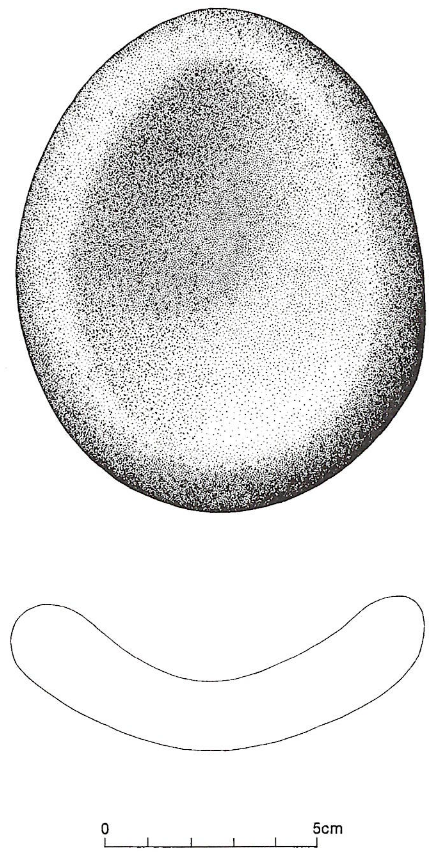


FIGURE 8.6 Small cobble mortar from CA-SLO-175: 484-412. *Illustration by Tammara Ekness-Hoyle*

(Reinman 1961), two types were differentiated: square rimmed and rounded. One well-ground specimen of the latter type was made with "slight indentation just under the lip of the bowl" (Reinman 1961:16).

From a largely fragmented sample at CA-SLO-2, Greenwood (1972) differentiated between small and large bowls. The latter were characterized by roughly pecked interiors and minimal exterior finishing and little symmetry. Small bowls were recorded as occurring in the upper levels of the deposit. The shape of larger bowls was characterized as either globular or flower pot (that is, flat-bottomed with straight walls and straight rims). These latter specimens were reported to be ground smooth on the interior. Exterior surfaces were pecked and generally ground smooth. Rims were described as rounded, rounded and scalloped, straight across, flat, or grooved. At CA-SLO-585, sandstone bowl fragments were identified as the remnants of "globular bowls of substantial size" (1972: 61) whose interiors were ground and whose exteriors were pecked and often ground. Recovery of these fragments was almost invariably from upper levels implying that this form of mortar postdated the deposition of most of the milling slabs.

At the Aerophysics site, Harrison and Harrison (1966) discussed the recovery of crudely made "stone vessels," which were generally nonuniform in shape. Many were noted as showing evidence of being used as mortars, but use as containers or cooking pots was not discounted (1966:20). Two types were derived from this collection: large globular vessels with hemispheric bottoms and either straight walls or walls that curved outward below the rim and smaller more spherical bowls, some of which had scalloped rims. No flowerpot forms were reported, nor were any specimens described whose interiors were conical or V-shaped.

In the later component at CA-MNT-281 at Willow Creek, a small cobble mortar, identified as a pigment mortar, was recovered (Pohorecky 1976). Hopper mortars were described for the later component at Willow Creek (Pohorecky 1976), in late context at CA-MNT-1227 and MNT-1233 on the Big Sur coast (T. Jones and Haney 1992), and as surface finds at Diablo Canyon (Greenwood 1972). The single hopper mortar at CA-SLO-175 was recovered during the wide, relatively shallow exposure undertaken subsequent to the initial trench excavation (Abrams 1968c).

Handstones. Commonly interpreted as the primary hand-held device for grinding foodstuffs and certain noncomestible items on milling stones, handstones (or *manos)* are represented in both the 1965–66 and 1989 collections for CA-SLO-175 and from the excavation at CA-SLO-1259 (see table A.47).

Morphological description of handstones is structured in terms of conformation and wear patterning, with the implicit consideration that wear itself often accounted for shape. Shaped handstones are here defined as those whose margins have been modified by at least 10 percent by pecking or grinding. Planar conformation is described as circular, oval, subrectangular, and so forth. Cross sections may be flat (plano), convex, or subconvex. Convexity of a longitudinal surface is measured in terms of the angle of the arc created by the surface and the margins, with *subconvex* corresponding to an angle of from 10° to 45°, *flat* measuring under 10°, and *convex* more than 45°. Working surfaces are characterized as unifacial or bifacial in placement and by description and enumeration of facets, the wear-produced areas that mark both the planar and lateral surfaces. These working surfaces may show polish, striations, or shouldering, features that are assumed to demonstrate use-related function. Remnants of any ingrained organic material are noted as well as post-depositional effects, such as heat or fire. Secondary use is indicated, such as battering or beveling on ends or pitting on any surface.

CA-SLO-175. Handstones from the 1965–66 excavations were identified for the present report from the UCLA catalog. Of the twenty-three specimens classified as *manos*

in that catalog, sixteen were identified in the collection at SLOCAS; seven were not located; and, one specimen was reclassified as a possible *metate* fragment. In addition, twelve other pieces—originally characterized as groundstone, hammerstone, or in one case a pitted stone—are categorized as handstones here. These last-mentioned specimens have been reclassified on the basis of evidence for their original use, that is, by ground or polished facets and by shouldering. Secondary use-wear primarily took the form of battering. Consequently, the total number of handstones in the Abrams collection is estimated to be thirty-six.

In the Abrams collection twenty-one handstones are unshaped beach or stream cobbles, whose modification is largely the result of minimal use and, on occasion, by slight edge grinding or pecking. Of the unshaped specimens, only three are bifacially worked, and twelve are oval in planar view with flat working surfaces and subconvex or convex opposing surfaces. The most common cross section for the unifacial specimens are plano/subconvex and plano/convex, conforming to natural cobble shape. One unshaped unifacially modified handstone (511-NW145NE0-3) is wedge shaped on the longitudinal axis.

Six handstones classified as "shaped" show substantial margin/edge abrasion. Shaped handstones have bifacial working surfaces (N=4) and are oval in planar conformation (N=5). Cross sections distinguish four specimens with opposing plano, or flat, surfaces, and one each for plano/ subconvex, and subconvex/ subconvex. One elongate specimen (511-NW92NE41-51.05) is wedge-shaped on the longitudinal axis with two converging sides supporting wear and one end showing slight beveling that may relate to use as a pestle. One specimen (511-959), fractured in a manner that precludes positive estimates of shaping, is also wedge shaped with only one of the convergent sides showing evidence of wear. All handstones show only one facet per working surface.

The most common secondary use is assumed to be hammering or battering, with eight specimens clearly showing evidence on end or lateral margins (511-38; 511-889; 511-SE20SW90/7; 511-NW150NE0: 3; 511-NW66NE-46: 49.00; 511-NW145NE0-3; 511-NW79NE40-49.05; 511-NW99 NE41-51.30; 511-NW150NE-60.11). Two handstones are pitted on a single planar surface (511-955; 511-SE10SW90/2), and two others on opposing surfaces (511-743; 511-NW79NE40-49.05). One unifacial specimen (511-SE10SW90/4) is irregularly grooved on one surface and was originally cataloged as a net weight. One handstone (511-NW150NE0/3) bears traces of an unidentified organic residue on the working surface. Fourteen handstones (see table A.47) show varying degrees of heat effect in crazing, crenated fracturing, and color modification. Whether this reflects specialized use—such as in stone boiling or the construction of hearths—or evidence of grass wild fire is uncertain.

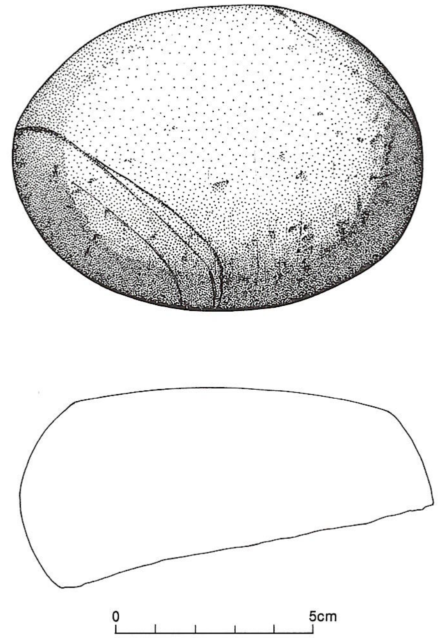


FIGURE 8.7 Handstone from CA-SLO-175: 484-031. *Illustration by Tammara Ekness-Hoyle*

Sizes for these handstones range in length from 147.5 to 96.8 mm, in width 105.1 to 74.2 mm, in thickness 74.5 to 29.1 mm, and in weight from 918.5 to 307.3 gm. Simple statistics for complete specimens (N=15) are:

length	x = 112.1 mm	sd = 18.0
width	x = 86.0 mm	sd = 13.5
thickness	x = 46.2 mm	sd = 11.7
weight	x = 608.8 gm	sd = 212.1

Eight handstones recovered from the 1989 fieldwork conform morphologically to the Abrams sample. The majority are unshaped (N=6), are unifacially worked (N=7), have flat working surfaces (N=7), and have convex or subconvex opposing surfaces (N=6). Planar conformation for the majority is oval (N=4) and circular (N=3), with one subrectangular specimen. One of the two shaped handstones (484-031, fig. 8.7) is a cobble that was split longitudinally; striations parallel to the longitudinal axis mark the working surface on this specimen. The other shaped handstone (484-573) is distinguished by pecking around the entire lateral margin with some localized battering. Unshaped specimens accounted for three (484-157; 484-193; 484-204, fig. 8.8a) of the four recovered in situ. Evidence of minimal hammering or batter marks three other handstones (484-020, fig. 8.8b; 484-029; 484-193). Only one handstone (484-047) was fire affected.

Sizes for the handstones from the 1989 fieldwork at CA-SLO-175 range in length from 102.6 to 67.1 mm, in width 80.4 to 64.6 mm, in thickness 44.9 to 23.1 mm, and in weight from 551.3 to 273.3 gm. Simple statistics for complete

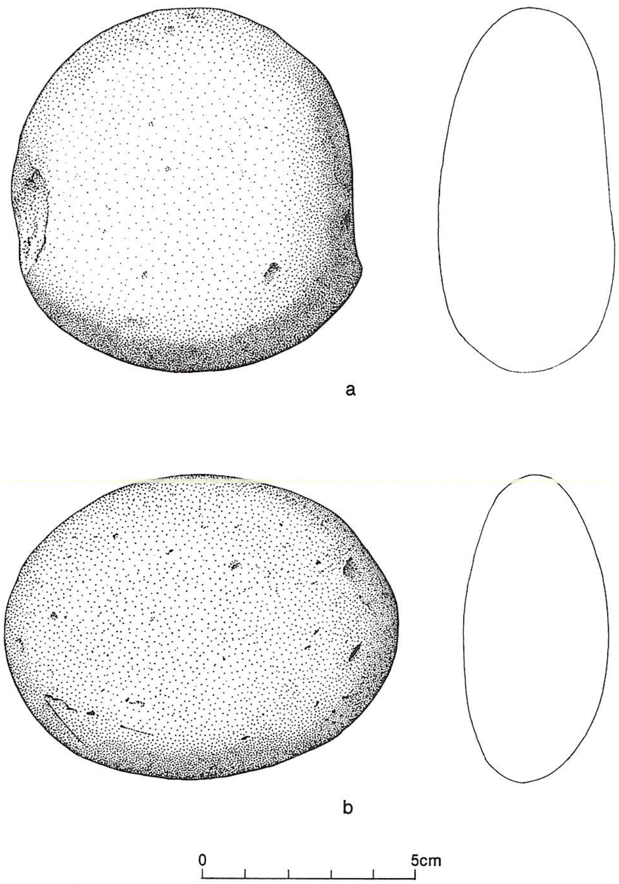


FIGURE 8.8 Handstones from CA-SLO-175: *a*, 484-204; *b*, 484-020. *Illustration by Tammara Ekness-Hoyle*

specimens (N=7) are:

length	x = 85.4 mm	sd = 10.7
width	x = 71.6 mm	sd = 6.4
thickness	x = 39.6 mm	sd = 4.6
weight	x = 373.3 gm	sd = 93.5

CA-SLO-1259. Two handstones are recorded from the recovery at CA-SLO-1259. Both are unshaped and fall within the thinner range of specimens from CA-SLO-175. One handstone (485-341) has a lightly pecked facet, and the other (485-322) is marked by a heavy deposit of asphaltum and is lightly battered at one end.

In both the Abrams and Caltrans collections shaping of handstones is not highly pronounced. Wear facets most often are small and characterized by light polish. Consequently, evidence conveys the sense that these tools are of an expedient nature and not items that were commonly curated. The easy access to cobbles on the beach or in the streambed of Little Pico Creek would appear to have provided any amount of appropriate material for tools.

Conclusions on the distribution of the handstones are equivocal. In the CA-SLO-175 Abrams excavation, four were recovered from the surface with little provenience noted in the catalog, except "west of highway" for two specimens. With the exception of these relatively unprovenienced pieces, only three were recovered from depths above 30 cm, and fourteen were recovered from below 40 cm. Horizontal distribution of the handstones from the early excavations occurred in all areas with some concentration (N=5) in two of the most southwesterly units (SE10SW90 and SE20SW90). For those artifacts recovered from the Caltrans fieldwork at CA-SLO-175, four were recovered during the monitoring of the excavation for the abutment 4 and the drain and, consequently have little depth provenience. The remaining four, however, were retrieved from unit 1 at depths of from 30 cm to bedrock. Of the two specimens from CA-SLO-1259, one was recovered from the rock layer in unit 2 and one from the 10 to 20 cm level of unit 6.

In comparison to the collection from CA-SLO-585 at Diablo Canyon, handstones from Little Pico are smaller in length and width, although thickness is comparable. Handstones from the Piedras Blancas sites fall comfortably within the range of those from the 1989 excavation at CA-SLO-175.

Common in sites in central California, the handstone is either unrecognized (or simply lacking) at several locations. At Morro Bay its absence was specifically recognized by Clemmer (1962) even though milling-slab fragments were found throughout the midden. A similar absence was noted for the Whale Rock Reservoir sites, although only a single small milling stone was present at one site (Reinman 1961). In more northerly coastal sites, Pohorecky (1976) did not report handstones (or milling stones) at Willow Creek. Pritchard (1984) at CA-MNT-101 described both bifacial and loaf-shaped forms. At CA-MNT-1232/H at Big Creek on the Big Sur coast (T. Jones and Haney 1992), bifacial, well-shaped specimens were recovered from contexts dated from circa 4200 to 600 BC.

Among the substantial sample of handstones at CA-SLO-585 at Diablo Canyon, a majority of bifacially shaped specimens (74/112) were described as "symmetrical and well fashioned" (Greenwood 1972:16) and were recovered predominantly from the lower levels of the deposit. Similar to the collection at Little Pico, handstones at Piedras Blancas were primarily unshaped and bifacially worked (Bouey and Basgall 1991).

For specimens at both CA-SLO-2 and SLO-585, Greenwood noted the reuse of many handstones as pitted stones or hammerstones. Similar reuse was described by Pritchard (1984) at CA-MNT-101.

Pestles. The complementary implements for grinding and pounding materials in bowl mortars or bedrock mortars, pestles were recovered from both CA-SLO-175 and CA-SLO-1259. According to Abrams (1968a:44), the limited

sample at CA-SLO-175 did not warrant a typological classification. Yet, the quantity recovered at that site compares well with other collections in the area. Consequently, several descriptive categories for pestles recovered from all excavations at Little Pico Creek are of value for comparative purposes. All pestles are roughly cylindrical and elongate. Many are shouldered or beveled at the working ends, which are either flat surfaced or convex. The major classificatory element is the presence or absence of shaping along sides of the specimen.

CA-SLO-175. Originally, 13 whole pestles and 23 fragments were reported upon from the 1965–66 fieldwork at CA-SLO-175 (measurements are recorded in Abrams 1968b, c). In a survey of the collection at SLOCAS, 32 specimens were located, including one pestle that was reidentified as a hammerstone, another (511-SE20SW90) originally classified as a hammerstone that is now classed as a pestle, and one longitudinally fractured specimen ground on the short axis for use as a net weight (511-NW62NE37-50.70). Four of the thirteen complete specimens are cobbles that are unshaped or unmodified other than use-wear (for example, 511-NW108NE18-53.43; 511-Surface T 56; 511-125NE-53.83). Aside from a limited number (for example, 511-NW196NE46-57.60; 511-NW217NE58-54.01), extensive shaping, however, is not a characteristic of the majority of those considered shaped. Six complete and five fractured pestles have one or more sides ground almost flat (for example, 511-NW109NE56-55.06). Extensive pecking on lateral surfaces is present on only six of the incomplete implements. Eleven pestles from the Abrams collection average 219.5 mm in length, and two are under 100 mm. The latter two specimens are unmodified cobbles. The use-wear on polar ends produced flat (for example, 511-531) or convex shapes (511-NW109NE56-55.06; 511-1966T57). Seven complete pestles are shouldered or beveled on one polar end (for example, 511-NW125NE-53.83; 511-Surface T53; 511-NW108NE41-54.00). Battering or pitting on polar ends is common (for example, 511-NW196NE46-57.60; 511-NW113NE40-53.90). Twelve specimens show evidence of heat fracture.

The UCLA catalog noted that one pestle (511-108NE18-53:43) was associated with a bowl mortar (511-NW108NE18-53.65). Hematite, noted on mortars, was also identified on several pestles (511-1966NW305SW90/7; 511-NW109NE36-55.06). Almost half of the surface of one fire-cracked pestle (511-531) is coated with asphaltum. Consequently, a number of processing activities is suggested for these tools.

Two shaped (that is, side-ground) pestles (511-SE15SW90-4/A; 511-SE20NW90/6) were recovered from units southwest of the highway at depths of approximately a meter. Two other shaped specimens (511-531 and 511-532) were associated with burial 4. Six more were recorded as surface finds, and the remaining majority were located throughout the length of the trench at varying depths.

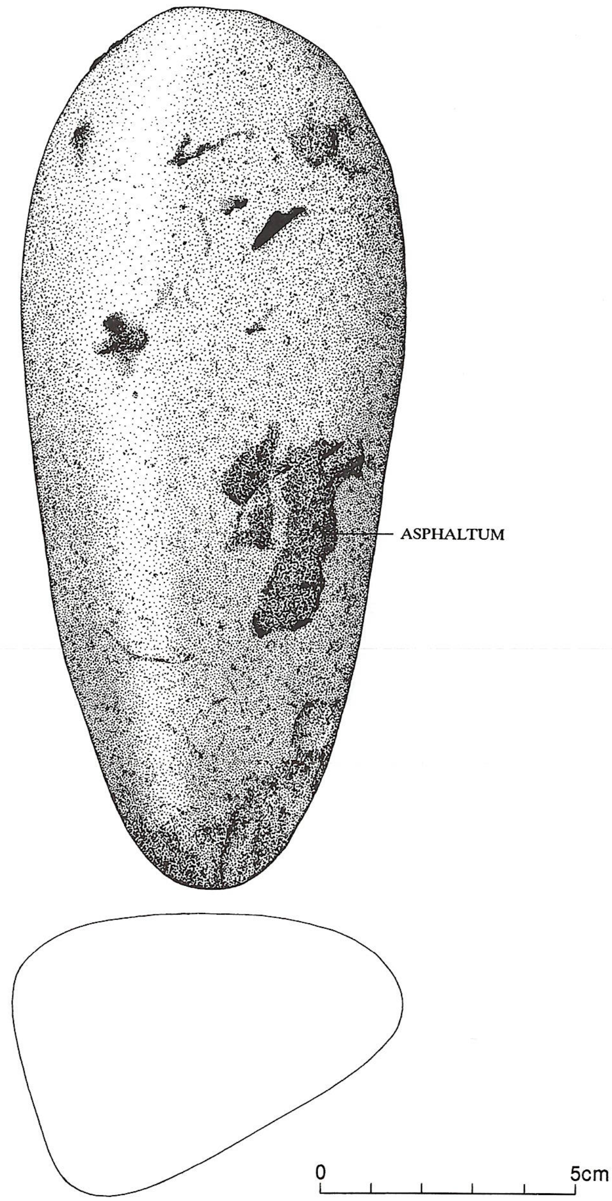


FIGURE 8.9 Pestle from CA-SLO-175: 484-081. *Illustration by Tammara Ekness-Hoyle*

Four specimens were recovered during the 1989 fieldwork (see table A.48), three during the monitoring for the abutment and one from the 20–30 level of unit 2 (484-228). Three are subrectangular, and one specimen (484-081; fig. 8.9) is subtriangular in cross section. All are in the long range and are elongate and unshaped. The polar working ends of all implements are characterized by battering and/or grinding. One pestle (484-027) has a slightly beveled end, while another specimen (484-080, fig. 8.10) shows battering on opposing ends, one of which was previously flattened. Those specimens from the abutment excavation have use-wear on both

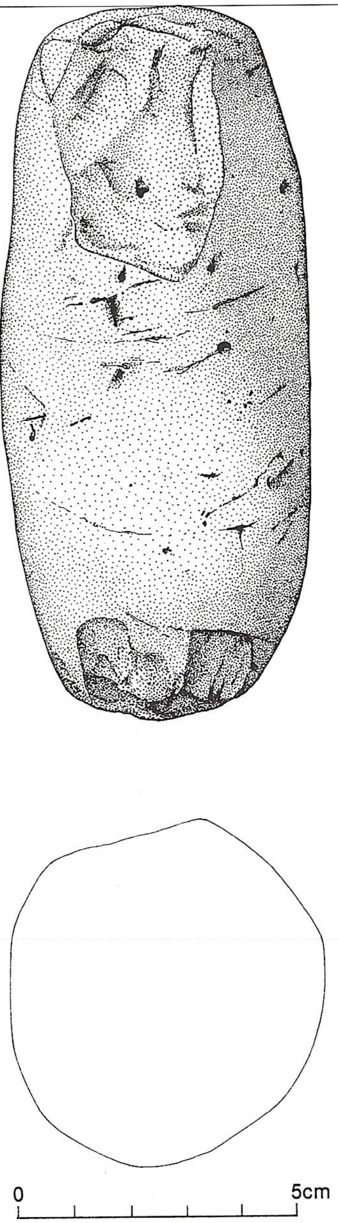


FIGURE 8.10 Pestle from CA-SLO-175: 484-080. *Illustration by Tammara Ekness-Hoyle*

convex ends; the pestle from unit 2 is fractured, heat-spalled, and has diffuse pecking on one lateral surface.

CA-SLO-1259. Two granite pestle fragments were recovered at CA-SLO-1259, one (485-356) from excavation of the abutment and the second (485-356, fig. 8.11) from the 20–30 cm level of unit 2. The former is fractured crosswise; length measures 216.0 mm, diameter 78.6 mm, weight 2474.2 g. This subrectangular specimen is shaped and bears diffuse pitting on three surfaces. The remaining polar end is minimally battered and is slightly convex in shape. The second pestle is an unshaped cobble whose remaining polar end is battered into a flattened working surface. Several spalls on one surface may be the result of fire. Measurements for this fractured specimen are 99.7 x 68.2x 52.6 mm with a weight of 514.4 g.

Greenwood (1972) reported pestles from two sites in Diablo Canyon, CA-SLO-2 and CA-SLO-585. Here, pestles were divided on the basis of whether they were "worked" implements (that is, sides shaped by pecking and/or grinding) or unmodified cobbles. At CA-SLO-2 pestles were almost equally divided between these classes, but CA-SLO-585 predominantly yielded shaped, tapered specimens that were smooth and symmetrical and showed extensive pecking and grinding. Greenwood noted pitting and traces of asphaltum and hematite on several pestles of each type at both sites.

At Whale Rock, Reinman (1961) noted that pestles were characterized by minimum alteration with the exception of only a few specimens, one of which was heavily ground on one side. At the Morro Bay site, Clemmer (1962) described 15 well-shaped pestles with flanged ends. At Willow Creek, 15 pestles typed on the basis of being shaped or unshaped, occurred only in the upper midden, with one very finely pecked and worked specimen recovered from the final phase of the deposit (Pohorecky 1976). Pritchard (1984) differentiated at CA-MNT-101 between almost equal numbers of relatively unworked cobble pestles and flat-shouldered pointed specimens that were cylindrical in shape.

Net weights

Net weights, or "grooved stones," are well represented in the archaeology of central coastal California. Recovered from all excavations at Little Pico Creek, although in differential distribution, these specimens are beach or stream cobbles, unmodified save for a groove ground and/or pecked around the circumference of the cobble. Generally the groove appears to have been originally pecked, and then, occasionally, ground. In several cases, a previously modified stone tool—such as a handstone, hammerstone, or fragmented rock—was grooved. Conversely, in several instances net weights were recycled or reused as anvil stones. The usual function attributed to these artifacts is the weighting of fish nets or use as sinkers, wherein twine was wrapped around and secured within the groove (see Greenwood 1972 and Harrison and Harrison 1966 for alternative discussion).

CA-SLO-175. The Abrams fieldwork accounted for forty specimens that are described in terms of method of manufacture, placement, and size of the groove as well as by metric measurements of the individual pieces (Abrams 1968a:Appendix). Size is variable; however, as noted by Abrams, there appears to be a continuum rather than any distinct size differential. Seventy-five percent of that sample is grooved on the short axis of the cobble (Abrams 1968a). Specimens that are merely notched on margins were included in the Abrams analysis. Small to medium net weights, ground and pecked around the short axis, range from 43 to 78 mm

FIGURE 8.11 Pestle from CA-SLO-1259: 485-356. *Illustration by Tammara Ekness-Hoyle*

in length (511-1966 Surface 14, fig. 8.12a; 511-756, fig. 8.12b; 511-Surface 13; 511-Surface 11; 511-1966B36a). Large specimens that are grooved on the short axis range from 170 to 225 mm in length (511-NW169NE53-57.06; 511-512). One large specimen (511-NW173NE46-57.50) was longitudinally pecked on one surface, apparently subsequent to the initial grooving. One elongate net weight (511-NW140SW-53.43) was grooved lightly around the long axis and subsequently around the short axis. This piece is notched on one end. Longitudinal grooving by pecking and grinding is noted for specimens that are in the small to medium size range (511-NW123NE18:4; 511-NW61NE31-50.58). On occasion, net weights were recycled as pitted stones (511-NW350SW-62.74; 511-NW74NE37-51.40), and conversely, one pestle fragment (511-NW62NE37-50.70) was recycled as a net weight.

Net weights from the Abrams excavation were recovered in surface survey, throughout the trench and with several burials (q.v.). In those units excavated during the 1965 field season, where stratigraphic deposition is clearer, vertical distribution ranged from the top level to 61 cm below ground surface with one specimen recovered at a depth of 76 cm.

Of the four net weights recovered in 1989, all are in the small range (see table A.49), and all are grooved on the short axis. With the exception of one specimen (484-078), which is marked by a pronounced pecked groove from 9.2 to 15.0 mm wide and from 1.5 to 2.4 mm deep, grooves on the remaining specimens are only minimally deep. On one net weight (484-018), pecking is evident only on the two lateral margins and part of one face to a maximum depth of 0.4 mm. On another (484-126) the grooving was pecked only on one side, again only to a depth of 0.4 mm.

Two net weights were recovered during monitoring: one from the abutment (484-078) and another from the footing for the trench (484-018). The remaining two specimens were recovered from the 10-20 cm level of unit 1 (484-126) and unit 5 (484-398).

CA-SLO-1259. Two net weights were recovered from the excavation at the south bank of Little Pico Creek (table A.50), both from the rock feature in the 20–30 cm level of unit 1. The longitudinal groove on one granite specimen (485-051) is 9.8 to 10.4 mm wide and is 1.1 mm deep. The second specimen (485-105) is a small sandstone cobble, fractured at one end and grooved on the long axis to a width of 6.9 mm and to a depth of 0.7 mm. Neither net weight is fire or heat affected.

While this artifact class has been recognized as being widespread in the archaeology of the area, there has been little discussion concerning its functional and temporal significance. Greenwood (1972) differentiated between grooved and notched stones. For the latter artifact, notches occur only at polar ends and occasionally on opposing sides. At Diablo Canyon sites, grooved stones were reported to occur at an earlier time and for a longer period than the notched specimens. In addition Greenwood suggested that the heavier grooved stones appear at greater depth than the smaller specimens and may have had a function other than as net weights. In the Willow Creek collection (Pohorecky 1976), the grooved/notched distinction was thought to represent a temporal difference with grooved sinker stones occurring in the lower midden (CA-MNT 282) and two pecked, or notched, specimens in the upper stratum (CA-MNT 281). At the Aerophysics site, Harrison and Harrison (1966) de-

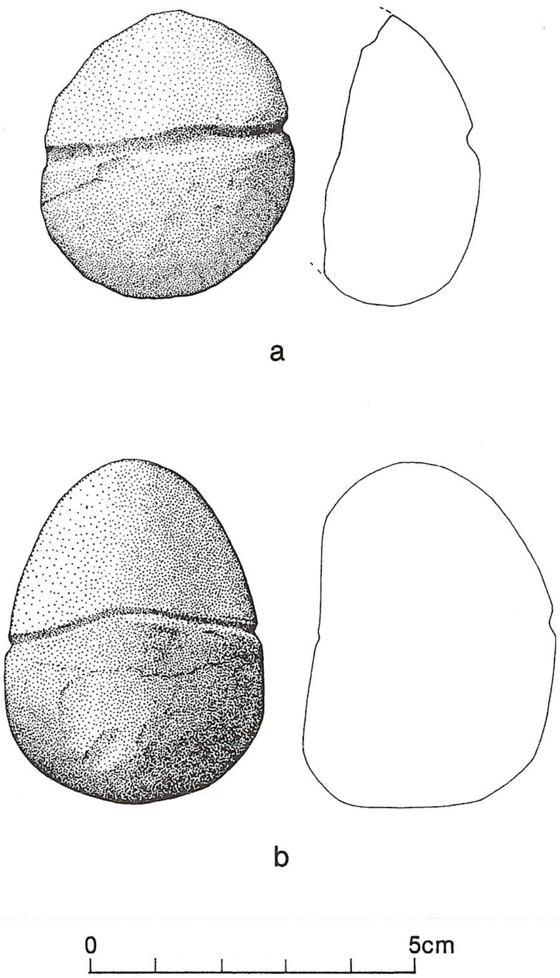


FIGURE 8.12 Net weights from CA-SLO-175: *a*, 511-1966 Surface 14; *b*, 511-756. *Illustration by Tammara Ekness-Hoyle*

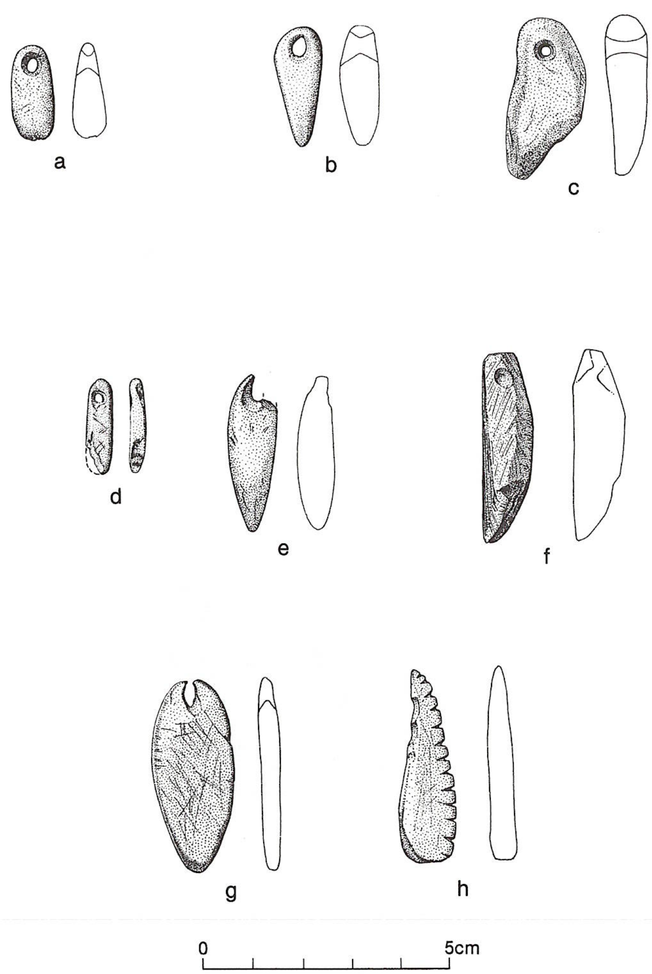


FIGURE 8.13 Stone ornaments from CA-SLO-175 and CA-SLO-1259: *a*, 511-SE10SW90-5; *b*, 511-554; *c*, 511-858; *d*, 485-043; *e*, 484-331; *f*, 511-SE20SW90-10/2; *g*, 511-941; *h*, 511-NW25SW90/5. *Illustration by Tammara Ekness-Hoyle*

scribed notched stones in conjunction with pitted stones but did not report any grooved stones. For the Abrams excavation at Little Pico, there does not appear to be any significant difference in distribution of larger specimens, but the smaller net weights did occur more often in surface contexts and in upper levels. Those specimens recovered at CA-SLO-175 in 1989 were found in the upper levels of two units.

Tarring pebbles

These beach or stream pebbles were identified at CA-SLO-175 by Abrams (1968b). Their tarred exteriors indicate some use in the application of asphaltum for caulking, such as the waterproofing of basketry. Ten pebbles are briefly discussed, although evidently more were encountered in the field in all contexts at depths "of greater than two feet below the surface" (Abrams 1968b:54). The larger examples were described as "about the size of manos," and smaller specimens were "one to two inches in diameter" (Abrams 1968b:54). No examples of tarring pebbles were recovered from the Caltrans fieldwork.

Stone balls

CA-SLO-175. Two artifacts described as stone "balls" are listed in the UCLA catalog for the Abrams fieldwork and were recovered during the trenching operation.

CA-SLO-1259. Two small singularly round stone "balls" were recovered. One (475-072) is a dense quartzite sphere, measuring 44.4 mm in diameter and weighing 102.4 g, which was recovered from the 0-10 cm level of unit 2. The second specimen (485-256) is a smaller sandstone ball, which was recovered from the 40–50 cm level of unit 4 and which measures 29.4 mm in diameter and weighs 30.2 g. Neither piece is modified, but their form and occurrence echo similar finds in coastal sites.

Stone ornaments

CA-SLO-175. Five stone pendants and six stone beads were described by Abrams (1968a, b,c), and an additional five specimens were identified in the UCLA catalog. The five pendants were made from green serpentine (511-554, fig.

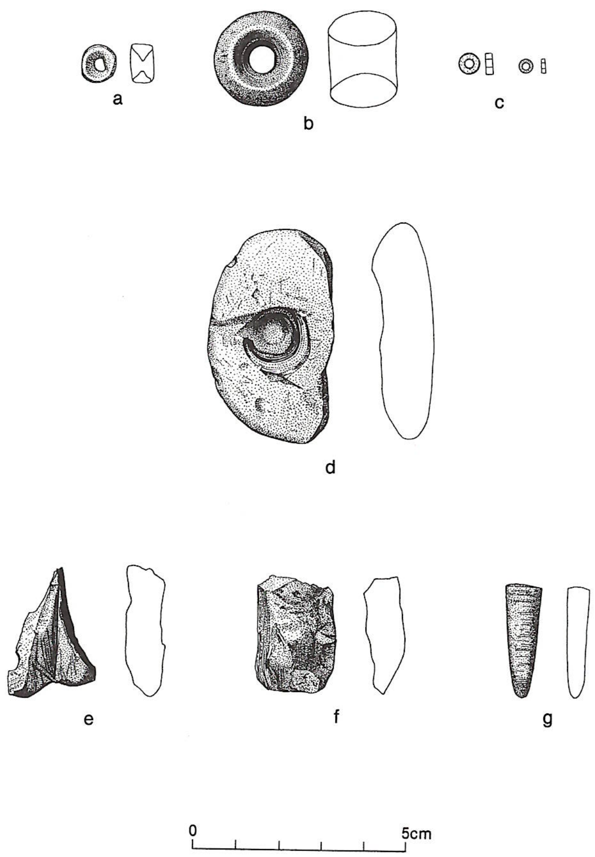


FIGURE 8.14 Stone artifacts from CA-SLO-175: *a*, 511-152; *b*, 511-NW115NE5; *c*, 511-Bur38b; *d*, 511-47; *e*, 511-NW94NE40-53.47; *f*, 511-NW30SW95.3; *g*, 511-SE20SW90-5. *Illustration by Tammara Ekness-Hoyle*

8.13b; 511-858, fig. 8.13c; 511-SE20SW90-10/2, fig. 8.13f) and black schist (511-NW25SW90/5, fig. 8.13h; 511-941, fig. 8.13g). Among the shapes identified here are cuneate (fig. 8.13b, e, g), a raw tear drop (fig. 8.13a), and asymmetric (fig. 8.13h). The last mentioned specimen (511-NW25SW90/5, fig. 8.13h) was considered by Abrams (1968c: 65) to have been broken and reworked; however, the general appearance of asymmetry may be attributed to an absence of finishing or shaping rather than breakage. A similar incompleteness is noted for one pendant (511-SE20SW90-10/2, fig. 8.13f), whose perforation was not drilled through and whose shape is relatively unmodified. In contrast, the flat ovate pendant of black schist (511-941, fig. 8.13g) is well finished. A final specimen (511-SE10SW90-5, fig. 8.13a) was unidentified in the Abrams report.

Among the six beads recovered during the initial excavations, three black schist flat disks (see fig. 8.14c) originally identified as serpentine, with diameters from 3.7 to 5.1 mm, were recovered from a burial in the second mass burial (see Features). A single black schist flat disk (511-129), a thick green serpentine disk (511-152, fig. 8.14a), and a large black schist disk (511-NW115NE5, fig. 8.14b) make up the remainder of the sample accounted for by the Abrams report.

The five specimens listed in the UCLA catalog that were not noted in the Abrams discussion include an oval piece of black schist (511-047, fig. 8.14d) that is unmodified save for a partially complete perforation and a schist pendant (511-SE20SW90-5, fig. 8.14g) whose proximal tip is missing. Three other specimens of black schist were recovered, one of which was reported to be worked and is probably a pendant blank (511-NW94NE40-53.47, fig. 8.14e). Two other pieces are unworked fragments (for example, 511-NW30SW95-3, fig. 8.14f).

A small schist pendant (484-331, fig. 8.13e) was recovered during the Caltrans excavation from the upper level of unit 4. The broken perforation for this cuneate-shaped specimen was biconically drilled and measures 3.6 mm in diameter. Maximum length of the specimen is over 30.6 mm, and the diameter ranges from 9.7 to 8.8 mm.

A single elongate elliptical sandstone cobble (484-265, fig. 8.15), possibly an ornament or a sinker of some kind, was recovered from unit 4 at the 20–30 cm level. This specimen, measuring 141.1 x 41.3 x 19.6 mm and weighing 174 g, was lightly ground and pecked into shape. A perforation at one end of the piece was biconically drilled at an angle. Dimensions for the perforation are 6.9 to 17.7 mm.

CA-SLO-1259. The proximal end and midsection of a slim small steatite bead (485-043, fig. 8.13d) was recovered from the 20–30 cm level of unit 1. Enough remains of the distal end to estimate the length at 18.5 mm; width measures 5.9 mm and thickness 3.7 mm. The biconically drilled perforation measures 3.5 to 2.2 mm in diameter.

Discussion. While the recovery of stone beads and pendants in the area north of the Santa Barbara Channel has not been discussed previously in any integrative context, specimens from the Little Pico sites are similar to forms recovered from sites in Big Sur to the north (T. Jones and Haney 1992), as well as to forms from Diablo Canyon (Gibson 1988c) and San Simeon (Gibson 1986c). The forms recovered from Little Pico indicate that the production of pendants probably was accomplished on-site. Further, smaller disks recovered appear linked to the later time frame represented at CA-SLO-175, particularly as they are elsewhere (Gibson 1988c:107) considered contemporaneous with *Olivella* cupped beads, a type that generally appears in late prehistoric and protohistoric contexts.

Arrow shaft straightener

A single steatite arrow shaft straightener (511-NW82NE36-57.73, fig. 8.16) was found during the original fieldwork in unit NW82NE26 at a depth of about 30 cm and was described by Abrams (1968c:51) as being recovered from the rock feature east of the highway.

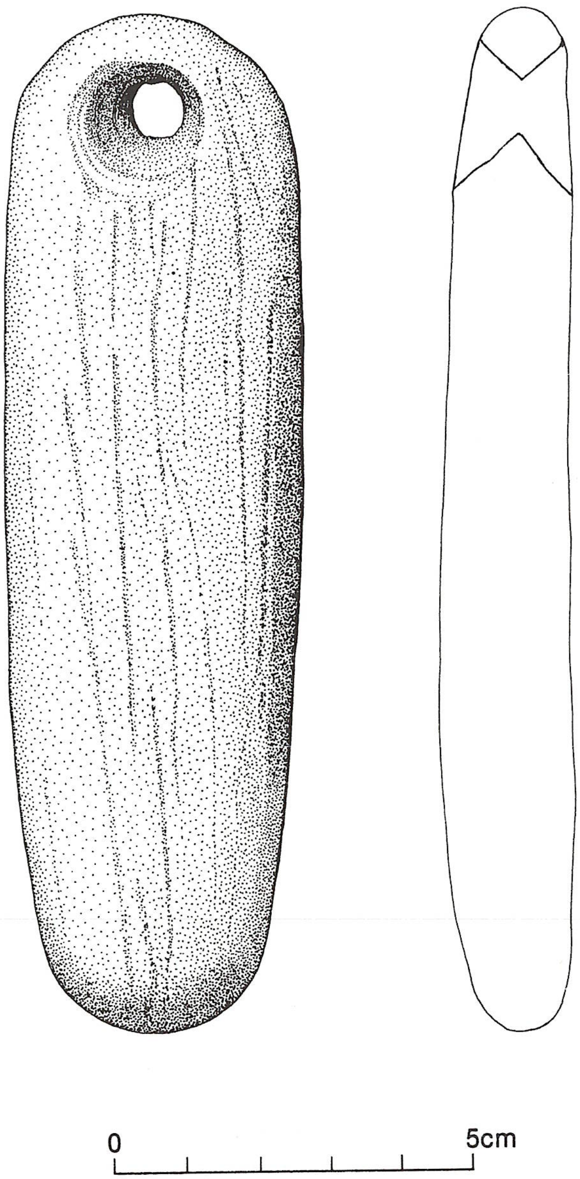


FIGURE 8.15 Ground stone artifact from CA-SLO-175: 484-265. *Illustration by Tammara Ekness-Hoyle*

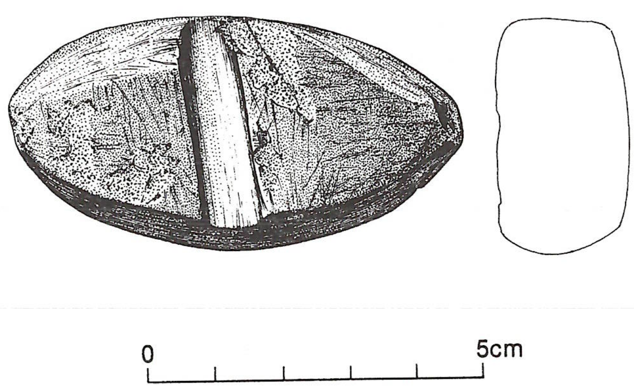


FIGURE 8.16 Arrow shaft straightener from CA-SLO-175: 511-NW82NE36-57.73. *Illustration by Tammara Ekness-Hoyle*

Miscellaneous ground and modified stone

CA-SLO-175. Miscellaneous pieces of ground stone from the Abrams excavation are identified in the UCLA catalog merely as "ground stone." Fifteen specimens were identified from the Caltrans fieldwork: five from the monitoring during excavation for abutment 4 and the remainder from the units.

The three specimens from the abutment monitoring are probably bowl mortar fragments. One (484-032) is a thick (42.6 to 59.3 mm), fire-fractured piece of sandstone with visible curvature of one surface and light pecking on the other. The other two are possible remnants of convex rims, one (484-086) of which shows heavy pecking on what would be the interior surface. Two other specimens from the monitoring phase—a split granite cobble fragment and a small sandstone margin fragment—are possible handstone remnants. The last specimen (484-083), recovered during the monitoring of the abutment, is an elongate steatite cobble with one slightly spatulate end. Apparently unmodified, this piece measures 105.4 x 21.2 mm.

From the upper two levels of unit 2, three fire-fractured sandstone fragments were recovered: the polar end of a cobble (484-211) measuring 59.9 mm wide and 54.4 mm thick with a single slightly ground planar surface, a thick (52.2 mm) possible bowl wall fragment, and a unifacially ground margin and end fragment (484-218) measuring 72.6 mm in thickness, which may be the remnant of a milling slab.

Two other small sandstone pieces were recovered from unit 2: a lenticular midsection (484-232), 18.4 mm in width and 6.9 mm thick and a small, thin subovate specimen (484-220), measuring 38.7x16.6x6.5 mm, which is minutely ground around the distal end to a slight bulb.

The deposit from unit 6 yielded two fire-fractured specimens: a shaped margin of a milling surface, 59.3 mm thick, from the 20–30 cm level, and a fire cracked granite cobble fragment (484-515) from the 40–50 cm level, which shows slight pecking on the margin remnant. From the basal level of unit 6, a small elongate cobble of sandstone appears to be very slightly ground on one surface. This piece measures 73.8 mm in length with a maximum diameter of 26.5 mm.

Two fire-fractured fragments of sandstone were recovered: a wedge-shaped cobble fragment (484-267) with a single slightly ground surface from the 10–20 cm level of unit 3 and a small thin bifacially pecked fragment (484-574) from the 10–20 cm level of unit 1.

CA-SLO-1259. Five artifacts identified as miscellaneous ground stone were recovered from excavation at the southern bank of Little Pico Creek. One (485-222) split sandstone cobble fragment probably representing a fractured handstone was recovered from the 0–10 cm level of unit 4. The planar surface is lightly ground as are the edges of that surface. This

piece measures greater than 80.9 x 72.4 x 56.5 mm. Another fire-fractured specimen (485-186) from the 30–40 cm level of unit 3 may be the remnant of a milling stone. Thickness (44.5 mm) is the only measurable attribute. A remaining edge is lightly pecked, and both surface remnants are slightly ground. Three other specimens, one granite (485-366) and two sandstone (485-269 and 485-255) are margin fragments, probably of handstones.

BATTERED STONE

Tools in this category show evidence of hammering or battering that generally is spatially localized on one or more of the artifact's plane surfaces or polar ends. These tools may be distinguished by informal and probably ephemeral use, and while often general modification in terms of intentional shaping may be minimal, use-wear might be quite specific. Battered stone tools for sites at Little Pico Creek include hammerstones and anvils, or "pitted stones." A third category is that which Abrams (1968a) identified as "picks," artifacts that show intentional shaping.

Hammerstones

CA-SLO-175. The UCLA catalog of the Abrams collection identifies one "battered rock," two granite specimens with "battered end(s)," three "mashers" (apparently not pestles), and forty-three hammerstones, of which seventeen are described as "pitted." These specimens were recovered from surface to depths of 168 cm in the southwest units and throughout the trench. Sizes and materials are variable, and most appear as expedient tools.

The Caltrans excavation produced two specimens. Recovered during the monitoring for the abutment, the first (484-079) is a large unshaped cobble of a heavy dense igneous material, measuring 104.0 x 80.9 x 67.8 mm and weighing 759.5 g. Extensive battering is evident on one end of this tool. A second hammerstone (484-225) recovered from the 20–30 cm level of unit 2 is a small thin fine-grained igneous cobble measuring 68.6 x 59.5 x 19.7 mm and weighing 122.4 g. The entire margin of this piece is either flaked or lightly battered. Several handstones show evidence of hammering in the form of fracturing or flaking. Similar use-wear is evident on other tools, such as anvils and net weights.

CA-SLO-1259. Three elongate sandstone cobbles and one small thin oval cobble of a dense, fine-grained igneous material represent this category at CA-SLO-1259. One sandstone specimen (485-133), recovered from the 40–50 cm level at the bottom of the rock feature in unit 2, is fist size and is only lightly battered on opposing ends. This cobble measures 91.7 x 58.1 x 47.3 mm and weighs 352.2 g. A second sandstone specimen (485-180) is over one-third longer, measuring 126.4 mm x 76.5 mm x 48.9 mm, and is heavily battered and fractured at one end. The latter tool was recovered from the 30–40 cm level of unit 2. The third sandstone specimen (485-052), which was recovered from rock feature at the 30–40 cm level of unit 1, is heavily fractured at one polar end and has light pecking at the opposing end. This fractured piece is 89.4 mm long, 95.2 wide, and 70.2 thick. One planar surface shows heavy pecking, or batter, that occurred prior to fracture. The small hammerstone (485-334) recovered from the 20–30 cm level of unit 6 is evenly pecked around its entire lateral margin. Measurements for this specimen are 55.7 x 46.8 x 24.7 mm and 106.5 g.

Pitted stones

Termed *pitted stones* (Greenwood 1972; Harrison and Harrison 1966; Lathrap and Hoover 1975; Pohorecky 1976; Reinman 1961), *anvils* (Abrams 1968a, b, c; Bouey and Basgall 1991), or *pitted hammerstones* (Leonard 1968), these artifacts are ubiquitous and plentiful in the archaeology of central coastal California. Specimens are whole natural cobbles, fragmented cobbles, fist-sized rock fragments, or previously modified lithic tools, such as handstones or hammerstones, which have been pitted on one or more surfaces. On specimens from sites at Little Pico Creek, pits have been pecked and ground into restricted or localized areas, almost consistently in or near the center of the cobble surface. These appear either on one surface, or more commonly on opposing surfaces, although in several instances, three or more surfaces are pitted. Some pieces are pitted in a more random fashion; that is, pits are not centrally localized. The most regular morphological characteristic may be the dimensions of the pit itself. While there appears to be a continuum from dimple size to deeper forms, possibly representing more prolonged use, depth and diameter of the pit are relatively uniform. Hammering, or battering, is recorded on the polar ends and margins of a number of specimens.

Functional connotations for this artifact are diverse. Reinman (1961) details possible hammering use with the pits serving as finger holds. Use as both hammerstone and anvil surface for nut cracking, acorn processing, cracking of shellfish, or reduction of chert cores has been variously proposed (Abrams 1968a; Bouey and Basgall 1991; Greenwood 1972; Harrison and Harrison 1966; Hines 1986; Lathrap and Hoover 1975). While the ubiquity of these objects in coastal contexts suggests an association with marine resources, the occasional occurrence in such inland sites as CA-MER-130 (Olsen and Payen 1984:79) indicates that such associations may not be exclusive.

CA-SLO-175. Abrams (1968a, b, c) reported twenty-eight whole specimens and fifteen fragments at Little Pico and derived basic descriptive measurements for those tools. The

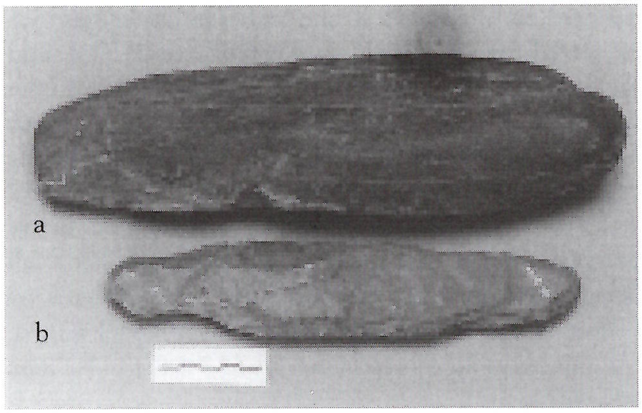


FIGURE 8.17 "Picks" from CA-SLO-175: *a*, 511-Surface T52; *b*, 511-B10a

number of pits per surface were noted and classified as either "shallow" or "deep."

Fifteen pitted stones were recovered during the 1989 fieldwork, of which only two are too fragmented to assess total dimensions or diameter and depth of the pits (table A.51). Sizes are variable; for complete specimens (N=13), length averages from 86 to 93 mm, width from 75 to 77 mm, and thickness from 41 to 47 mm. Pit diameter ranges from 17 to 31 mm and depth from 1 to 5 mm. Statistical descriptors are:

length	x = 86.9 mm	sd = 33.2
width	x = 77.8 mm	sd = 20.4
thickness	x = 47.6 mm	sd = 16.3
pit diameter	x = 22.9 mm	sd = 2.5
pit depth	x = 4.5 mm	sd = 1.3

The majority (N=10) of the thirteen whole specimens are pitted on opposing surfaces; two specimens are pitted on a single surface, and one wedge-shaped stone is pitted on three surfaces.

Four pitted stones were recovered during the monitoring of excavation for the abutment with the remaining eleven coming from all units except unit 4 and at depths of from 10 to 50 cm. One specimen (484-174) from the 40–50 cm level was encrusted with caliche.

CA-SLO-1259. Pitted stones from the excavation at the southwest bank of Little Pico Creek number fourteen. Size and morphological character of those artifacts fit quite well with those from CA-SLO-175 (see table A.52). Dimensions range in length from 68 to 112 mm, in width from 60 to 113 mm, and in thickness from 30 to 61 mm. Simple statistical parameters are:

length	x = 93.1 mm	sd = 12.4
width	x = 75.8 mm	sd = 16.6
thickness	x = 41.6 mm	sd = 10.5
pit diameter	x = 22.3 mm	sd = 5.2
pit depth	x = 5.2 mm	sd = 1.0

Ten specimens are pitted on two surfaces, one on a single surface, one on three surfaces, and one on four surfaces. Two specimens are heat affected; one (485-365) is so severely burnt that dimensions of the pit are not measurable.

At CA-SLO-175, pitted stones were recovered from all contexts, including the monitoring for the abutment and all levels of excavation. Two (485-174 and 485-240) were retrieved from the rock feature in units 2 and 4, and six (485-343; -061; -062; -106; -132; -134) from directly beneath the layer.

Discussion. Greenwood (1972) differentiated between pitted "cobbles" and "stones," basically between whole or half cobbles and fractured rock with pits. The total of both classes at the Diablo Canyon sites is 1179, a substantial number, particularly as adjunct pitting of other stone tools was excluded from the count. In other sites in central coastal California, recovery of this artifact has been common—apparently occurring as early as what Greenwood (1972) and others have designated as the "Milling-stone culture" and continuing through subsequent phases.

Picks

These tools are described by Abrams as "roughly rectangular" in planar and cross section with slightly tapered ends and a flaked periphery. The UCLA catalog identifies four chert specimens recovered from the trench and from the southwest units. Of three specimens of "chlorite-schist" described by Abrams (1968a), two show slight battering, or flake removal on their polar ends, and one is a fractured specimen of sandstone. The schist picks (511-Surface T52, fig. 8.17a; 511-B10a, fig. 8.17b) were recovered from surface survey and from burial 10, respectively. No artifacts were recovered during the Caltrans fieldwork that approximate those recovered during the 1965-66 excavation.

Picks were identified at the Aerophysics site (Harrison and Harrison 1966) and at Diablo Canyon (Greenwood 1972). Those implements measured considerably smaller than the specimens from the Abrams collection. Picks with apparently similar size and shape, however, were reported at other coastal and island sites (Hudson and Blackburn 1986:38) and were hypothesized to have been used for quarrying steatite or for the manufacture and maintenance of *metates* and mortars. The latter function is assumed to account for their occurrence at Little Pico Creek.

SUMMARY

Ground and battered stone artifacts at the Little Pico Creek sites represent a diverse and broad component of the total

assemblage. Chronological and structural implications are not entirely straightforward, however, in large part because of the original excavation and reporting strategies. Separating out any distinct tool group or context that could signal a tool kit predominantly oriented toward milling activities is clearly not possible. Although fourteen of thirty-six handstones were recovered below 40 cm during the original excavation, deposition of handstones and milling stones was far from spatially discrete either in terms of horizontal or vertical stratigraphy, and in point of fact, appeared to be randomly distributed throughout the sites. As a consequence, an argument can be made that preparation of foodstuffs and possibly other materials with the handstone/milling stone was an integral part of the processing activities during a substantial part of the time span represented at the Little Pico sites. The occurrence of a number of handstones (N=4) from that portion of CA-SLO-175 excavated by Caltrans in 1989 suggests that the handstone/milling-stone technology was in use during the early occupation of the site. The occurrence of a single pestle in the same context is more equivocal. This co-occurrence, however, is consistent with the findings at the Aerophysics site.

The bowl mortar and pestle are well represented in the collection. While the original report accounted for nine complete bowl mortars, 42 fragmented specimens were also recovered. Mortars are similar to the globular specimens at CA-SBA-205, at Diablo Canyon, and particularly at CA-SBA-52, the Aerophysics site. Greenwood (1972:93) specifically designated the beveling between the wall and rim of bowls as characteristic of the Santa Barbara Hunting Tradition and the Diablo Canyon collection. This trait is not evident in the Little Pico mortars. Nonetheless, other characteristics—such as size, form and extent of shaping, and the scalloped rim style—are all clearly reminiscent of mortar forms at sites along the south central coast. Pestles, similarly, conform in general to specimens from Aerophysics, Diablo Canyon, and neighboring sites along the coast north of Big Sur and Monterey Bay. Recovery of these tools as well as of the bowl mortars in a fair quantity at Little Pico indicates that the activity represented was an integral part of the processing technology. To what degree this technology was devoted either exclusively or primarily to acorn preparation is uncertain, at best. Traces of hematite and other materials suggest a range of preparation and grinding. The bedrock mortar feature more clearly speaks to acorn processing, probably in a late time context.

Two other predominant constituents of the ground and battered stone assemblage are the net weight and anvil stone. These artifacts are clearly associated with coastal sites and are assumed to represent some variants of artifacts geared to the procurement and processing of marine resources and, in the case of the pitted stone, possibly to the reduction of lithic material. The occurrence of these artifacts at the 1989 excavation at CA-SLO-175 indicates that the pitted stone was in use during the early occupation of the site as represented by that area, while the net weight may have appeared at a slightly later time. Whatever the function of the anvil, or pitted stone, there is a marked reuse of various other tools and tool fragments as anvils. Because of the lack of consistent classification and description of hammerstones, establishing meaningful comparative ratios between categories of battered stone is tenuous. Those few hammerstones recovered from the 1989 project do indicate that a range of activities was accomplished with those implements.

9

Bone Artifacts

THE BIAS TOWARD the recovery of large-sized artifacts at CA-SLO-175 during the 1965–66 fieldwork is clearly evident in the inventory of bone artifacts. From the hand-excavated units where the deposit was screened through 3-mm mesh during the first season and from those units south of the highway similarly excavated during the latter days of the second season, as well as the deposit from burial contexts, fifty-five bone artifacts were recovered. Conversely, the mechanical trenching operation accounted for only one bone tool. The bone artifact assemblage is nevertheless substantial and varied. Many pieces are so fragmented that it is not possible to identify the species, but the identification as large mammal was possible. Artifacts identified by Abrams and in the UCLA catalog were examined and analyzed; however, twelve "large mammal" specimens described as worked, polished, and/or grooved were not accounted for in the collection. A whale bone vertebra and one awl were also not found.

During the 1989 excavation, four bone artifacts were recovered. All bone specimens presented here are categorized: awls, strigils, spatulas, needles, whistles, pins, punches, and a single gorge hook. One ground antler tine is included. Supplementary types have been defined by Dr. James Bennyhoff within the needle and whistle classes.

AWLS

A detailed examination of the Abrams collection located twenty-two tools that are classified here as awls (table A.53). An awl in the UCLA catalog, recorded as associated with burial 25, was not located. The vast majority (N=20) are either tip or midsection fragments and were made from bones that can only be securely identified as large mammal. According to the UCLA catalog and burial record, two complete specimens were recovered from burial 3, although Abrams (1968a) later listed one as recovered from burial 5. One of these (511-537, fig. 9.1a) conforms to Gifford's (1940) type A1cII and was manufactured from a deer cannon bone with the partially worked proximal end serving as a handle. The second specimen (511-538, fig. 9.1b), which conforms to type A1bII in Gifford (1940), is a deer cannon bone whose proximal end serves as the handle and is unmodified save for the original splitting. These implements may have served as "hair pins" (see chapter 6).

The remainder of the awl collection consists of tip or midsection fragments, of which all but one are scorched, possibly owing to fire hardening, and all but two are polished (see table A.53). With the exception of one awl that was split longitudinally (511-SE10SW90/6, fig. 9.2i), tip fragments are missing proximal ends. With the exception of one specimen, the remainder appear to be ground or shaped to a round to subrounded form. The exception is a tip fragment that is flat in cross section. Seven of the midsection specimens are fragments of split long bone. None is shouldered.

Modification on awls from the initial excavation is clearly evident on two implements. The tip of one specimen (511-SE10SW90/6, fig. 9.2i) is well polished, and the midsection bears faint spiral striations. Asphaltum is present on this specimen, possibly as a remnant of its fixture to a handle. The second awl (511-SW15SW90/8, fig. 9.2j) has faint longitudinal striations with gouges or nicks almost diagonal to the length. Again, a trace of asphaltum is noted on one surface. Because of the incomplete state of the 20 awl fragments, however, no firm assignment within Gifford's (1940) classification or Orr's (1947) supplementary typology can be made.

The two awl specimens recovered during the 1989 excavation (table A.53) originally would have been needle-sharp; however, one (484-154, fig. 9.2l) had been reused as a punch and the tip of the second (484-441, fig. 9.2k) was broken during recovery. The latter awl is lenticular in cross section and is beveled on both edges, with one edge showing almost imperceptible shouldering. This specimen is highly polished and has several scratches that run longitudinally, possibly resulting from shaping. This awl, measuring 47.6 mm x 8.1 mm x 3.6 mm, was recovered from unit 5 in the 40–50 cm level. The reworked punch is slightly trapezoidal in cross section; the tip has a chipped edge with microstep fractures that probably resulted from perforating or "punching" use. Recovered from unit 1 at 20–30 cm, this specimen measures 23.6 mm long at the break, 6.5 mm wide, and 3.3 mm thick.

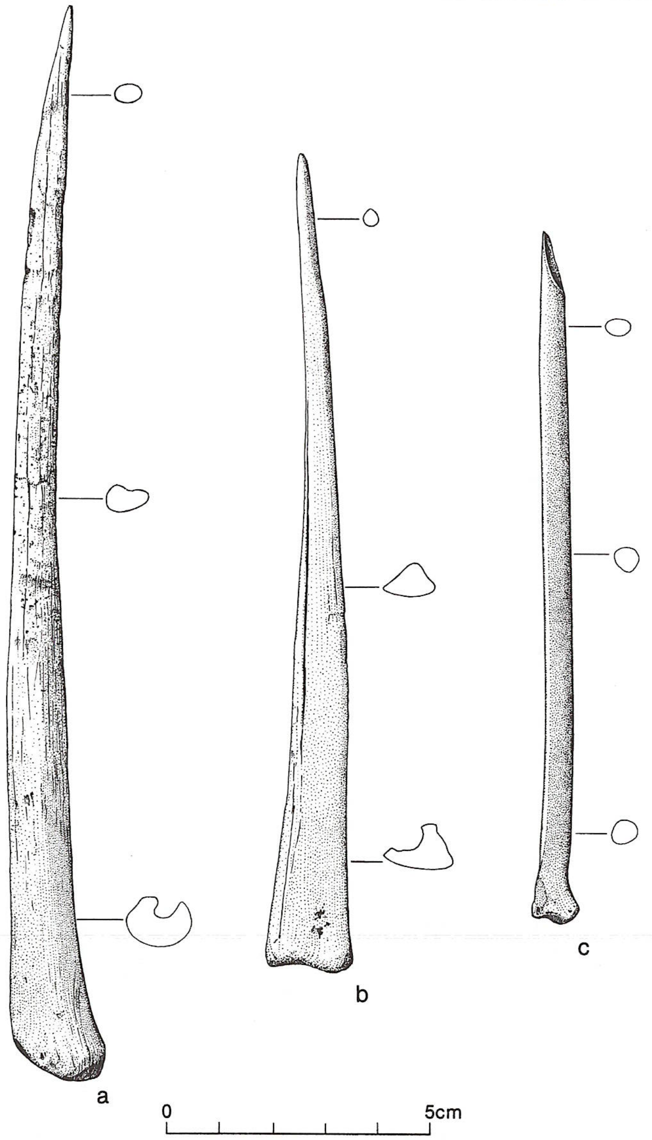


FIGURE 9.1 Bone artifacts from CA-SLO-175: *a*, 511-537; *b*, 511-538. *Illustration by Tammara Ekness-Hoyle*

While in the cases of complete or virtually complete specimens morphological characteristics can be related to those classes developed by Gifford, functional correlates are somewhat less secure. Many of these tools were employed in the manufacture of woven or twined materials—such as matting, thatching, or basketry—and can be assumed to relate to economic or household tasks. The lack of any measurable shouldering on awls in the collection appears not to challenge the hypothesis that coiled basketry techniques were not employed in the south central coastal region until approximately AD 1200 (L. Dawson, personal communication 1991). Awls have been reported upon in excavations of sites in the south central coast that are apparently coeval with the time span represented by the major occupation at Little Pico Creek. At the Aerophysics site in Santa Barbara County, only "worked" bone tools were discussed, but at the Eakins site (CA-SBA-119) which dated to 3000 years BP, four unshouldered bone awls with asphalted handles were recovered (Harrison 1964), and at CA-SLO-2 at Diablo Canyon (Greenwood 1972) and the early component at Willow Beach (Pohorecky 1976), bone awls were recovered throughout the deposits.

STRIGILS

The category of strigil, or sweat scraper, is represented by five specimens (table A.54), all recovered during the 1965–1966 fieldwork. Abrams (1968a, b, c) included artifacts that here are discussed as spatulas (see below). In accordance with Gifford (1940), we identify strigils as side-bladed scrapers made from large mammal rib bones, generally artiodactyl, although sea lion rib strigils have been recorded (Gifford 1940:172). Four specimens from Little Pico were formed from split deer ribs; one fragmented piece was made from an elk tibia (511-983, fig. 9.3c). Most of these artifacts showed polish and evidence of burning or scorching. Two (511-891, fig. 9.3b, 511-983, fig. 9.3c) were recorded as associated with burial 5, a third (511-498) with burial 3. The two remaining specimens, while not noted as in direct association with burials, were recorded either from the same unit as a burial (511-444, fig. 9.3a) or in a unit adjacent to a burial (511-451). Ethnohistoric reference to these artifacts and their function as sweat scrapers was documented by the Spanish (Fages 1937:67-68). Archaeological instances are less common. Strigils were recovered, however, at CA-MNT-229 at Elkhorn Slough (Dietz et al. 1988:208).

SPATULAS

Six bone artifacts from the Abrams collection have been identified as spatulas (table A.55), three of which (511-533, fig. 9.4a; 511-981, fig. 9.4b; 511-1966B14a, fig. 9.4c) were originally included in the description of sweat scrapers (Abrams 1986a, b, c). Bone spatulas, a descriptive nomenclature, are distinguished from strigils on several counts. Typically, spatulas were fashioned from elk tibia bone and were shaped flat at the distal portion of the bone. Gifford describes M1 as an unperforated type and notes that M2 and M3 had holes or perforations at one end. Gifford (1940:173-174) categorized this artifact as an elk-tibia "sword" and quotes Putnam in describing the margin of the perforated end as a "hilt" of the sword, which may have been mounted in handles of wood. One specimen from CA-SLO-175 (511-533) is assigned to Gifford's M1 type. C.D. King (1990:259-260) depicts similar implements as "scepters [or] sweatscrapers." One polished specimen (511-1966 B14a, fig. 9.4c) was manufactured from the proximal portion of an elk tibia and is assigned to M5a; two unperforated spatulas (511-981, fig. 9.4b; SE20 SW90/13), which bear traces of asphaltum at the proximal portion, have been placed in type M5b. Of the latter two, one (511-981, fig. 9.4b) bears two parallel rows of a punctate design.

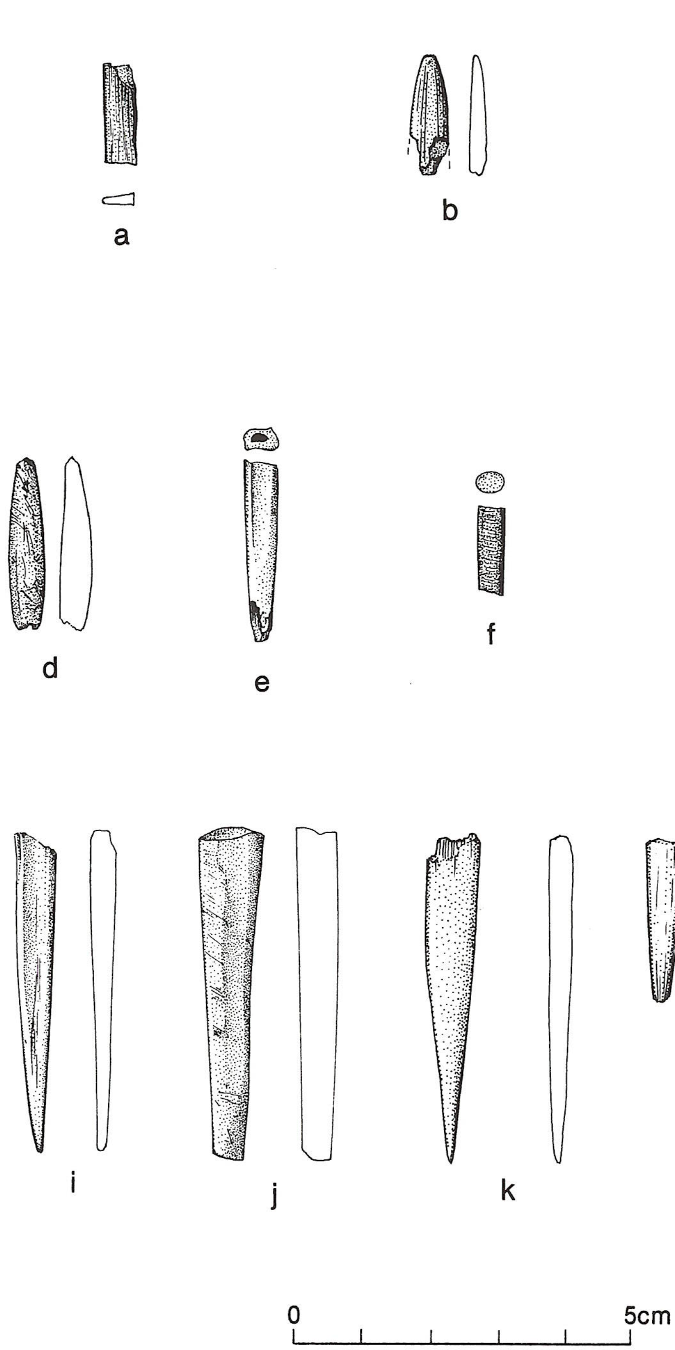


FIGURE 9.2 Bone artifacts from CA-SLO-175: *a*, 511-877; *b*, 511-SE20SW90/13; *c*, 511-NW71NE49; *d*, 511-377; *e*, 511-147; *f*, 511-500; *g*, 511-673; *h*, 511-NW30NE5; *i*, 511-SE10SW90/6; *j*, 511-SW15SW90/8; *k*, 484-441; *l*, 484-154; *m*, 484-430. *Illustration by Tammara Ekness-Hoyle*

Three of the spatulas were associated with burials (see Features).

NEEDLES

Eight bone artifacts, classed as pendants by Abrams (1968c), were recovered from CA-SLO-175 during the initial field seasons (table A.56). Seven eyed specimens were recovered in a row in the neck area of burial 2, indicating that they were strung in some fashion, thus accounting for Abrams' categorization as pendants. The eighth specimen (511-830, fig. 9.5d) was recovered unassociated directly with any burial; it was located within a unit where burial 5 was excavated.

While no similar artifacts are recorded as "pendants" within existing typologies, these items are duplicated in historic collections where they are described as needles (see Hudson and Blackburn 1986:152–153). All specimens conform to the characteristics of Gifford's type P classification, "Eyed Dagger, Awl, Needle, Gouge, etc.." The first (511-534, fig. 9.5a), classed within Gifford's type P3a, shaped from a large mammal bone, possibly a cannon bone, is slightly curved and conical. The remaining six specimens from burial 2 and the single specimen from unit NW95NE15 were formed from the slender splints that are a portion of the metacarpal bone of deer (for example, 511-535, fig. 9.5b; 511-536b, fig.

FIGURE 9.3 Bone strigils from CA-SLO-175: *a*, 511-444; *b*, 511-891; *c*, 511-983. *Illustration by Tammara Ekness-Hoyle*

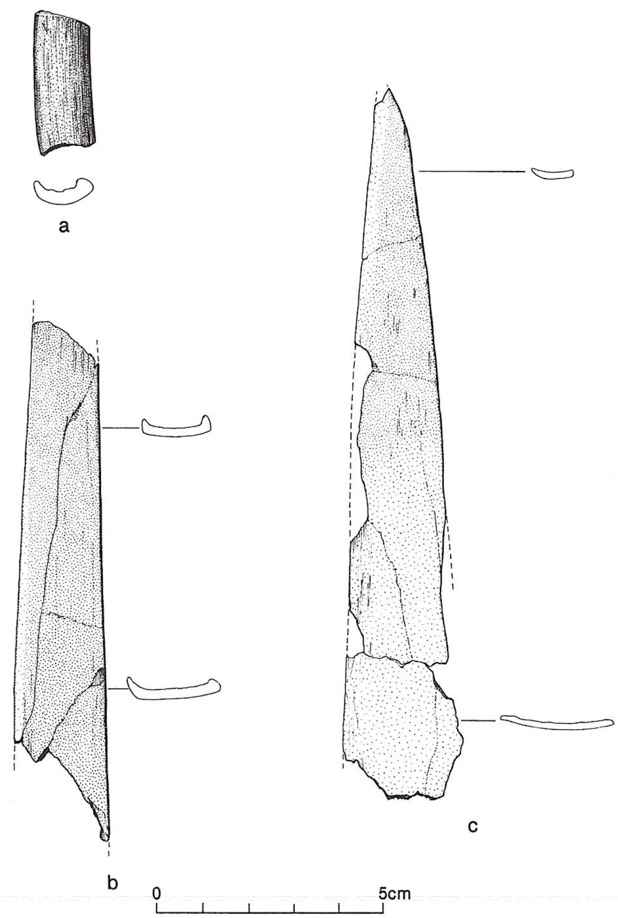


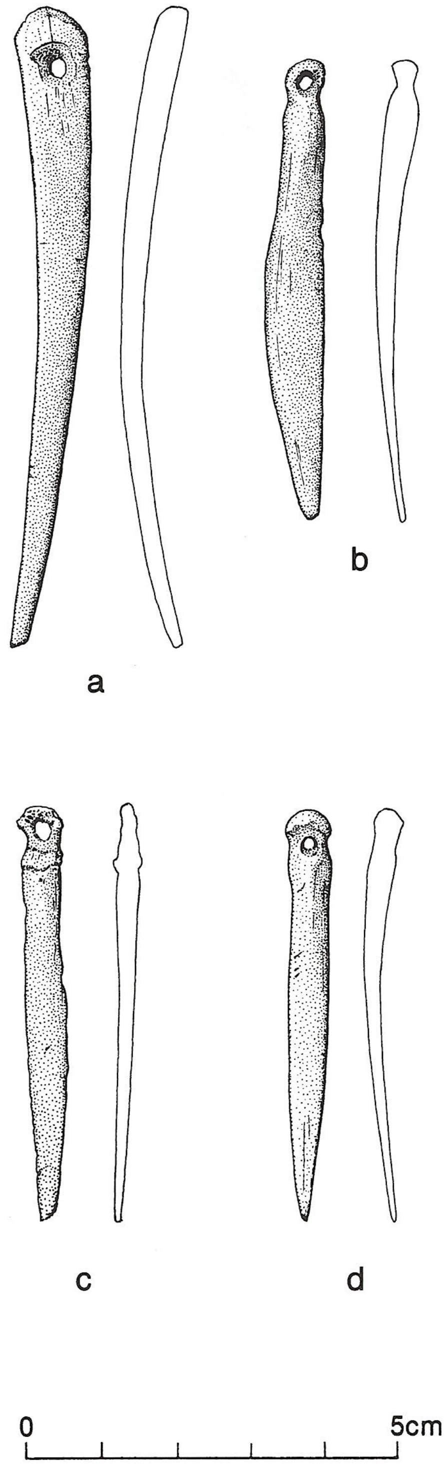
FIGURE 9.4 Bone spatulas from CA-SLO-175: *a*, 511-533; *b*, 511-981; *c*, 511-1966B14a. *Illustration by Tammara Ekness-Hoyle*

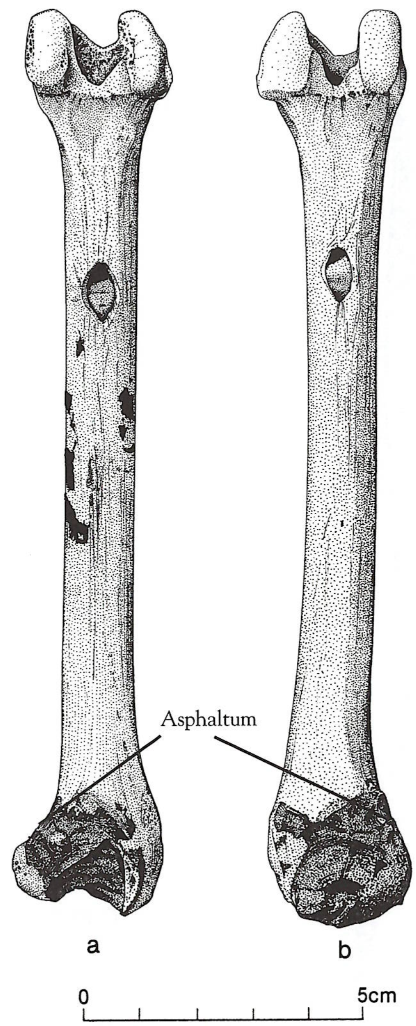
9.5c). Harrington noted that this needle type, made from the metacarpal bones of the California mule deer, were recovered from the Burton Mound, and that according to consultants they "...needed only to have the butt bored and the already sharp tip touched up by a little rubbing on a stone to make a perfect needle" (in Hudson and Blackburn 1986:151). At CA-SLO-175, these tools have been placed in a supplemental PII type.

WHISTLES

During the 1966 fieldwork at CA-SLO-175 (see chapter 6), an assemblage of six bone whistles was recovered from association with burial 14 (table A.57). Two single-holed whistles were made from wildcat, or bobcat (*Lynx rufus*), femur elements (511-1966B14d, fig. 9.6a; 511-1966B14f, fig. 9.6b). The distal portion of these specimens is plugged and coated with asphaltum. These whistles are classed as FF1dII because the epiphyses had not been removed. The remaining six whistles are modified elk tibia (511-1966B14g, fig. 9.7; 511-1966B14b, fig. 9.8a;511-1966B14h, fig. 9.8b; 511-1966B14j, fig. 9.9) and are typed as FF1a, single-holed whistles with each epiphysis removed and the distal ends partially plugged with asphaltum. Abalone discs originally were embedded in asphaltum at the distal ends of two specimens (511-B14b; 511-B14j). Cordage impressions are visible in the traces of asphaltum around the circumference of the elk tibia specimens, a characteristic that was interpreted by Abrams as indicating that the whistles had been tied together (Abrams 1968c:58).

At Diablo Canyon whistles were recovered from burials characterizing the later occupation at CA-SLO-2. These specimens were made from mountain lion and coyote femurs and pelican radius and ulna elements. The larger specimens are quite similar to the whistles made from lynx femurs at Little Pico. Wallace (1962) described a substantial number of mammal bone whistles (N=18) and bird bone whistles (N=6) recovered with a child burial at a site in the Arroyo Grande watershed. No species identification was made for those items. Tainter (1971) described "22 to 27 mammal" bone whistles that had been interred with a single male burial at CA-SLO-406.





Left, FIGURE 9.5 Bone needles from CA-SLO-175: *a,* 511-534; *b,* 511-535; *c,* 511-536b; *d,* 511-830. *Illustration by Tammara Ekness-Hoyle*

FIGURE 9.6 Bone whistles from CA-SLO-175: *a,* 511-1966B14d; *b,* 511-1966B14f. *Illustration by Tammara Ekness-Hoyle*

PINS

A variety of bone implements has been placed within this category, seven from the original field work and one from the Caltrans excavation (table A.58). These objects are oval to cylindrical in cross-section, have generally slender proportions, and are hollow (511-147, fig. 9.2e) or solid (511-500, fig. 9.2f; 511-673, fig. 9.2g). Three specimens are burnt, possibly as a result of fire-hardening. Two "pins" (511-1966B14i; 511-982, fig. 9.10) are bird radius bones that have been cut obliquely to form a point at the proximal end (Gifford types A4aI and A4b1). These specimens were associated with burials 14 and 5, respectively. One fragmented polished and burnt midsection of an oval solid pin (484-191) was recovered during the 1989 excavation from the 50–60 cm level of unit 1. This incomplete specimen is 20.5 mm x 5.0 mm x 3.3 mm.

A wide functional variation for these artifacts is assumed, but the fragmentation of most specimens precludes any solid inferences with the exception of those long specimens recovered from burials. A considerable amount of ethnographic and ethnohistoric ink has been expended on the description of "hairpins" (see C.D. King 1990; Hudson and Blackburn 1986; Heye in Gifford 1940; Gifford 1940). These descriptions cite the practice among the Chumash men of

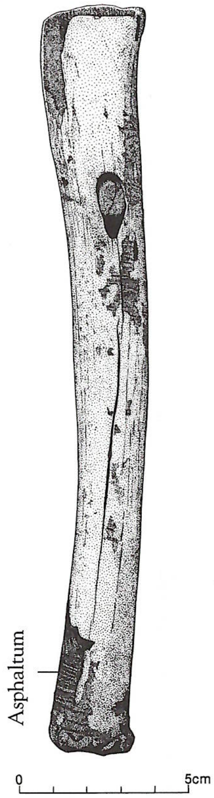


Figure 9.7 Bone whistle from CA-SLO-175: 511-1966B14g. *Illustration by Tammara Ekness-Hoyle*

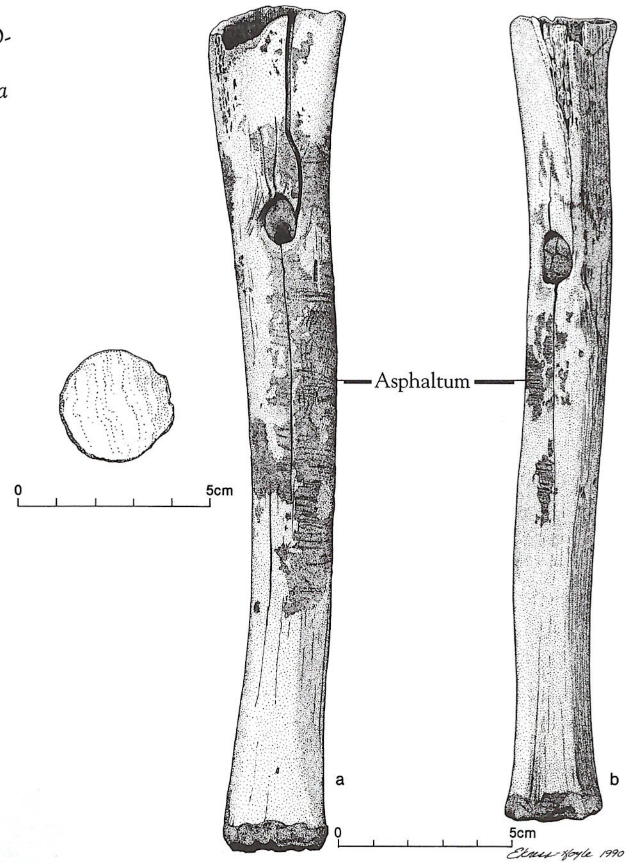


Figure 9.8 Bone whistles and abalone plug from CA-SLO-175: *a*, 511-1966B14b; *b*, 511-1966B14h. *Illustration by Tammara Ekness-Hoyle*

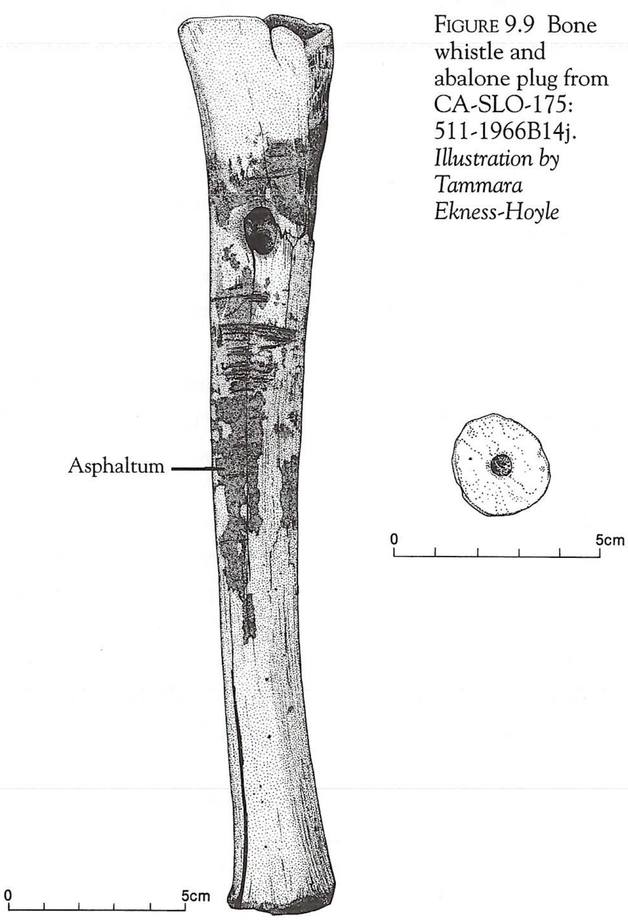


Figure 9.9 Bone whistle and abalone plug from CA-SLO-175: 511-1966B14j. *Illustration by Tammara Ekness-Hoyle*

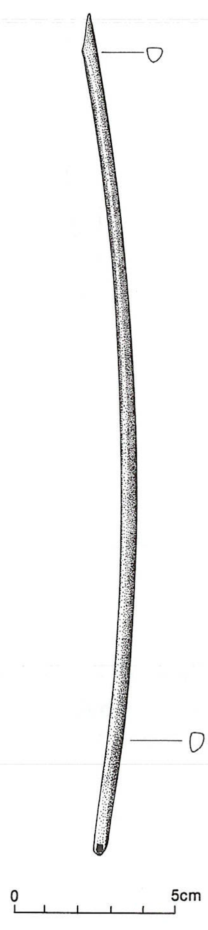


Figure 9.10 Bone artifact from CA-SLO-175: 511-982. *Illustration by Tammara Ekness-Hoyle*

knotting their hair atop the head and supporting or piercing that knot with long bone pins. Heye (in Gifford 1940; see also Hudson and Blackburn 1986:84) felt that the association of those pins in and around the skull and upper portion of burials implied use in head dressings—possibly a signature of rank or status. Similar interpretation has been afforded to the spatulas and strigils that were also thought to have been placed through the hair knot. Recovery of pins or pinlike bone implements is common in archaeological excavations throughout the region.

According to C.D. King (1990), the proliferation of pins and hair pins, as well as strigils and spatulas (that is, scepters and "sweatscrapers"), occurred from his M2a phase through M5, but exact placement has not yet been made "on the basis of present data" (C.D. King 1990:261). Punctate designs that approximate that on the spatula (511-981, fig. 9.4b) are specified for the M5 phase.

PUNCHES

While the traditional category of awl often has included a range of pointed bone tools of varying degrees of sharpness or tapering, a distinction is made here for those tools that generally are wider at the distal end than the traditional slender awl and that show primary evidence of pressure or microwear which can be attributed to a heavier perforating or punching action. One specimen (484-154, fig. 9.2l) is a reused awl (see "Awls"). A second specimen (484-430, fig. 9.2m) is a punch tip that is slightly torqued longitudinally with one beveled edge. This specimen was recovered from the Caltrans excavation at 20–30 cm in unit 1.

GORGE HOOK

At CA-SLO-175 during the initial fieldwork a single bipointed bone implement—identified as a gorge hook (511-377, fig. 9.2d)—was recovered from unit NW160 NE55 at the 15–30 cm level. This incomplete specimen measures 25.4 mm by 5.4 mm and is 5.1 mm thick.

Not common or necessarily frequent in central coastal sites, gorge hooks do appear with some regularity. C.D. King (1982) has interpreted their occurrence as characteristic of Early to Middle periods, and Harrison (1964) has discussed their presence in the Aerophysics and the Eakin's sites.

ANTLER TINE

Of the two antler tine fragments reported in Abrams (1968a), only one specimen was located. This implement (511-NW71NE49, fig. 9.2c) is a burned tip fragment that was ground and beveled. Recovered at a depth of 34 cm in unit NW71 NE49, the piece measures 34.4 mm in length at the break, 10.6 mm in width, and 6.5 mm in thickness. They may have been used for flaking or in making projectiles.

SUMMARY

Bone artifacts fall within several general functional classes: task-oriented, ornamental, or ritual or ceremonial. Certainly, a number of household and ornamental items assumed a ritual role when included with burials. The wide range of use for these implements can only be imagined or surmised from rich ethnographic or ethnohistoric referents. Furthermore, any assessment of the character and distribution of the bone artifact assemblage at the Pico Creek sites is hampered by the disparate recovery techniques. Awls were present in greatest number in units on the south side of the highway at CA-SLO-175 and were not found at CA-SLO-1259, which may indicate differential site activities. The majority of needles were associated with one interred female. Pins, strigils, spatulas, and the bone whistles are accounted for most commonly as burial goods. These artifacts go far to flesh out a picture of the broad range of the occupation and character of the sites at Little Pico Creek.

10

Faunal Remains

FAUNAL REMAINS recovered from the Little Pico Creek sites included mammal, bird, fish, reptilian, and invertebrate taxa. Vertebrate faunal remains were sampled in a limited fashion during the 1965–1966 fieldwork, and a listing of species identified was included in the original report (Abrams 1968c:14). Unfortunately, because these remains could not be located for reinspection, the present discussion is limited to materials recovered in 1989. Basic taxonomic identification and assessment of dietary diversity and relative significance through time, as suggested by proportional variation among identified taxa, were the goals of the analysis.

Recovery and analysis of vertebrate remains has generally emphasized specimens that could be identified to the genus level or better, although without soft parts some fish can only be confidently identified to family. Nonidentifiable specimens were weighed, cataloged by provenience lot, and set aside. Identifiable mammal and bird remains were evaluated with samples from 6-mm and 3-mm mesh excavation units; shellfish remains were evaluated with 3-mm mesh column samples; and fish bone was evaluated with 1.5 mm mesh column samples. These were the mesh sizes judged most efficient for identifying the full taxonomic spectrum at the Little Pico Creek sites efficiently. The use of any given mesh size imposes certain biases, and so we attempted to hold methods constant across temporal components in order to evaluate the direction of relative dietary change through time. For mammal bones, large mesh can lead to an underrepresentation of rodents. At Little Pico Creek, all rodent bone must be considered intrusive, as it is impossible to segregate prehistoric specimens from those of postdepositional origin. Shellfish fragments can be captured in any mesh size, but taxonomic identifications are nearly impossible with specimens smaller than 3 mm. On the other hand, the bones from many important fish (for example, anchovies) are so small they pass through 3-mm mesh. As these small taxa can be abundant in central coast middens, samples of 1.5-mm (1/16 inch) mesh must be used to evaluate the richness and taxonomic diversity of prehistoric fisheries (see Erlandson 1994; Gibson 1988c:107; Gordon 1993). Two bulk samples were collected after the other excavations were completed to obtain samples for processing through 1.5-mm mesh.

Identifiable mammal, bird, and reptile remains were analyzed by Dwight D. Simons of Sonoma State University using comparative osteological collections housed at the California Academy of Sciences in San Francisco. After initial identification, data recorded for each specimen included skeletal element, side of body or body segment, relative completeness, type of fragment, relative age (adult or juvenile), presence or absence of cultural modification (butchering marks, signs of burning, or evidence of use as a tool) and evidence of noncultural modification (animal gnawing or weathering). Element counts were determined for each vertebrate taxon on the basis of the number of separately identifiable portions represented by each specimen. Findings are summarized by number of identified specimens (NISP) per component. Minimum numbers of individuals (MNIs) were calculated for each level and unit by determining the number of the most abundant skeletal element of each vertebrate taxon. Seventeen taxa have been positively identified (table 10.1); two others—whale and sea lion—were noted by Abrams (1968c:14).

Fish remains were identified by James Quinn of the Cultural Resources Facility at Sonoma State University, using comparative collections maintained by the Department of Ichthyology, California Academy of Sciences, and the Department of Biology, Sonoma State University, and by Kenneth Gobalet, California State University, Bakersfield, using comparative collections in his possession. Gobalet identified the remains obtained from bulk samples processed through the 1.5-mm mesh from CA-SLO-175. Quinn identified specimens recovered from CA-SLO-175 and CA-SLO-1259 excavation units. Data recorded include species or genera and elements. Minimum numbers of individuals were calculated for each level of each unit or column sample. Fish were classified into twenty taxonomic categories, including one order, seven families, five genera, and eight species (table 10.2).

Shellfish remains were collected from the Little Pico Creek sites in bulk 10 x 10 cm column samples excavated

Table 10.1 Mean meat values for bird, mammal, and reptilian taxa represented at Little Pico Creek

Taxon	*Common name*	*Mean meat weight (kg)*	*Reference*
MARINE MAMMALS			
Phoca vitulina	Harbor seal	70.0	Hildebrandt (1981:53)
Enhydra lutris	Sea otter	24.0	Hildebrandt (1981:53)
TERRESTRIAL MAMMALS			
Odocoileus hemionus	Black-tailed deer	34.0	Simms (1984:89)
Canis sp.	Dog/coyote	6.0	Dietz et al.(1988:344,348)
Sylvilagus audubonii	Brush rabbit	0.6	Simms (1984:89)
Taxidea taxus	Badger	4.0	Dietz et al.(1988:344,348)
Urocyon cinereoargenteus	Gray fox	5.5	Dietz et al. (1988:344, 348)
Ursus americanus	Bear**	90.0	Dietz et. al. (1988:344, 348)
Cervus elaphus	Tule elk	162.2	Dietz et al. (1988:344, 348)
Spermophilus beecheyi	California ground squirrel*		
Scapanus latimanus	Broad-footed mole[1]*		
Thomomys bottae	Pocket gopher*		
Neotoma sp.	Wood rat*		
BIRDS			
Anas/Aytha/Melanitta sp.	Duck	0.53	Dietz et al. (1988:362,366)
Fulmaris glacialis	Northern fulmer	0.30	
REPTILES			
Squamata	Snake*		
Clemmys marmorata	Western pond turtle		

*Predominantly intrusive. **Reported by Abrams (1968c:14).

Table 10.2 Mean meat values for fish represented at Little Pico Creek

Taxon	*Common name*	*Preferred habitat**	*Mean meat weight (kg)*	*Reference*
Amphistichus sp.	Barred surfperch	Sandy bottoms	1.50	**
Amphistichus rhodoterus	Redtail surfperch	Beaches, offshore	1.50	**
Atherinidae	Topsmelt or jacksmelt	Beyond surfzone, sandy bottoms	0.30	**
Atherinops affinis	Top smelt	Beyond surfzone, sandy bottoms	0.40	**
Clupeidae	Herring and sardine	Outer edge of kelp beds	0.14	***
Cottidae	Sculpin	Tide pools	0.10	Estimate
Cyprinidae	Minnow	Freshwater streams	0.10	Estimate
Elasmobranchi	Shark	Various	5.00	**
Embotiotocidae	Surf perches	Between kelp beds and shore	0.52	***
Phanerodon furcatus	White sea perch	Shallow water (to 43 m)	0.20	**
Engraulis mordax	Northern anchovy	Surface waters	0.10	***
Gibbonsia metzi	Striped kelpfish	Kelp beds	1.50	**
Gobiesox sp.	Clingfish	Inshore, kelp	0.10	**
Hexagrammos sp.	Rock or kelp greenling	Rocky inshore kelp beds	0.31	***
Ophiodon elongatus	Lingcod	Rocky reefs	4.11	***
Osmeridae	Smelts	Sandy beaches, estuaries; nearshore	0.01	**
Raja stellulata	Big skate	Various	6.50	***
Scorpaenichthys marmoratus	Cabezon	Rocky reefs, inshore	0.50	***
Sebastes sp.	Rockfishes	Kelp beds	1.24	***
Xiphister sp.	Prickleback	Intertidal and rocky reefs	0.80	**

*Following Salls (1988) and Fitch and Lavenberg (1971). **K. Gobalet, personal communication 1990. ***Mitchell (1988:256).

into the sidewalls of completed units. In one instance an auger was used to obtain samples from the northern site area. Samples were not screened in the field, but were bagged and then transported to the laboratory, where they were wet-screened through nested 3-mm (1/8 inch) and 6-mm (1/4 inch) mesh. Noncultural materials (for example, soil particles and small rocks) were sorted from samples, and remaining shell residues were weighed and identified to species using a Caltrans reference collection. All of the 6-mm residues were examined, and a 25 percent sample was taken by weight from the 3-mm residues. Values obtained from the 25-percent samples were then multiplied by four to obtain estimates of the total representation of each species. Whole and unusual shells were also collected in the field to note any species not represented in the column samples. Thirty-three invertebrate taxa were recognized at the two sites (table A.67), but only a fraction of these occurred in quantities large enough to suggest dietary significance (table 10.3). With the excep-

Table 10.3 Meat values for shellfish identified at Little Pico Creek

Taxon	*Common name*	*Meat:shell ratio*	*Reference*
Acanthina sp	Unicorn	0.667	Tartaglia (1976:170)
Collisella spp.	Limpet	0.780	T. Jones and Haney (1992:157)
Cryptochiton stelleri	Gumshoe Chiton	1.159	from related Nuttalina californica
Haliotis spp	Abalone	1.363	Koloseike (1969)
Lottia gigantea	Owl limpet	1.360	Tartaglia (1976:170)
Mytilius californianus	California mussel	0.298	Erlandson (1988a:445)
Nuttalina californica	Nuttal's chiton	1.529	Erlandson (1988a:452)
Protothaca staminea	Littleneck clam	0.527	Dietz et al. (1988a:350)
Strongylocentrotus purpuratus	Purple sea urchin	0.426	T. Jones and Haney (1992:158)
Tegula funebralis	Turban snail	0.371	Erlandson (1988a:453
Unidentified		0.952	T. Jones and Haney (1992:158)

Table 10.4 Summary of economically significant mammal and bird remains from CA-SLO-175

Taxon	*NISP*	*MNI*	*Mean meat weight/individual*	*Meat (kg)*	%
Black-tailed deer	22	12	34.0	408.0	70.8
Harbor seal	1	1	70.0	70.0	12.2
Badger	2	2	24.0	48.0	8.3
Dog/coyote	3	3	6.0	18.0	3.1
Sea otter	1	1	18.0	18.0	3.1
Rabbit	15	11	0.6	6.6	1.1
Gray fox	1	1	5.5	5.5	1.0
Duck	3	3	0.5	1.5	0.3
Fulmar	1	1	0.3	0.3	0.1
Totals	49	35		575.9	100.0

tion of *Tresus nuttallii*, all of the represented species are common along the exposed rocky shore adjacent to the mouth of Little Pico Creek.

Assessment of the relative dietary significance of taxa has been attempted by developing two types of quantitative indices. First, the amount of meat represented by identified elements has been calculated by multiplying MNIs by mean taxon-specific meat values. Meat values for mollusks have been calculated through the use of meat-to-shell ratios (table 10.3). The proportions of meat have then been compared with respect to terrestrial versus marine sources. Because this method is reliant on MNIs, a highly problematic index, the results are considered only as potential indications of change through time. Ratios of mammal, fish, and shell have also been developed as a less subjective dietary index.

CA-SLO-175

A total of 1,105 vertebrate elements were recovered from CA-SLO-175, including 602 mammals, 497 fish, 4 birds, and 2 reptiles. Invertebrate remains include materials collected from two column samples and one bulk sample. The following summarizes the analyses of these faunal assemblages.

Mammals, Birds, and Reptiles

Of the 608 vertebrate elements recovered, eighty-four were considered identifiable. Of the seventeen taxa are represented among these elements, four—snake (NISP=1), ground squirrel (NISP=2), wood rat (NISP=1), and pocket gopher (NISP=2)—are considered postdepositional intruders (table A.59). Species considered part of the prehistoric assemblage include three marine mammals (sea otter, harbor seal, and an unidentified pinniped) and seven terrestrial mammals (cottontail rabbit, dog/coyote, gray fox, badger, deer, and an unidentified carnivore). The northern fulmar and ducks were identified, as well as the Pacific pond turtle. Abrams (1968c:14) reported whale and sea lion. The bird and mammal remains are dominated by terrestrial taxa, particularly by elements representing the black-tailed deer, which accounts for 44.9 percent of the NISP (table 10.4). Deer are followed by rabbits (NISP=15), and ducks (NISP=3).

The presence of the northern fulmar is of some interest since these birds are generally found well offshore over the open ocean (Grinnell and Miller 1944:42). They do occasionally occur along the open coast, particularly near headlands (Cogswell 1977:71). Fulmars are generally winter visitors to the central California coast, although some individuals loiter throughout the summer (Grinnell and Miller 1944:42; Cogswell 1977). Many species of ducks pass this stretch of coast during the winter months as well, arriving between September and October and leaving between March and April (Grinnell and Miller 1944; Cogswell 1977). At the very least, the remains of these birds suggest that the portion of CA-SLO-175 excavated in 1989 was occupied in the winter; this by no means precludes—particularly in light of the small sample—the possibility of occupation during other times of the year.

When MNI are converted to meat values, deer account for 70.8 percent of the assemblage, followed by harbor seal at 12.2 percent, and badger at 8.3 percent. Rabbits, which account for

Table 10.5 Fish remains from CA-SLO-175

Units 1 to 6 (3 mm and 6 mm)

Taxon	*Common name*	*NISP*
Cyprinidae	Minnow	2
Elasmobranchi	Shark	2
Hexagrammos sp.	Greenling	3
Scorpaenichthys marmoratus	Cabezon	4
Sebastes spp.	Rockfish	3
Stichaeidae	Prickleback	1
Unidentifiable		5
Totals		20

Bulk samples (1.5 mm)

		NISP				
		#1 (60–80 cm)	*#1 (130–150 cm)*	*#2 (10–20 cm)*	*#2 (70–80 cm)*	
Taxon	*Common name*	*(5.8 liters)*	*(7 liters)*	*(8.3 liters)*	*(5.9 liters)*	*Totals*
Atherinidae	Silversides	2	2	1	0	5
Atherinops affinis	Top smelt	0	0	1	0	1
Clupeidae	Herring and sardine	5	9	57	100	171
Cottidae	Sculpin	0	0	0	1	1
Embotiotocidae	Surf perches	1	0	2	2	5
Amphistichus rhodoterus	Redtail surfperch	1	1	0	0	2
Phanerodon furcatus	White sea perch	0	0	1	0	1
Engraulis mordax	Northern anchovy	0	0	43	88	131
Gibbonsia metzi	Striped kelpfish	0	0	1	0	1
Gobiesox sp.	Clingfish	0	0	1	0	1
Hexagrammos sp.	Rock or kelp green	0	0	1	2	3
Ophiodon elongatus	Lingcod	0	0	0	1	1
Osmeridae	Smelts	0	0	17	1	18
Raja stellulata	Big skate	0	0	1	0	1
Sebastes sp.	Rockfishes	0	0	2	1	3
Stichaeidae	Pricklebacks	4	3	0	0	7
Xiphister sp.	Rock or black prickleback	0	0	0	3	3
Nonidentified		3	10	62	47	122
Totals		16	25	190	246	477

30.6 percent of the NISP, represent only 1.1 percent of the extrapolated meat values (table 10.4).

Employing the Shannon Index of Diversity (Kintigh 1993), the mammalian and bird assemblage scores a fairly high value of 0.6882, suggesting a fairly broad-based use of these types of animals in the diet. This would be consistent with occupation during an extended portion of the year, as a seasonally restricted occupation would result in a more limited, less diverse faunal inventory.

Fish

Of the 497 fish elements recovered, 370 were identified to at least the family level (table A.60). All but one — the freshwater minnow—are marine species common to the open central California coast. All of the marine taxa have been reported from other nearby prehistoric contexts (Bouey and Basgall 1991:115; Fitch 1972). Meaningful interpretation of the fish remains requires careful consideration of the techniques associated with recovery. Two different field methods were employed to sample fish remains at CA-SLO-175, and these produced very different results. First, all fish recovered from units 1–6 were retrieved from screens and identified. This resulted in a total sample of only twenty elements, of which fifteen were identifiable (table 10.5). Of those, fifteen were recovered from unit 1, where soils were processed with water through 3-mm (1/8 inch) mesh (table A.60).

Fish bone recovery from bulk samples processed with 1.5-mm mesh, however, was substantially greater than the recovery from units, and these samples supply the most important dietary inferences. Bulk samples were collected from proveniences that correlate with the two discrete temporal components identified at the site. Bulk sample 1 was taken from an exposed cliff face in the southern site area and can be associated with occupation dating 3500–600 BC. Bulk sample 2 was taken with an auger from the northern site area and correlates with Middle period occupation. Several aspects of the materials recovered from these samples are significant. First, the fine-mesh processing shows that fish bone occurs in higher frequency throughout the deposit than

Table 10.6 Dietary implications of fish remains from selected CA-SLO-175 bulk samples

			#1 (130–150 cm; 7 liters)		#2 (70–80 cm; 5.9 liters)	
Taxon	*Common name*	*Meat/individual (kg)*	*MNI*	*Edible flesh (kg)*	*MNI*	*Edible flesh (kg)*
Atherinidae	Silversides	0.30	2	0.60	0	0.00
Atherinops affinis	Top smelt	0.40	0	0.00	0	0.00
Clupeidae	Herring and sardine	0.30	3	0.90	7	2.10
Cottidae	Sculpin	0.15	0	0.00	1	0.15
Embotiotocidae	Surf perch	0.50	0	0.00	1	0.50
Amphistichus rhodoterus	Redtail surfperch	1.50	1	1.50	0	0.00
Phanerodon *furcatus*	White sea perch	0.20	0	0.00	0	0.00
Engraulis mordax	Northern anchovy	0.10	0	0.00	3	0.30
Gibbonsia metzi	Striped kelpfish	1.50	0	0.00	0	0.00
Gobiesox sp.	Clingfish	0.15	0	0.00	0	0.00
Hexagrammos sp.	Rock or kelp greenling	1.00	0	0.00	2	0.30
Ophiodon elongatus	Lingcod	24.00	0	0.00	1	24.00
Osmeridae	Smelts	0.05	0	0.00	1	0.05
Raja stellulata	Big skate	68.30	0	0.00	0	0.00
Sebastes sp.	Rockfishes	1.90	0	0.00	1	1.90
Stichaeidae	Pricklebacks	1.00	2	2.00	0	0.00
Xiphister sp.	Rock or black prickleback	0.80	0	0.00	1	0.80
Totals			8	5.00	18	30.10

is evident from the 3-mm processing. Second, piscine remains were noticeably more abundant in the Middle period component in the northern site area. In the southern site area, column 1, 60–80 cm, produced 16 elements from 5.8 liters (2.8 elements/liter) and column 1, 130–150 cm, produced 25 elements from 7.0 liters (3.6 elements/liter; table 10.6). In the portion of the site associated with Middle period occupation, column 2, 10–20 cm, produced 190 elements from 8.3 liters (22.9 elements/liter) and column 2, 70–80 cm, produced 246 elements from 5.9 liters (41.7 elements/liter). The mean fish element/liter value for the northern site area of 32.3 is considerably higher than the mean value of 3.2 obtained from the southern site area. Clearly, fish were a more important resource during the Middle period than they had previously been. Mean identifiable elements/liter are 2.1/liter for the southern site area and 28.3/liter for the northern site area.

Bulk sample 1 (130–150 cm) also can be used as an index of the importance of fish relative to mammals and birds for the Early period component. Clearly, the small mesh used for this sample provides a better picture of the frequency of fish bone in the deposit and its probable dietary significance. Because this mesh was used only with the bulk samples and not for the rest of the excavation, it is necessary to extrapolate the values obtained from the bulk sample to the full excavation volume. Some argue that such a procedure is unacceptable and that only total recovery with window mesh (1.5 mm screen) provides accurate ichthyofaunal information (Gibson 1988c:107). Because we consider the exclusive use of 1.5 mm mesh highly impractical, we have employed volumetric extrapolation to evaluate the relative importance of fish versus mammals. Extrapolating values represented in the 7-liter bulk sample (table A.60) to the full excavation volume (5.8 m^3) produces the following amounts: 12,428 NISP; 6,629 MNI; and 4,142.9 kg of edible flesh. The ratio of identifiable fish to mammal/bird bone, therefore is 355:1. The estimated meat yield of 4,142 kg from fish is greater than the 575.9 kg attributed to mammals and birds.

While the Middle period fish remains exhibit greater taxonomic richness, Shannon index of diversity scores indicate little change in fishery diversity across temporal components: the Early period score is 0.4513 and the Middle period is 0.4246. Although fishing intensity increased, it did not result in increased diet breadth. The overall dietary diversity score (combined fish, mammals, and birds) is 0.6393.

Shellfish

Shellfish remains were collected from CA-SLO-175 via bulk 10 x 10 cm column samples excavated into the sidewalls of units 1 and 2 after unit excavation was completed. Shellfish remains were also analyzed from bulk sample 2 (70–80 cm), as a representation of the Middle period component on the north side of Highway 1. Samples were not screened in the field but were bagged and transported to the laboratory, where they were wet screened through nested 3-mm (1/8 inch) and 6-mm (1/4 inch) mesh. The bulk sample was also processed through 1.5-mm (1/16 inch) mesh, but only the 3-mm (1/8 inch) residues were retained for shell analysis. Noncultural materials (soil particles or small rocks) were sorted from samples, and remaining shell residue was weighed and identified to

Table 10.7 Shell weights (gm) from CA-SLO-175 column samples

	Caltrans excavation area				Northern site area	
Taxon	Unit 2	Unit 1	Mean	%	BS2 (70–80 cm)	%
Mytilus californianus	1133.3	1204.5	1168.9	80.5	277.8	78.9
Balanus sp.	111.7	159.5	135.6	9.3	23.6	6.7
Tegula funebralis	109.9	115.7	112.8	7.8	32.2	9.1
Mopalia muscosa	7.0	5.0	6.0	0.4	1.7	0.5
Cancer sp.	8.6	2.9	6.2	0.4	1.3	0.4
Strongylocentrotus purpuratus	2.8	4.7	3.8	0.3	2.0	0.6
Protothaca staminea	0.9	3.6	2.3	0.2	1.2	0.3
Acmea mitra	1.5	0.7	1.1	0.1	0.1	*
Crepidula adunca	2.6	0.3	1.5	0.1	0.0	0.0
Haliotis rufescens	1.3	0.5	0.8	0.1	0.0	0.0
Unidentifiable	13.4	10.3	11.9	0.8	9.3	2.6
Collisella sp.	1.0	0.0	0.5	*	0.0	0.0
Olivella biplicata	0.9	0.0	0.5	*	0.0	0.0
Cryptochiton stelleri	1.2	0.0	0.6	*	0.0	0.0
Clinocardium nuttallii	0.0	0.0	0.0	0.0	0.3	0.1
Tresus nuttallii	0.0	0.0	0.0	0.0	1.4	0.4
Pollicipes polymerus	0.0	0.0	0.0	0.0	0.1	*
Acanthina Spirata	0.0	0.0	0.0	0.0	1.3	0.4
Totals	1396.1	1507.7	1452.5	100.0	352.3	100.0

* Less than 0.1.

species. All of the 6-mm residues were examined, and a 25 percent sample was taken by weight from the 3-mm residues. Values obtained from the 25-percent samples were then multiplied by four to obtain estimates of the total representation of each species. Whole and unusual shells were also collected in the field to identify taxa that were not represented in the column samples. This procedure resulted in identification of an additional 17 species at CA-SLO-175, bringing the overall total of species identified to 32 (Jones and Waugh 1993:289).

Of the species represented in the column samples, three—California mussel (*Mytilus californianus*), barnacle (*Balanus sp.*), and turban snail (*Tegula funebralis*)— account for more than 97 percent of the shellfish remains (tables 10.7, A.62–A.66). These results also show a constancy through time, as mussels occur in nearly identical proportions in the Early period column taken from the Caltrans excavation area (80.5%) and the Middle period sample obtained from the northern site area (bulk sample 2, 70–80 cm). They further contrast with the findings from nearby Cambria, where J. Rudolph (1985) reported *Tegula* as the dominant taxon during the Middle and Late periods, which he attributed to an increase in beach sands as a consequence of sea-level rise. The proportions from Little Pico Creek, however, are more in line with the findings from Big Sur (T. Jones and Haney 1992), Diablo Canyon (Greenwood 1972), Pico Creek (Waugh 1992), and Piedras Blancas (Bouey and Basgall 1991), where mussels dominate molluscan assemblages throughout time. The intertidal resource base adjacent to Little Pico Creek apparently was unchanged through the course of occupation at CA-SLO-175.

Large barnacles were probably consumed by inhabitants of Little Pico Creek, but the tiny individuals represented in the column samples were probably riders on other shells. Excluding barnacles, meat/shell ratios indicate that the total edible flesh represented by the column invertebrate remains is 405.5 kg (table 10.8). Shannon index of diversity scores indicate a minor increase in invertebrate diversity from Early (0.2612) to the Middle period (0.2966).

Dietary reconstruction

Reconstructing the overall diet represented by faunal remains from CA-SLO-175 is hazardous because of the small number of clearly identified vertebrate elements. Some dietary inferences can nonetheless be drawn from the available sample. Stronger statements can be made for the Early period, as a full complement of faunal remains is represented by the Caltrans excavation findings. The unavailability of the faunal remains from the Abrams excavation limits conclusions that can be drawn for the Middle period. Overall, in terms of edible flesh, the reconstructed diet is dominated by marine taxa, which represent 88.7 percent of the edible flesh values (table 10.9). Fish are by far the most important resource (80.8%), followed by terrestrial mammals (9.5%), and shellfish (7.9%). Among the terrestrial game, black-tailed deer were the heaviest dietary contributor. This reconstruction accords with the findings from CA-SLO-179, where Waugh (1992) reported an abundance of fish remains from an Early period context circa 2500 BC. Breschini and Haversat (1989) also reported a high frequency of fish remains from a similarly dated component at CA-MNT-108.

The Little Pico findings agree only partially with data recently reported from Vandenberg Air Force Base, where Glassow (1992:121) reported heavy marine foci among what

Table 10.8 Conversion of shell weights from CA-SLO-175 into edible flesh

Taxon	Meat:ratio	Column shell weight (g)	Extrapolated total shell weight (kg)	Total weight (kg)
Mytilus californianus	0.298	1168.9	1129.9	336.7
Balanus sp.	*	135.6	-	-
Tegula funebralis	0.371	112.8	109.0	40.4
Mopalia muscosa	1.159	6.0	5.8	6.7
Cancer sp.	0.952	6.2	5.9	5.7
Strongylocentrotus *purpuratus*	0.426	3.8	3.7	1.6
Protothaca staminea	0.527	2.3	2.2	1.2
Acmaea mitra	0.780	1.1	1.1	0.8
Crepidula adunca	0.952	1.5	0.5	1.4
Haliotis rufescens	1.363	0.8	0.8	1.1
Unidentifiable	0.952	11.9	11.5	10.9
Collisella sp.	0.780	0.5	0.5	0.4
Olivella biplicata	*	0.5	-	-
Cryptochiton stelleri	1.159	0.6	0.6	0.7
Total		1452.5	1271.5	407.6

* Not dietary.

Table 10.9 Dietary reconstruction based on faunal remains from CA-SLO-175

Class	Meat (kg)	(%)
Fish	4142.9	80.8
Marine mammal	88.0	1.8
Terrestrial mammals	486.1	9.5
Shellfish	405.5	7.9
Birds	1.8	0.1
Total	5124.3	100.1

Table 10.10 Mammal remains from CA-SLO-1259

Taxon	NISP	MNI
Odocoileus hemionus	3	3
Sylvilagus sp.	2	2
Canis	1	1
Cervus elaphus	18	1
Thomomys bottae	4	3
Total	28	10

Table 10.11 Mean shell weights from CA-SLO-1259 unit 6 column samples

Taxon	Column 1	Column 2	Mean	%
Mytilus californianus	3.2	218.2	110.7	71.3
Balanus sp.	1.3	39.5	20.4	13.1
Tegula funebralis	0.3	21.9	11.1	7.2
Mopalia muscosa	0.1	3.3	1.7	1.1
Protothaca staminea	0.3	0.4	0.4	0.3
Acmea adunca	0.0	0.3	0.2	0.1
Haliotis rufescens	0.0	0.1	0.1	*
Olivella biplicata	0.0	3.0	1.5	1.0
Cryptochiton stelleri	8.3	0.0	4.2	2.7
Unidentifiable	0.8	9.2	5.0	3.2
Total	14.3	295.9	155.3	100.0

* Less than 0.1.

he referred to as Terminal Early period components (dating 4700–3000 BC), but these components were dominated by marine mammals and shellfish. Glassow's findings, however, were based on data obtained with 3-mm (1/8 inch) screen.

An increased intensity in fishing is suggested by comparison between the Early period and Middle period fish bone-to-shellfish ratios. For the Early period component, the ratio of fish NISP to shellfish (kg shell) is 8.8:1, whereas for the Middle period the figure is 565.3:1.

CA-SLO-1259

Faunal remains recovered from CA-SLO-1259 included mammal, bird, fish and invertebrates, but bone and shell were not prolific at this site. The deposit could, based on its color, be characterized as a midden. Faunal elements debris was extremely sparse. These low frequencies suggest significant intrasite variability between CA-SLO-175 and CA-SLO-1259, reflecting change in site use through time.

Mammals and birds

A total of twenty-eight nonfish identifiable faunal elements were recovered from CA-SLO-1259, representing five taxa (table 10.10). Four elements represent the pocket gopher (*Thomomys bottae*) and are considered intrusive. Species considered part of the prehistoric assemblage are limited to four terrestrial mammals: the cottontail rabbit (*Sylvilagus* sp.), dog/coyote (*Canis* sp.), deer (*Odocoileus hemionus*), and tule elk (*Cervus elaphus*) (tables 10.10 and A.61). The assemblage yields a diversity score of 0.5880, but sample size is too small to allow for confident inferences.

Fish

Only a single fish element, unidentifiable to species, was recovered from this location.

Shellfish

Nine shellfish species were identified in two column samples taken from unit 6, where shells were the most abundant (table 10.11). One additional species, giant rock scallop (*Hinnites giganteum*) was represented by a single large specimen, which was used for radiocarbon dating. The low density of shellfish remains in the midden is clearly reflected in the low values obtained from the columns (table A.65 and A.66), particularly in comparison to CA-SLO-175, where a sample 0.06 m^3 in size produced as much as 1507.8 gm of shell. In contrast, the largest sample from CA-SLO-1259 (0.02 m^3) yielded only 295.9 gm of shell. Mussel is the dominant species, representing 71.3 percent of the remains (table 10.10), followed by barnacle (13.1%) and turban snail (7.2%).

The most important attribute of the faunal component at CA-SLO-1259 is its near absence. Flaked stone residues are profuse, but vertebrate and invertebrate remains were not present in sufficient quantities to allow for meaningful conclusions on diet or taxonomic diversity. The low frequency of dietary debris and the profusion of flaked stone residues suggest that CA-SLO-1259 had a well-defined, specialized function.

11

Summary and Conclusions

At a primary level, this study has established a chronological framework within which the occupation of these sites occurred and has provided a definition of assemblages in terms of constituent components. Now we'll consider how these results reflect and refine regional prehistory in terms of chronology and the shifting patterns of regional land-use and subsistence.

CULTURAL CHRONOLOGY

Occupation of the Little Pico Creek sites appears to have occurred from approximately 3500 BC through the Protohistoric period. The lack of cohesive taxonomy for regional cultural history complicates the discussion of the sequence of habitation. Several conflicting cultural schemes are potentially applicable to the prehistory of the San Luis Obispo County coast.

Discrepancies in nomenclature and uncertainties regarding the spatial limits of applicability of competing sequences for the central coast are two main problems. Local convention dictates that ethnographic and contemporary political boundaries determine the most appropriate sequence. Consequently, in areas—such as Little Pico Creek—occupied by the Chumash at the time of contact, C. D. King's (1982, 1990) cultural chronology appears most relevant. In Monterey County, the Big Sur chronology proposed by T. Jones et al. (1989) or the Breschini and Haversat (1980) adaptation of Fredrickson's (1974) system are considered appropriate. Because prehistoric central coast cultures did not conform with contemporary or ethnographic situations, this procedure only serves to make an inherently complex archaeological phenomenon even more involute. To avoid compounding this problem, we have classified the Little Pico Creek materials in local phases. A *phase* is considered to encompass a locally specific, temporally restricted suite of archaeological traits, "sufficiently characteristic to distinguish it from all other units so conceived" (Willey and Phillips 1958:22). As such, a phase is a heuristic device. Phases are framed against a series of periods, the dating and nomenclature for which have been developed as compromises between C. D. King (1982, 1990), Fredrickson (1974), and schemes B1 and B2 (table 11.1) of Bennyhoff and Hughes (1987).

Materials recovered from the two Little Pico Creek sites are considered to represent two local occupational phases: one spanning the Early period (3500–600 BC), identified at CA-SLO-175 in the southern site area, and another spanning the Middle period, represented by the northern portion of CA-SLO-175 and the excavated portion of CA-SLO-1259. Limited occupation appears to have also transpired during the Protohistoric period.

Early period (3500–600 BC): Little Pico Creek I

Chronometric data indicate that the southern site area of CA-SLO-175, represented by the six units excavated by Caltrans and by Abrams test pit B, harbors a cohesive Early period component. The lowermost levels of the southwestern site area (Abrams units SE10/SW90, SE20/SW90, SE15/SW90, NW30/SW95, NW30/SW90, NW80/SW90) also appears to mark the Early period, but substantial chronometric data are not available from that portion of the site.

Flaked stone. Projectile points marking this phase at CA-SLO-175 include the Large Side-notched examples and two variants of the Central Coast Stemmed series: the Rossi Square-stemmed and the Contracting-stemmed. This series, subsuming previous regional typologies, consists of fairly robust stemmed points that are often larger in weight and length than points associated with the *atlatl* (see T. Jones and Hylkema 1988:182). Stem configurations include Contracting-stemmed, Square-stemmed, Long-stemmed, and Concave Base-stemmed. Extensive blade reworking is common among the stemmed points, creating temporally insignificant morphological variability. Reworking appears to have transformed tanged forms into nippled and nontanged variants and created smaller variants. Some of these reworked specimens resemble what have been referred to locally as "lozenges" (Greenwood 1972:16) and the Little Pico Creek Nippled Bipoint (T. Jones et al. 1989:41). These and other morphological variants previously segregated as potentially distinctive types are herein reclassified as

Table 11.1 Proposed central coast cultural periods

	Dating	*Fredrickson (1974)*	*C.D. King (1990)*	*Bennyhoff and Hughes (1987)*
PaleoIndian	9000–6500 BC	PaleoIndian		
Millingstone	6500–3500 BC	Lower Archaic	Ex, Eya	
Early	3500–600 BC	Middle Archaic	Eyb	Early
Early/Middle Transition	1000–600 BC		Ez	
Middle	600 BC–AD1000	Upper Archaic	M1–M5a	E/M Transition, Middle, Middle/Late Transition
Middle/Late Transition	AD 1000–1250			M5b, M5c
Late	AD 1250–AD 1500	Lower Emergent	L1	L1
Protohistoric	AD 1500–AD 1769	Upper Emergent	L2	L2
Historic	Post–AD 1769		L3	

reworked variants of what is best portrayed as a series of stylistically and culturally related types.

Square-stemmed, Contracting-stemmed and Large Side-notched points have been recovered from contemporaneous contexts at CA-MNT-170, CA-MNT-391, CA-MNT-1228, CA-SCR-7, and CA-SBA-53. The Large-Side-notched subtype with bifurcated base, referred to by Lathrap and Troike (1984:107) as a Jalama Side-notched, appears to be restricted to areas from Little Pico Creek south, as no similar examples were recovered from CA-MNT-73, CA-MNT-391, CA-MNT-1228, CA-SCR-7, or SMA-77. Flake tools also comprise a significant proportion of the flaked stone tool assemblage, including five formal and fifty-four informal examples.

Ground and battered stone. Definition of the ground-stone assemblage marking the early occupation phases at CA-SLO-175 is somewhat problematic because of the small sample of clearly provenienced specimens. Nonetheless, the recovery in 1989 of four handstones indicates that milling slabs and handstones were used, while identification of a mortar and a pestle in the southern site area suggests that this technology was also in use. Mortars and pestles have been reported from contemporaneous contexts at CA-MNT-391, CA-MNT-1228, and CA-SBA-53. It is likely that both types of implements were in use to the north and south at this time depth, as well as at Little Pico Creek.

Grooved net weights also appear among the artifacts inventory of the early phase. The two recovered from controlled provenience at CA-SLO-175 in 1989 are similar to those reported by Harrison and Harrison (1966:22) from CA-SBA-53. The unusual drilled elongate sandstone object recovered during the 1989 excavation may also represent a type of net weight used at this time. Net weights appear to be much less common during the Early period than during the Middle period. The pitted stone is also a constituent of this phase at CA-SLO-175.

Shell beads. *Olivella* shell bead types that occur as part of the early component include Oblique Spire-lopped (A2), and End-ground (B2b and B2c). Early dating for these types is largely consistent with that ascribed to the types in both Central (Bennyhoff and Hughes 1987) and Southern California (King 1990). The most common Early period marker, the class L *Olivella* rectangle, was not identified at Little Pico Creek, but its apparent absence is likely a by-product of small sample size, given that examples have been reported from CA-MNT-391, CA-MNT-1228, CA-SLO-165, and CA-SLO-877. A distinguishing characteristic of the San Luis Obispo Early period components is the absence of abalone square beads, common at CA-MNT-391 and sites further north (for example, CA-SMA-77).

Stone ornaments. Drilled talc schist pendants appear to mark the early phase at CA-SLO-175, as they do at CA-SBA-53 (Harrison and Harrison 1966:31), and CA-MNT-1228 (T. Jones and Haney 1992:267). At least one similar object was also recovered from CA-MNT-391 (Cartier 1993a:171).

Bone tools. The bone tool assemblage associated with the early occupation at CA-SLO-175 is limited to two bone awls and a single pin. A similarly depauperate bone tool collection was reported from CA-SBA-53 (Harrison and Harrison 1966:32). An expanded excavation sample would expect to document fish gorges, which have been found identified at CA-MNT-391 and CA-MNT-1228.

Discussion. The artifact assemblage associated with the early occupation at CA-SLO-175 is extremely consistent with those reported from other similarly dated central coast site components. Although the frequency of ground-stone implements is somewhat low, and temporal assignment is less secure than at other locations, the Early assemblage from CA-SLO-175 seems to conform with the materials reported from CA-SBA-53 by Harrison and Harrison (1966), CA-MNT-1228 (T. Jones and Haney 1992), and CA-MNT-391 (Cartier 1993a). Large Side-notched projectile points with bifurcated bases (the provisional Jalama Side-notched) may be restricted to the San Luis Obispo and Santa Barbara counties.

Table 11.2 Summary distribution of milling artifacts from Little Pico Creek and other important central coast site components

	Mortar/pestle		*Milling stone/handstone*	
	N	%	*N*	%
Milling-stone period (Pre 3500 BC)				
CA-MNT-1232/H Stratum II	0	0	7	100.0
CA-SLO-585 (180–220 cm)*	2	9.5	19	90.5
Early period (3500–600 BC)				
CA-MNT-1228	2	25.5	6	75.0
CA-SLO-175 Southern Site Areal	16.7	5	83.3	
Middle period (600 BC–AD 1000)				
CA-MNT-229	64	100.0	0	0.0
CA-SLO-175 Northern Site Area**	68	69.4	30	30.6
CA-SLO-1259	2	40.0	3	60.0
Middle/Late Transition (AD 1000–1200)				
CA-MNT-1233	3	60.0	2	40.0

* Possible mixed component. **Based upon entries in Abrams UCLA catalog and data presented in tables A.46 to 48.

The striking similarities between the Early assemblage at CA-SLO-175 and the materials from CA-SBA-53, CA-MNT-391, and CA-MNT-1228 foreground the problem of regional chronological nomenclature. Even though the culture represented here is classified one way from the Santa Barbara perspective and another from the Monterey Bay area, a single cultural pattern extends across the entire central coast region. Adhering to local convention suggests cultural variability that is not actually manifested in the record. The Early period component at Little Pico Creek also retains some locally distinctive characteristics. To recognize these traits but not perpetuate the nontreatment of the spatial dimension to culture history dictated by local convention, the Little Pico Creek I is defined as a locally distinct assemblage distinguished from the Saunders phase in the Monterey Bay Area by the presence of Jalama Side-notched points and notched net weights and absence of abalone square beads. Little Pico Creek I distinguishes itself from Early assemblages in the south by a lower frequency of side-notched points and higher incidence of stemmed points. Little Pico Creek I also shares many traits with the Monterey Bay Area and the Santa Barbara Channel. Little Pico Creek I conforms with a broader, regional pattern similar to Roger's (1929) Hunting Culture. As the middle unit in Rogers' tripartite Santa Barbara cultural sequence, the Hunting Culture is marked by large-stemmed and side-notched projectile points (often in high frequencies), mortars and pestles, and some milling slabs and handstones. Similar assemblages have since been associated with a Hunting Culture or Hunting People by Orr (1943), Harrison (1964), Harrison and Harrison (1966), and Greenwood (1972), although absolute dating and interpretive inferences have varied. Certainly this assemblage occurs as a cohesive unit along the central coast and in Little Pico Creek I as a local expression phase of the broader assemblage pattern.

Middle period (600 BC–AD 1000): Little Pico Creek II
The Middle period is represented at Little Pico Creek by materials from the northern area of CA-SLO-175, most of the burial population from CA-SLO-175, and all of the CA-SLO-1259 assemblage. Constituents recovered from these contexts and presumed representative of the Middle period at Little Pico Creek include the following.

Flaked stone. The Central Coast Stemmed series represents the overwhelmingly dominant point type used during the Middle period along the central coast from Santa Barbara (CA-SBA-54 [Harrison and Harrison 1966:42]) to San Mateo County (CA-SMA-218 [Hylkema 1991:320] and CA-SMA-77 [Gerow with Force 1968]). Contracting-stemmed types are most common, although all four stem forms occur. Examples available from CA-SLO-175 and CA-SLO-1259 are particularly meaningful because the large size of the available sample illustrates the range of variability allowing the effects of reworking to be recognized and because the clear Middle period context of the specimens recovered from CA-SLO-1259 solidifies at least a portion of the time span during which the points represented by this series were in use. The other significant occurrence of virtually identical points in a single-component Middle period context is at CA-MNT-282, the Willow Creek site. The occurrence of the Stemmed Concave-base variant at CA-MNT-282 and CA-SLO-1259, along with the absence of this type from earlier components at CA-SBA-53, CA-SLO-175, CA-MNT-170, CA-MNT-391, and CA-MNT-1228, suggests that this variant, unlike others, may be restricted to the Middle period.

Ground stone. The milling tool assemblage strongly suggests that both the handstone/slab and mortar/pestle technologies were used during the Middle period along this stretch of the

Table 11.3 Summary of grave-lot dating from CA-SLO-175

Burial	*Associations*	*Dating*
3	2 appliquéd asphaltum plugs, J2bII Abalone ring, 39 Tiny saucer beads, abalone sequin, 2 bone pins, strigil	600 BC–AD 700
5	Bone spatula, 2 strigils, 24 Tiny saucer beads, J2bII Abalone ring Radiocarbon date: 1 sigma probability 1526–820 BC	800–600 BC
7	5* Small Spire-lopped beads, 1 End-ground bead, 1 Barrel bead, 4 Irregular saucer beads, 1 Cupped bead, 16 Flat-ended limpetrings (H2aIII)	AD 1000–1250
12	11 Spire-lopped beads, 26 End-ground beads, 1 Spire-lopped Littorina, 1 Double Side-notched point	AD 1000–1250
13	1 Flat-ended Limpet ring (H2aIII), 2 Contracting-stemmed points	AD 1000–1250
14	26 Spire-lopped beads, 1 Oblique Spire-lopped bead, 39 End-ground beads, 536 Tiny saucer beads, 4 Deer Tibia whistles, 2 bobcat femur whistles, 1 strigil, 1 bone tube, 1 Contracting-stemmed point, hematite	AD 500–1250
15	18 Tiny saucer beads, J2aIV Abalone ring, asphaltum plug**	600 BC–AD 700
20	Contracting Stemmed projectile point	1000 BC–AD 1250
21	Coso obsidian biface: hydration=4.1 microns, 3 Spire-lopped beads, hematite.	600 BC–AD 1000
Group II	4 Double Side-notched points, 3 talc schist disks, Coso obsidian biface: hydration=5.2 microns***	AD 1000–1200

*Abrams (1968b) reports 7, but only 5 were relocated in 1989. **Conflicting documentation suggests that these specimens could have been associated with burial 14.
***Grave association suspect.

Table 11.4 Summary of Little Pico Creek culture history

	Dating	*Site areas*	*Interments*	*Obs. hydr.span**	*Projectile points*	*Shell artifacts*	*Ground stone*	*Bone tools*
Little Pico I	3500 to 600 BC	Southern Southwestern	None	4.4–6.1	Contracting-stemmed Square-stemmed Long-stemmed** Large Side-notched	A1b, A1c, A2, B2b, B2c, B3a, B3c, L**	Bowl mortars, Pestles, Handstones, Milling slabs Grooved net weights, Pitted stones Talc schist Pendants	Awl Fish gorges** Pin Antler tine
Little Pico II	600 BC to AD 1000	Northern	3, 15, 20, 21	2.0–4.8	Contracting-stemmed Square-stemmed Long-stemmed Concave Base-stemmed	A2,A5***, G1, G2 G6, J2bI, J2bII, J2aIV	Bowl mortars Pestles Handstones Milling slabs Grooved net weights Pitted stones Talc schist Pendants	Awls Strigils Spatulas Needles Elk tibia whistles Bobcat femur whistles Pins Fish gorge
	AD 1000 1250	Northern	7, 12, 13 Group II	–	Contracting-stemmed Double Side-notched	A1a, B2a, B2b, B3a, G6, K1 H2aIII F7		
	AD 1250 to 1500	–	–	–	–	O.1a		
	AD 1500 to 1800	–	–	–	Small Concave Base	E3a, K/E		

* Casa Diablo and possibly Coso obsidian. **Presence inferred. *** Early Middle circa 600 BC.

Note: A1 = *Olivella* Spire-lopped; A2 = *Olivella* Oblique Spire-lopped; B2 = *Olivella* End-ground; B3 = *Olivella* Barrel; G1 = *Olivella* Tiny Saucer; G2 = *Olivella* Normal Saucer; G6 = *Olivella* Irregular saucer; K1 = *Olivella* Cupped; F7 = Spire-lopped *Littorina*; J2bI = Artificial shell ring with incised edges *Haliotis rufescen*; J2bII; Artificial shell ring with incised edges *Haliotis* sp.; J2aIV = Artificial shell ring ; H2aIII = Flat-ended shell ring; K/E = *Olivella* Cupped/Lipped.

central coast. Proportional frequencies, however, suggest more emphasis on the mortar and pestle (table 11.2). Coterminous use of these implements at this time depth is also indicated at CA-SBA-54, and nearby CA-SLO-267 (Bouey and Basgall 1991); however, exclusive preference for mortar and pestle is suggested at CA-MNT-282 (Pohorecky 1976:43–45) and CA-MNT-229 (Dietz et al. 1988). Findings from Middle/Late transition contexts in the upper Carmel Valley (Breschini and Haversat 1992) show a high frequency of handstones, suggesting that increased use of mortars and pestles through time may not have been a universal pattern.

The type of mortar representative of this phase is cobble derived and globular in shape, with elliptical-to-round exterior conformation, with a minimum of exterior finishing.

Pestles include both shaped and unshaped variants as do handstones.

Grooved net weights also make up a significant proportion of the Middle period assemblage, being recovered from both CA-SLO-175 and CA-SLO-1259. Stone balls, of unknown function, occur as represented by two examples from CA-SLO-1259. The pitted stone also occurs during the Middle period.

Stone ornaments. The small talc schist pendant recovered from CA-SLO-1259 indicates stylistic continuity in this medium from Early through Middle period.

Shell fishhooks. Shell fishhooks constitute an apparently minor portion of the Middle period assemblage at this location, although they occur in greater frequencies at other sites during this time. Their low frequency at Little Pico Creek is only partially a by-product of the relatively small screened excavation sample.

Mortuary lots. Five burials can be confidently assigned to the Middle period, based upon associated shell beads and ornaments, and projectile points. Two of these (burials 5 and 14) appear to date to the beginning of the Middle period circa 600 BC (table 11.3). Four (burials 3, 15, 20, and 21) are assigned to the Middle period in general.

Shell beads. Shell beads representing the Middle period are low in number at Little Pico Creek. Consistent with the Middle period is a single *Olivella* saucer (G2), Oblique Spire-lopped *Olivella* (A2), and Irregular saucers (G6). Other types occur during this phase but are not restricted to the Middle period (table 11.4).

Middle period grave lots yielded a diverse array of bone and shell artifacts that contribute substantially to the assemblage representing this period at Little Pico Creek. Important additions to the represented shell bead types include *Olivella* Spire-lopped (A1), Small Oblique Spire-lopped (A2a), Medium End-ground (B2b), Small barrel (B3a), Medium barrel (B3b), Tiny saucers (G1), Symmetrical Irregular saucer (G6a), Asymmetrical Irregular saucer (G6b), Oval Irregular saucer (G6c), *Haliotis* disk ornament, perforated disk, ring with incised edges, *Megathura* Plain and Flat-ended rings (table 11.3).

Bone tools. The bone tool assemblage has been made larger by the addition of grave goods. Bone artifacts that can be assigned to the Middle period, both on the basis of grave association and provenience within the northern site area include awls, strigils, spatulas, elk tibia and bobcat femur whistles with asphaltum and abalone plugs, needles, pins, a gorge hook, and a single antler tine. Informal types represented within these functional classes appear stylistically consistent with Middle period bone tool assemblages from adjacent areas, particularly the Santa Barbara Channel and CA-MNT-229.

The artifact inventory that can be associated with Middle period occupation at Little Pico Creek is broadly similar with contemporaneous assemblages reported from the rest of the central coast. The appearance of an increased proportion of stylized implements in comparison with the Early period artifact inventory must be considered largely illusionary, being a byproduct of the lack of Early period burials. Many of the artifact types associated with the Middle period occupation demonstrate continuity from the Early period, although bead types certainly change, and shell fishhooks appear for the first time.

Middle/Late Transition (AD 1000–1250)

Occupation dating to what is herein referred to as the Middle/Late Transition can only be partially isolated at CA-SLO-175 based on burials 7, 12, 13, and group burial II. Because of the similarity in body position, group burial I may also date to this time. Perhaps the most diagnostic trait of this time range is the co-occurrence of G6 *Olivella* saucers and K1 *Olivella* cupped beads, as is evident among the burial 7 grave lot. A Double Side-notched point also occurred in this lot, providing some definition of the dating of that type. Additional items occurring among Middle/Late Transition grave lots at CA-SLO-175 are Contracting-stemmed points, Spire-lopped (A1a), End-ground (B2a, B2b), and Barrel (B3a) beads.

Recently acquired data from the Big Sur coast (T. Jones and Haney 1992; T. Jones 1993) suggest that the Middle/Late Transition is generally marked by the persistence of earlier artifact types, including Central Coast Stemmed series projectile points, bowl mortars, handstones, milling slabs, and B2 and G2 *Olivella* beads. The Little Pico Creek findings conform with this pattern, although the sudden appearance of Double Side-notched points stands in contrast.

Late period AD 1250–1500

Evidence for occupation circa AD 1250–1500 is almost wholly lacking at Little Pico Creek, suggesting a hiatus in site use. One drilled whole *Olivella baetica*, recovered during the Caltrans excavation, also suggests some minimal site usage during the Late period. The paucity of arrow points recovered from this location (7 of 130 points from CA-SLO-175 and CA-SLO-1259 combined) is generally suggestive of a minimum of post AD 1250 occupation.

Protohistoric period AD 1500–1800

Use of the Little Pico Creek sites appears to have been slightly more substantive during the Protohistoric period, although this interpretation is dependent upon exclusive temporal assignment of some artifacts and features to the

Protohistoric period, when, in point of fact, they could represent either Late Prehistoric or Protohistoric site use. In general, however, the combined inventory of objects representing post-AD 1250 occupation is considerably reduced from that of the Middle period, and there can be no doubt that use of this location after AD 1250 was significantly less intensive than it had been earlier.

The bedrock mortar outcrop probably equates with this period of site use, although it could have been used earlier. Artifacts include a single Large Appliqué Spire-lopped *Olivella* (A5), a Full Large-lipped *Olivella* (E3a), and a Cupped/Lipped *Olivella* (K/E). Two Small Concave Base points also mark this period, as well as the single hopper mortar. The E3a type is a reliable historic marker (Bennyhoff and Hughes 1987:129).

Summary

Materials recovered from the Little Pico Creek sites illuminate two local phases: Little Pico Creek I representing the Early period (3500–600 BC) at CA-SLO-175 only and Little Pico Creek II representing the Middle period (600 BC–AD 1000; table 11.4). Substantial occupation also occurred during the Middle/Late Transition (AD 1000–1250), but neither CA-SLO-175 nor CA-SLO-1259 experienced much use after AD 1250. There is some evidence for an occupational hiatus circa AD 1250–1500. A great deal of cultural/typological continuity is evident between the Early and Middle phases at Little Pico Creek; examples of the Central Coast Stemmed projectile point series occur during both phases. Large Side-notched points occur only during the Early period. Examples of class L *Olivella* rectangular beads were not found at Little Pico Creek but do occur as constituents of Early period assemblages elsewhere on the central coast (that is, CA-MNT-391, CA-MNT-1228, CA-SLO-165, and CA-SLO-877). A variety of bone and shell artifacts, some exhibiting a certain degree of stylistic elaboration occur as part of the Little Pico Creek II, along with the initial appearance of *Olivella* saucers. Both the mortar and pestle, and handstone and slab were used during both periods, although the former predominates during the more recent period. Fishing implements, including shell fishhooks and net weights, are noticeably more abundant during the Middle period, the former making their initial appearance at the onset of the Middle period. Even the Middle/Late Transition shows retention of many earlier types of flaked and ground stone tools.

Cultural continuity is not limited to the temporal dimension. Assemblages identified at Little Pico Creek, while exhibiting some local idiosyncrasies, are broadly similar to those reported from contemporaneous sites occurring some distance to the north and south. CA-SBA-53, situated along the Santa Barbara Channel, yielded examples of virtually all artifact types ascribed to Little Pico Creek I. Equally impressive are similarities between CA-SLO-175 and CA-MNT-1228, on the Big Sur coast, which yielded Central Coast Stemmed series points, mortars and pestles, handstones, milling slabs, and class L *Olivella* beads. Similarities are also evident during the Early period between the Monterey Bay area and Little Pico Creek, as indicated by the assemblage recovered from CA-MNT-391 (Cartier 1993a), which is virtually identical to that recovered from CA-MNT-1228.

Continuity across space is equally apparent during the Middle period on the central coast. Components equivalent to Little Pico Creek II have been identified at CA-MNT-282, the Willow Creek site, CA-MNT-229; the Vierra Site at Elkhorn Slough; CA-SLO-2 at Diablo Canyon; and CA-SBA-54, the Corona Del Mar site in the Santa Barbara Channel. An assemblage comparable to that associated with the Middle/Late Transition at Little Pico Creek has been identified at CA-MNT-1233, the Highland site on the Big Sur coast (T. Jones and Haney 1992).

Cultural continuity is evident spatially between the Santa Barbara Channel and the Monterey Bay area and temporally from 3500 BC to AD 1250. Recognition of this regional cultural uniformity validates observations made by Pilling (1955) and Baldwin (1971) on the basis of surface data and supports some of Gerow with Force (1968) suggesting strong cultural ties between the University Village site on the southwestern shore of San Francisco Bay and sites of the Santa Barbara Channel.

In contrast with Early and Middle periods, major changes begin during the Middle/Late Transition, as indicated by group burials I and II and the appearance of the unusual Double Side-notched projectile points, which have not yet been documented anywhere other than northern San Luis Obispo County. An occupational hiatus seems to have occurred at Little Pico Creek circa AD 1250–1500, although actual dating of this event is not secure. Sporadic use took place between AD 1500 and 1800.

FLAKED STONE TECHNOLOGY

When conjoined with experimental working of local stone, the Little Pico Creek flaked stone collections provide some insights into a relatively nonspecialized technology associated with the reduction of locally occurring Monterey and Franciscan chert, primarily into bifaces. The exact source of the former has not been identified, but it is assumed to occur within the area encompassed by the Monterey Formation several kilometers inland from the mouth of Little Pico Creek. Dominating all of the Little Pico Creek archaeological components, Monterey chert apparently arrived on site in the form of stage 1 bifaces that were heated and reduced into tools. This material seems to be superior to the local Franciscan chert (compare Moore 1989) in its working qualities which may explain its high frequency in the Little Pico biface assemblage. Both cherts were used for bifacial, flake,

and core tools, but Franciscan chert was more common among the core and flake tools.

Franciscan stone occurs immediately adjacent to Little Pico Creek in the form of small, flat cobbles and larger slabs. The preference for Monterey chert, despite the nearness of this source, suggests that Franciscan chert was not a valuable trade commodity in northern San Luis Obispo County. This situation contrasts with the Santa Ynez Valley in Santa Barbara County, where Moore (1989) describes the Franciscan stone as very high quality. Whether superior quality imbued the material with significant exchange value in that locality as further claimed by Moore is another issue. Debitage and cores from CA-SLO-175 and particularly CA-SLO-1259 reflect the reduction of these items with the objective of obtaining large flake blanks suitable for further reduction into biface blanks (that is, stage 1 bifaces). Large flakes obtained by either direct freehand percussion of slabs or bipolar reduction of cobbles were probably heated to improve their workability. After thermal alteration, bipolar flake blanks, bipolar cores, or percussion flake blanks were reduced into stage 1 bifaces and eventually worked further into projectile points and other tools. Bipolar reduction, the most efficient technique for reducing cobbles, is minimally represented among the CA-SLO-175 and CA-SLO-1259 cores and debitage, but this low frequency may reflect the nondiagnostic character of much of the waste created by this technique. Most of what are classified as cores among the Little Pico Creek collections are really waste products—large angular shatter (that is, "chunks") cobble and slab fragments—derived from assaying and from bipolar and direct freehand percussion of the naturally occurring chert pieces. The high frequency of stone residues, particularly at CA-SLO-1259, seems to reflect designation of a use area specifically for stoneworking.

COMPONENT FUNCTION AND SETTLEMENT ORGANIZATION

Assemblage diversity and formality within classes and between classes have proven useful as measures of the character and intensity in patterns of site use. Further, with the control of temporal parameters, there is the possibility of examining change in those patterns over time. Nowhere, however, are the limitations at Little Pico of sample size for the 1989 excavation and of the bias toward large, formal artifacts during the 1965–66 fieldwork more evident than in the examination of those categories. Because of the absence of control over the recovery of small and informal artifacts and the exclusion of certain classes of ground-stone implements in the 1965–66 investigations at CA-SLO-175, the following interpretations are restricted to the results of the Caltrans excavation, although some intuitive judgments are forthcoming concerning the Abrams collection.

In contrasting the flaked stone tools and associated debitage of CA-SLO-175 and CA-SLO-1259, several points of diversity and similarity are evident (table 11.5). In a profile of biface stages, which includes both Monterey and Franciscan chert, a parallel pattern is evident at both sites. The relatively high percent of late stage bifaces, particularly in comparison to those of the early stage, indicates that a paramount activity at both loci was the finishing of bifaces, which had been brought in as early stage forms, into complete and finished tools. This pattern is echoed in the proportion of debitage reflecting reduction stages (table 11.5). Such a pattern contrasts with conclusions for CA-SLO-267 (Bouey and Basgall 1991), where it is hypothesized that a lower ratio of pressure debris argued for transport of unfinished tools, specifically those of Monterey chert, to other locations.

The ratio of debitage to tools between CA-SLO-175 and CA-SLO-1259 (table 11.5) contrasts strongly, although this undoubtedly is a function of differential recovery rates between screen sizes and between wet and dry screening techniques. In contrasting the 3-mm wet-screen samples from both sites (debitage:cubic meter), closer comparability is noted. At CA-SLO-1259, chert debitage is still 23 percent greater than at CA-SLO-175, which probably indicates a higher proportion of stoneworking at the latter. Despite the profusion of flaking debris, the flake:tool ratios from both sites suggests that some bifaces were transported elsewhere for final reduction. The greater flake:tool ratio apparent at CA-SLO-1259 suggests less such transport during the Middle period, perhaps as a reflection of more extended use of this location through the year.

The diversity of all tool types—both flaked stone and ground stone—is equally apparent at both sites and indicates that a wide range of activity was pursued within the time frames represented. Some artifacts' presence must be inferred from the occurrence of others (that is, milling stones from handstones), but classes of ground-stone artifacts are equally represented, as is the flaked stone assemblage:

CA-SLO-175	*CA-SLO-1259*
handstone/[milling stone]	handstone/milling stone
mortar/pestle	[mortar]/pestle
net weights	net weights
pitted stone	pitted stone
battered stone	battered stone

[ ] = inferred presence

Activities deduced from the above categories relate to varying subsistence pursuits and probably to the fabrication of stone tools in the case of battered stone. In this case, both the larger undifferentiated pounding stones and the small hammerstone form are present. Ornamentation is represented by single talc schist artifacts at both sites, but the presence of talc schist detritus elsewhere at CA-SLO-175 leads to the inference that these pieces were manufactured on site. Bone tools are absent from CA-SLO-1259, prob-

Table 11.5 Flaked stone percentages and ratios from CA-SLO-175 and CA-SLO-1259

	CA-SLO-175	*CA-SLO-1259*
Early (stage 1–3) bifaces	66.7%	59.4%
Late (stage 4) bifaces	33.3	40.6
Early (stage 1–3) debitage	24.0	29.7
Late (stage 4 and 5) debitage	76.0	70.3
Informal:formal artifacts (excluding stage 4 bifaces)	4.6:1	2.2:1
Informal:formal artifacts (including bifaces)	1.3:1	1:1.3
Flake:tool	53.2:1	223.5:1
Debitage:cubic meter	3831:1	4979:1

ably a function of the emphasis on stoneworking at that locus, and are only minimally present at CA-SLO-175.

While the remainder of the area of CA-SLO-175 investigated during the 1965–66 fieldwork is represented primarily by the more formal artifact forms, there can be small doubt that even in this skewed distribution, evidence proclaims a substantial investment in terms of the production and maintenance of those formal pieces. The mortars alone speak to a less-than-mobile lifestyle for their owners. The amount and character of the reworking of projectile points shows that it was a mini-industry in itself.

The conclusions that can be drawn from the examination of variability in formality and diversity between CA-SLO-175 and CA-SLO-1259 must be considered tentative because of the small sample marking Little Pico Creek I. Nonetheless, some inferences can be drawn. Both site loci show a diversity of artifact classes implying a wide range of household and manufacturing activities. The emphasis at CA-SLO-1259 on stoneworking suggests logistical differentiation of intrasite work space during Little Pico Creek II. Little Pico Creek served as a combined residential base/workshop quarry during both the Early and Middle periods, but more extensive Middle period occupation fostered a more spatially structured settlement, with CA-SLO-175 serving as a residential area and CA-SLO-259 as a locus for stoneworking.

The Little Pico Creek I occupation was contemporary with nearby sites CA-177, -179, and -697, all of which are located in settings similar to Little Pico Creek. Assemblages also show general similarities, suggesting residential site use. All of these deposits could not have been used on a permanent basis but were probably part of a system of fluid residential mobility, with scheduling and direction of movements and group size dictated by periodic fluctuations in resource availability. Group movements may not have been undertaken frequently, but single sites were not used continuously for years on end. The same system was probably employed during Little Pico Creek II , when local sites CA-SLO-178, -267, and -383 were also occupied.

SUBSISTENCE

Faunal remains obtained from the Little Pico Creek sites are somewhat limited and allow for only guarded statements concerning subsistence practices. Subsistence remains were most substantial from the 1989 Caltrans excavation at CA-SLO-175, hence more conclusive statements can be made for the Early period.

Early period

Based on an edible flesh index, the reconstructed diet is dominated by marine taxa (89.3%). Fish were by far the most important resource (80.8%), followed by terrestrial mammals (9.5%) and shellfish (7.0%). Among the terrestrial game, black-tailed deer were the heaviest dietary contributor (46.8%). This reconstruction is most concordant with the findings from CA-SLO-165 (table 11.6), and nearby CA-SLO-179, where Waugh (1992) reported an abundance of fish remains from an Early period context. CA-MNT-108, an Early period site on the Monterey peninsula, also yielded a high frequency of fish remains (Breschini and Haversat 1989). CA-MNT-73, at the mouth of the Big Sur River, produced a similar dietary profile (table 11.6). Findings from Little Pico Creek contrast with other contemporaneous components at other central coast locations including Vandenberg, where (CA-SBA-210) shellfish were thought to represent around 90 percent of the dietary protein and marine mammals dominated slightly over terrestrial mammals (table 11.6). A lesser contribution by shellfish was evident at nearby CA-SBA-670 (Glassow 1992:121). A contemporaneous site component in the Santa Barbara Channel at CA-SBA-1 (Peterson 1984) purportedly demonstrates a heavy maritime focus, dominated by marine mammals and shellfish. In some instances this variability may be a reflection of differential site use (Glassow 1990:13–21) or localized variation in habitat characteristics and species availability, but differential sampling strategies also are a major contributor to variance in these results. This is particularly true with respect to assessments of the relative dietary importance of fish, in that use of small mesh sizes and/or water screening generally increases fish-bone yields considerably. Differences in screen size are probably the single most important factor contributing to the variability between the Vandenberg sites and Little Pico Creek. Fish remains are also underrepresented at CA-MNT-170 and CA-MNT-391, which were primarily excavated with 6-mm (1/4 inch) mesh.

On the other hand, sampling with 1.5-mm mesh at CA-

Table 11.6 Dietary reconstructions from Early period central coast sites (by %)

Site	*Marine*	*Terrestrial mammal*	*Marine mammal*	*Shellfish*	*Fish*
CA-MNT-73	87.6	12.1	12.7	0.6	74.3
CA-MNT-170*	89.6	10.4	33.8	54.7	1.1
CA-MNT-1228	41.4	58.5	24.4	16.8	0.6
CA-SBA-210	93.3	6.7**	0.0	90.9	2.4
CA-SBA-670	99.6	0.0	45.8	53.8	0.4
CA-SLO-165	98.9	1.1	16.3	35.7	46.9
CA-SLO-175	89.4	10.6	2.8	7.0	79.5

* Multicomponent; occupation continued to circa AD 1000.

**Percentage actually reflects confined terrestrial and marine mammals.

Note: Data from Jones and Haney (1992), Dietz (1991), Glassow (1992).

Table 11.7 Shell:bone ratios from important central coast site components

	Shell (kg):mammal bone (NISP)	*Fish Bone (NISP):shell (kg)*	*Fish (NISP):mammal (NISP)*
MILLING-STONE PERIOD			
CA-MNT-1232/H	105:1	1:28	3.7:1
EARLY PERIOD			
CA-MNT-1232/H	32:1	1:29	1.1:1
CA-MNT-1228	16:1	1:134	0.2:1
CA-MNT-73	2:1	1:0.4	3.1:1
CA-SLO-175	32:1	1:0.1	355:1
CA-MNT-108	–	–	11.6:1
CA-SLO-179	4.7:1	1:0.04	102:1
MIDDLE PERIOD			
CA-SLO-175	–	1:0.002	–
MIDDLE/LATE TRANSITION			
CA-MNT-1233	4.4:1	1:0.08	44.8:1
CA-SLO-179	0.6:1	1:0.01	64.4:1

MNT-1228, an Early period site on the Big Sur coast, still produced very few fish remains, and the reconstructed diet is dominated by terrestrial mammals (table 11.6).

Bone and shell ratios show some similarities between CA-SLO-175 and other Early period central coast sites. A modest ratio of shell to mammal bone (32:1) is similar to values represented at CA-MNT-1228 and CA-MNT-1232/H. These figures show a decrease from higher levels associated with the Milling-stone period (table 11.7). Fish:shell ratios exhibit a great deal of variability during the Early period, although CA-SLO-175 is similar to CA-SLO-179.

Middle period

With the important exception of a bulk column sample collected from the northern site area, Middle period faunal remains are available only from CA-SLO-1259, and these are depauperate. The few large vertebrate remains suggest a continued terrestrial focus in game pursuit. Shellfish remains were extremely sparse at this location. The most significant index of dietary change is the increased proportion of the mortar and pestle over the milling-slab/handstone technology, which corresponds with patterns evident elsewhere along the central coast. The high frequency of large bowl mortars at CA-SLO-175 suggests that this locality served as a central processing center for nut crops.

More important is the increased frequency of fish remains evident in the bulk column sample obtained from the Middle period component identified in the northern site area. Not only do 1.5 mm (1⁄16 inch) mesh samples show a high incidence of these remains, but also the represented taxa are significant in that the dominant taxa—anchovies, herring, and smelt—are so small that they could only be captured using fine-mesh nets or baskets. Their abundance among the Middle period deposits corresponds with the high frequency of net weights in this component. Together, these data indicate an intensification in fishing during the Middle period at CA-SLO-175, which is consistent with patterns identified elsewhere along the central coast, particularly at CA-MNT-228 (T. L. Jones et al. 1992) and CA-SBA-143 (Colten 1987:69). At least one site from Vandenberg Air Force Base, CA-SBA-663, shows a similar increase in the proportion of piscine remains during the Middle period (table 11.8).

At least one of the fish represented by large numbers in the Middle period component has seasonal implications. The northern anchovy (*Engraulis mordax*) engages in seasonal migrations, moving offshore in the fall and winter and returning inshore during the spring (Baxter 1967:110). At the very least, site occupation must have extended from summer through fall, assuming that the profusion of mortars and

Table 11.8. Dietary reconstructions from selected Middle and Middle/Late Transition components (by %)

	Marine	Terrestrial mammal	Marine mammal	Shellfish	Fish
MIDDLE PERIOD					
CA-MNT-228	79.9	11.9	12.6	3.9	71.4
CA-SBA-210	91.2	6.4	0.0	88.8	2.4
CA-SBA-539	99.9	0.0	23.4	75.1	1.4
CA-SBA-551	93.9	6.0	0.0	93.2	0.7
CA-SBA-663	94.2	5.8	0.0	80.0	14.2
MIDDLE/LATE TRANSITION					
CA-MNT-1233	65.1	35.3	11.8	5.2	59.5

Data from T. Jones and Haney (1992), T. Jones et al. (1992), Glassow (1992:121).

pestles in the Middle period component correlates at least partially with acorn use. The possibility exists that CA-SLO-175 was occupied for an extended period of the year. Year-round occupation has also been argued for CA-MNT-1233, occupied during the Middle/Late Transition on the Big Sur coast. On the Santa Barbara coast, Colten (1987:71) found evidence at CA-SBA-143 for occupation during the summer at a minimum. From the Diablo Canyon area, Breschini and Haversat (1988:79) reported evidence for occupation from late winter through early summer (March-June). A Middle period component at CA-SLO-165 near Morro Bay showed evidence for occupation during all but midwinter (T. Jones et al. 1994:133).

SOCIAL STRUCTURE

Determinants of social structure and the reflection of that structure within an archaeological context have posed vexing problems for those studying California prehistory. With the virtual absence of architectural remains and well-documented hierarchies of sites within delimited regions, California archaeologists have relied primarily on mortuary evidence, particularly in cemetery contexts, to base or bolster hypotheses for the existence of either stratified or egalitarian social structure or the dominance of political or economic spheres. The central coastal area from northern San Luis Obispo County south through Santa Barbara County, including the Channel Islands, has provided much data that have been interpreted in this vein (C. D. King 1982, 1990; L. King 1982; T. King 1970; Martz 1984; Stickel 1968; Tainter 1971; yet, see Arnold 1987, 1991, 1992a for conclusions based on nonmortuary contexts). The basic premise in this type of analysis is that individuals are treated in death consonant with their position in life, and that, consequently, burial within a structured area (that is, a cemetery) should reflect that position and associated networks. A major focus within these investigations has been the identification of status, which has been variably defined (Fried 1967; Service 1962) and has been generally interpreted by archaeologists as a measure of ranked vs. egalitarian social structure.

For the region occupied by the Chumash and their predecessors, archaeologists have offered differing interpretations of mortuary evidence in support of the existence and inception of the ranked society that greeted the Spanish at contact. The Medea Creek cemetery (L. King 1982) provided evidence of internal and nonrandom variability in terms of bead distributions and certain other classes of grave goods suggesting variably ranked kin groups. Following Saxe (1971) and others, ascription by birth and social identity was hypothesized on the basis of the quantity and character of goods buried with young children, particularly in contrast to adults. Furthermore, wealthy chiefly lineages, identified as persisting in dedicated areas of the Medea Creek cemetery for several hundred years, controlled economic networks and exchange. C. D. King (1982, 1990) alternatively drew upon mortuary data to postulate the development and eventual supremacy of a secular economic system in Chumash society. C. D. King, moreover, used those data to hypothesize "organizational change to a nonegalitarian society" near the end of the Early period (circa 600 BC) and a marked decrease in "ceremonial paraphernalia" began during the Early period, signifying a decrease in personal ownership of that paraphernalia and an increase in the association "between artifacts and institutions" (C. D. King 1990:xxi–xxiii). Martz (1984), on the other hand, interpreted the decrease in that form of grave goods as demonstrating a decline in the importance of religious leaders and the ascendance of secular political elite. King (1990:xxiii) chided Martz for not taking into consideration the ethnographic accounts that point to the importance of ritual artifacts in maintaining religious institutions, with "all types of ritual artifacts found in archaeological contexts of all time periods." In this instance, at least, C. D. King argues that "frequencies do not always reflect changes in the importance of objects in the society" (1990:xxiii). An alternative explanation for deposition of ritual accoutrements is found elsewhere in southern California ethnography (Strong 1972); as more defined and specific roles in ritual were developed, all necessary and important paraphernalia of a religious specialist were passed on to a designated successor and not included with burial goods of the deceased.

At any rate, C. D. King (1982, 1990) has argued that a ranked social order is indicated for peoples of the Channel

coast and adjoining regions commencing at the end of the Early period. Data from two burial populations purported to deal with measures indicating ranked social order are of some interest in the consideration of the population from Little Pico, both in terms of temporal considerations and social structure. Near Carpinteria, interments at the Rincon Point site dated to between 3500 and 3200 radiocarbon years BP, or at the terminus of King's Ez period, were hypothesized to represent an egalitarian society (Stickel 1968). Derived from criteria for certain discrete mortuary practices proposed by Binford, this conclusion was based on the predominance of technological/functional grave goods; the lack of exclusivity in grave goods; the absence of inherited status symbols indicating ascription; and the destruction, as opposed to preservation, of grave goods as an indication of the primacy of the individual role as opposed to that of the group (Stickel 1968:217). Following Stickel's criteria, Tainter (1971) concluded that social stratification was evident in the burial population excavated from a dedicated (that is, nonmidden area) cemetery at CA-SLO-406, which on the basis of a single radiocarbon sample was dated to 1460 years BP. The latter conclusions, however, were derived from data from a limited sample in which grave goods determined to be sociotechnic predominantly were associated with females and children and grave goods with males were mainly technological or functional items. The data are sparse; it could be equally possible to construct a model for matrilineality as for social stratification or status. In the absence of a substantial sample from well-documented contexts and adequate temporal control, such as at Medea Creek, conclusions should be tempered with caution.

In assessing the burials and burial context at CA-SLO-175 as measure of social structure, clearly the differential excavation strategies employed and the sample itself challenge any decision that a discrete cemetery existed at Little Pico. Unexcavated areas to the southwest of the mechanically excavated trench and those between the trench and the cutbank remained untested and constitute a substantial area in which burials might or might not have been located. Without a complete, controlled exposure of the site, it is clearly difficult to make an argument for clustering of burials in terms of age, sex, or positioning of interments. As discussed previously, one such cluster appears possible; however, the degree to which this cluster reflects status is inconclusive because of the incomplete knowledge of the surrounding area. While the single male (burial 14) in this group is accompanied by apparently singular grave goods—including a relatively substantial amount of beads and whistles that may be interpreted as indicating a ritual or ceremonial role, whistles and beads were not uncommon burial goods during a presumedly similar time period at CA-SLO-2 (Greenwood 1972). At that site, whistles were found in equal distribution with men, women, and children and occurred in 25 percent of the recorded burials. The restriction of such goods to one burial at Little Pico is provocative but inconclusive. Two females in this group were accompanied by distinctive bone implements; the one child burial was not associated with goods (that is, beads) that traditionally point to ascription, but with two pestles, which are considered technological. Clearly, however, typing grave goods as to ideotechnic and sociotechnic can only be provisional without the security of direct and secure ethnographic referents and a statistically meaningful sample. In this way, pins, needles, or strigils may have little to do with status and more to do with function or simple ornamentation. Certainly, functional or technological implements are included with the majority of the burials, although their meaning may be obscure or at least complex, as with the positioning of projectile points in group burial II.

When interpreting the burial patterning at CA-SLO-175, temporal control must be considered. At least the second group burial (burials 37–41), and possibly the first, and another single child burial (burial 12) have been determined to relate to a later time period than is represented by the majority of interments. Consequently, other interments may not be coeval. So while there appears to be some contradictory evidence in respect to so-called status burials, the pattern may represent a continuum representing distinctions based on age, sex, and achievement, and possibly role specialization, as in the instance of burial 14. Similar conclusions were derived for the burial population at CA-MNT-391, an Early period site in Monterey (Ortman in Cartier 1993a).

At Little Pico the possibility of defining a formalized, dedicated cemetery further poses some problem. A distinct difference exists between cemeteries that were located at a definable distance from the midden, such as Medea Creek, and burials that were interred directly into the midden, such as at the Rincon site and Little Pico. The former is more securely identified with later prehistoric and protohistoric phases, although single burials for those time periods have been recorded in house floors (see Clemmer 1962). For burials within dedicated cemeteries that are internally defined and lots that are differentiated statistically on the basis of grave goods, burial orientation, and grouping, some conclusions about ranking can be derived. For a less formally dedicated burial area, such identification is less probable or less secure.

With some exception (compare Arnold 1987, 1991, 1992a), the majority of hypotheses designed to treat the evolution or development of social or organizational complexity for the central coastal populations in the periods preceding contact have been built upon mortuary data. A renewed effort to incorporate alternative data and consequent hy-

potheses is necessary to afford more robust models.

HUMAN OSTEOLOGY

Mortuary data from Little Pico do not point to a highly structured social regime with differential access to resources, a quality that traditionally has been considered a hallmark of nonegalitarian social groups for the more southerly coastal region during the Middle period (C. D. King 1990, although compare Arnold 1992a and Martz 1984). Osteological evidence, however, does indicate that a shift in terms of settlement structure was underway during the Middle and Middle-Late Transition at Little Pico—a shift from lifeways that characterized an earlier time frame elsewhere on the central coast.

The Early period population to the north at CA-MNT-391, presumably a group with a more mobile hunting-gathering strategy and access to a wide range of resources, provides the profile of a relatively healthy group. In contrast, a generally poorer health profile and reduced longevity are evident for the Little Pico population, which is assumed to represent a Middle period occupation. A similar decline in health is noted during Middle and Late-Middle periods for groups from the Santa Barbara Channel Islands. Here, the frequency of infection has been recorded (Lambert 1993), as indicated by a substantial evidence of periosteal lesions in skeletal remains. This apparent reflection of poor health is proposed to suggest the introduction or increased susceptibility to new pathogens. On the Channel Islands this seeming increase in disease vectors is contrasted with the evidence of greater health during the Early period in that region and is tentatively correlated with a number of possible causal factors including a shift to a fish-based economy or the response to possible climatic changes (Lambert 1993: 518).

At Little Pico, significant climatic change may have impacted traditional subsistence strategies during the Middle/Late Transition, but the absence of local paleoenvironmental data and inadequate chronological resolution for the dietary residues prohibits a definitive conclusion. Similar to subsistence data for the Channel Islands at CA-SLO-175 (and for CA-SLO-179 at Pico Creek), data do show that fishing was pursued throughout both phases and intensified during the Middle and Middle-Late Transition. Procurement of smaller prey, the sardine and anchovy, demanded more labor-intensive strategies. Consequently, it is proposed that dietary stress in this case is not linked with an iron-deficient menu but with the increased transmittal of pathogens among a growing population in a semisedentary settlement pose. Corroborative data for this mortality profile are clear in the increased morbundity among females of a child-bearing age.

EXCHANGE

Hallmarks of trade and exchange networks for the archaeology of the central coast north of Point Conception are obsidian and shell beads. Farther south, other materials such as steatite, Monterey chert, Franciscan chert, and chert microblades appear as items of exchange. In the case of the first three, sources may have been more locally available than has been apparent. Clearly, many items have not survived in the archaeological record, and their recognition would have gone far to flesh out the micro- and macro-networks that characterized the ethnohistoric practices that at contact distinguished the Chumash as sophisticated economic entrepreneurs (C. D. King 1976).

For the area north of Point Conception, evidence for those practices is less striking and is mainly and variably preserved in obsidian and shell beads. Obsidian evidently arrived in finished bifacial forms that were refurbished and reworked, with the Casa Diablo source predominating for that material (see chapter 5). Obsidian was not associated with the Early occupation at Little Pico; several authors (Cartier 1993a:235; Bouey and Basgall 1991:225) have suggested that obsidian exchange did not extend to the central coast with any meaningful level of intensity until the Middle period. In conflict with this proposal is the recovery of abundant obsidian in Early period contexts from elsewhere on the central coast, including CA-MNT-73 (T. Jones 1994), CA-MNT-108 (Breschini and Haversat 1989), and CA-SLO-165 (T. Jones et al. 1994). Cumulative obsidian hydration data so far available from the central coast clearly indicate a major increase in the arrival of obsidian of between 5.0 and 6.0 microns into this region from the Napa, Coso, and Casa Diablo sources (fig. 11.1). We equate these readings with the beginning of the Early period circa 3500 BC (see table 11.1). The initial settlement of many sites along the central coast at this time (for example, CA-MNT-73, CA-MNT-108, CA-MNT-254/266, CA-MNT-391, CA-MNT-1228, and CA-SLO-179) was accomplished in concert with development of exchange networks. This increase in obsidian exchange appears to be one facet of a major shift toward a more intensified lifeway, as a result of population circumscription beginning at the Milling-stone/Early interface (T. Jones and Haney 1992:508). With direct resource access restricted in some areas by increased human population, exchange was apparently engaged in as a proxy to direct resource acquisition. The currently available regional obsidian hydration profile further indicates that obsidian exchange continued along these lines with increased frequency through the Middle period (fig. 11.1).

Many models of exchange in California posit a continuous linear increase in regularity and intensity through time (Fredrickson 1974; Chartkoff 1989), but obsidian movement to the central coast decreased dramatically during the Middle/Late transition and never returned to the formerly high levels. The apparent population hiatus evident at CA-SLO-175 after the Middle/Late transition corresponds with the decreased intensity of interregional obsidian exchange.

Evidence for manufacture of talc schist ornaments was

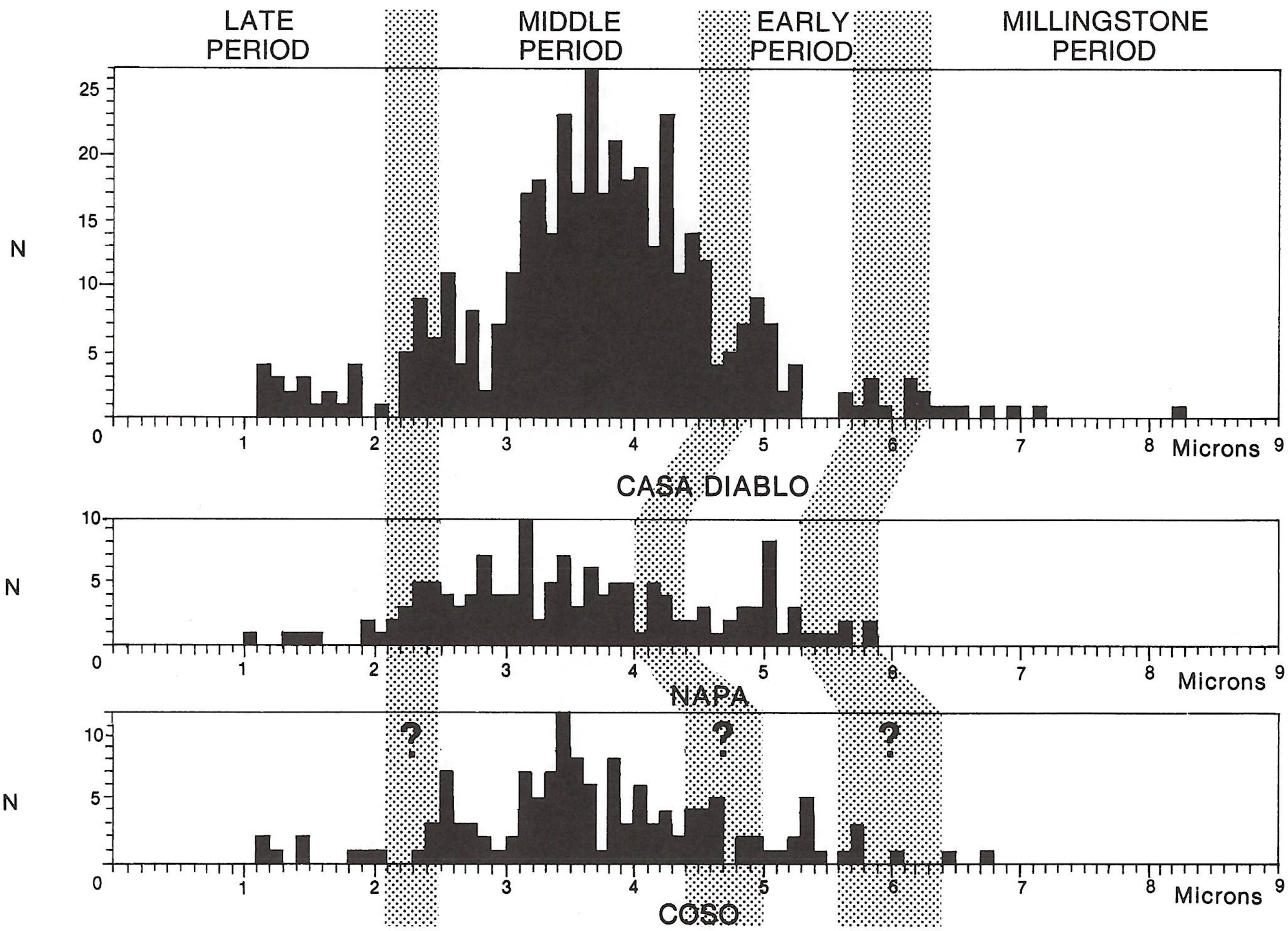


FIGURE 11.1 Cumulative obsidian hydration data from Monterey and San Luis Obispo counties

found at Little Pico. While temporal parameters are not clear, this industry has been firmly dated to 3500 BC at CA-MNT-1228 (T. Jones and Haney 1992:267) and is evident at a comparable time depth at CA-MNT-391 (Cartier 1993a) and CA-SBA-53 (Harrison and Harrison 1966). Shell materials are somewhat more complex. No evidence of shell bead manufacture was obtained from Little Pico Creek. Most of the Little Pico Creek bead assemblage can probably be associated with the Middle period component; however, the paucity of beads from the Early period is partially a reflection of the absence of burials from the Early period in the available excavation sample. Both the Early and Middle period beads arrived from a manufacturing center located elsewhere. Although it might commonly be assumed that these beads arrived from the Chumash area, directionality cannot be established, especially not for occupations preceding the ethnographic period by many thousands of years. Little Pico Creek is equidistant from the Santa Barbara Channel and Monterey Bay, and bead manufacturing loci have been identified at both locations for the Early and Middle periods (Bennyhoff and Hughes 1987:155). Indeed, there is no reason to assume that bead-making was highly specialized and that manufacturing loci were few and highly localized during these two periods. Production locations may have also been present in San Luis Obispo County.

In general, the deposition of shell with burials at Little Pico Creek and elsewhere along the central coast is nowhere as sumptuary as in the contexts of the Channel Islands or the adjacent mainland. In point of fact, the bead assemblages are considerably smaller in amount and diversity than recorded elsewhere in the immediate area (see Tainter 1971). Whether this is a function of excavation strategies or of functional or temporal considerations is not clear. In comparison to sites of the Santa Barbara Channel, a relatively limited amount of bead offerings with burials is apparent.

CONCLUSIONS

The chronology for the settlement at Little Pico indicates two major occupations: from 3500 to 600 BC and from 600 BC to AD 1250. The site was also witness to reduced use after AD 1250, with a possible hiatus in use circa AD 1250–1500 and renewed, but still ephemeral, occupation during the Protohistoric period from AD 1500 to contact.

Assemblage constituents have been reviewed in detail

above, from which it should be fairly apparent that meaningful cultural continuity is evident between Little Pico Creek I and Little Pico Creek II. The transition between these phases is characterized by a distinct trajectory of intensification. The Little Pico sites, while continuing to function as combined residential/quarry workshop localities, show evidence for more extended occupation and more structured task-specific differentiation, as evidenced by the discrete lithic-manufacturing area represented at CA-SLO-1259. Subsistence strategies depended upon the exploitation of diverse unspecialized resources, with an emphasis on fish and some use of nut crops. During the Middle period (represented by Little Pico Creek II) intensified fishing, including pursuit of extremely small taxa, is evident. Mortars and pestles became more dominant during Little Pico Creek II, indicating an increased use of labor-intensive vegetal foods including nut crops. This phase represents a large degree of relative stability and permanence probably throughout the annual cycle. The large number of similar sites along the central California coast, however, suggests that residences were moved periodically and were less intensively occupied than were Late and Historic period villages. A growing complexity of social structure is only hinted at in burial patterns and is by no means as evident as in later periods to the south.

A main focus of research in present-day hunter-gatherer studies for the general area has been the forager-collector dichotomy. Settlement patterns revealed at Little Pico do not fit these models; rather, a progressive intensification of economics and social interaction is apparent. People who were already relatively sedentary circa BC 3500 became increasingly so through time. Artifact diversity and the full range of lithic tool manufacturing with a particularly high proportion of late biface stage reduction speak to this condition. Some degree of impermanence is suggested by the high degree of lithic detritus indicating "tooling up" for moves to other residential bases or for hunting forays. A fairly intensive subsistence strategy was employed and residential bases were occupied for extended periods, but full sedentism was not achieved and residential mobility continued. The pattern and scheduling of residential movements, whether on a seasonal or yearly basis, remains unclear, but the diversity of the northern San Luis Obispo coast resource base suggests that it may not have been highly regularized or strictly scheduled. Residential movements were probably undertaken by groups of various size in response to periodic resource abundance and depletion. Some aggregation of people probably occurred along the shores of Morro Bay during the summer months to exploit a rich seasonal fishery. Smaller fishing encampments were probably occupied periodically at different locations on the open coast by smaller social groups.

Little Pico Creek, like many localities along the central coast shoreline, appears to have been less intensively inhabited after AD 1250. Those residues that do point to Late period occupation, both here and at other sites, suggest a shift away from the ever-increasing intensification associated with the Early and Middle periods. On the Big Sur coast and Monterey Bay, abandonment of coastal residences appears to reflect relocation to inland locations, as part of a decided shift to heavy reliance on the acorn as a stored commodity, in concert with a decreased emphasis on marine foods. Unlike the Santa Barbara area, where pelagic fish and other marine resources of the Channel provided opportunity for maritime intensification using increasingly sophisticated watercraft, the central coast resource base was more limited, with less prolific fisheries and no offshore islands. Increasing human populations were apparently forced to direct their focus inland to overcome the limited potential for intensification in the local marine context.

The decrease in exchange activities that appears to be coeval with this settlement shift suggests that this transition differed from the diachronic progression evident from the Early through Middle periods. This deterioration in interregional exchange suggests that intergroup relations had perhaps become less amiable and that human populations had increased to the point that competition over resource availability may have overridden any benefits that could be obtained through participation in trade. The occurrence of a mass grave (group burial I), in which bodies were interred with no particular orientation, further suggests intergroup hostilities at the Middle/Late transition. The occurrence of the apparently exotic Double Side-notched projectile point among the mass graves suggests the presence of an intrusive culture. Linguistic evidence does not define initial occupation along this part of the central coast. Data do suggest, however, that a contiguity between Salinan and Uto-Aztecan speakers was severed by Chumash-speaking peoples, possibly representing an influx of Chumash during or following the Middle-Late Transition.

To the south, Arnold (1992a) has suggested that a significant decline in marine productivity occurred in the Santa Barbara Channel circa AD 1150–1250, related to a hundred-year period of elevated ocean-water temperatures. Response to degradation of the marine resource base in the Channel area consisted of political manipulation by elites, promoting the emergence of craft specialization. The rest of the central coast may have experienced some effects of the decline, given its oceanic origin. Given that this event was preceded by 4500 years of gradually increasing human populations and intensifying subsistence, a quickly transpiring environmental degradation could well have had disastrous ecological ramifications. Since several lines of evidence suggest that a significant threshold was surpassed in the central coast region circa AD 1250, the Middle/Late Transition (Arnold 1992a) should be a major focus for future research, both with regard to precise delineation of environmental changes and their relationship, if any, to shifts in settlement and subsistence, exchange patterns, technology, and social structure.

Appendix A

Data Tables

Table A.1 Small Spire-lopped *Olivella* beads (A1a) from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B.7c	1	NW182 NE14	73	6.7	–	4.8	–	–	1.6	–	Shell	Bur. 7	Spire Ground
511-1966 B.7c	1	NW182 NE14	73	7.0	–	4.8	–	–	1.2	–	Shell	Bur. 7	Spire Ground
511-1966 B.7c	1	NW182 NE14	73	8.3	–	5.8	–	–	2.3	–	Shell	Bur. 7	Spire Ground
511-1966 B.7c	1	NW182 NE14	73	8.7	–	5.8	–	–	2.0	–	Shell	Bur. 7	Spire Ground
511-1966 B.7c	1	NW182 NE14	73	8.7	–	6.0	–	–	1.9	–	Shell	Bur. 7	Spire Ground
511-1966 B.12d	1	NW182 NE14	73	4.0	–	3.2	–	–	f	–	Shell	Bur. 12	Spire Broke
511-1966 B.12d	1	NW182 NE14	73	5.2	–	3.4	–	–	1.2	–	Shell	Bur. 12	Spire Ground
511-1966 B.12d	1	NW182 NE14	73	6.0	–	4.1	–	–	1.2	–	Shell	Bur. 12	Spire Ground
511-1966 B.12d	1	NW182 NE14	73	5.9	–	4.2	–	–	1.1	–	Shell	Bur. 12	Spire Ground
511-1966 B.12d	1	NW182 NE14	73	6.0	–	4.3	–	–	f	–	Shell	Bur. 12	Spire Broke
511-1966 B.12d	1	NW182 NE14	73	6.7	–	4.4	–	–	1.2	–	Shell	Bur. 12	Spire Ground
511-1966 B.12d	1	NW182 NE14	73	7.2	–	4.4	–	–	1.1	–	Shell	Bur. 12	Spire Ground
511-1966 B.12d	1	NW182 NE14	73	5.8*	–	4.6	–	–	1.7*	–	Shell	Bur. 12	Spire Broke
511-1966 B.12d	1	NW182 NE14	73	6.9*	–	4.7	–	–	1.4	–	Shell	Bur. 12	Spire Ground
511-1966 B.12d	1	NW182 NE14	73	6.7*	–	4.7	–	–	f	–	Shell	Bur. 12	Spire Broke
511-1966 B.12d	1	NW182 NE14	73	6.8*	–	4.9	–	–	1.4	–	Shell	Bur. 12	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	4.5*	4.6	2.8	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	4.2*	4.4	3.0	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	3.9*	–	3.1	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	4.7*	4.8	3.1	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	4.8*	4.9	3.2	–	–	f	–	Shell	Bur. 14	Spire Broke
511-1966 B.14d	1	NW180 NE8	70	4.9*	–	3.2	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	4.6*	–	3.2	–	–	f	–	Shell	Bur. 14	Spire Broke
511-1966 B.14d	1	NW180 NE8	70	4.4*	–	3.3	–	–	1.0	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	4.6*	–	3.3	–	–	f	–	Shell	Bur. 14	Spire Broke
511-1966 B.14d	1	NW180 NE8	70	4.9*	5.2	3.4	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	5.2*	5.4	3.4	–	–	1.1	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	f	–	3.4	–	–	f	–	Shell	Bur. 14	Crushed
511-1966 B.14d	1	NW180 NE8	70	5.1*	–	3.5	–	–	1.3	–	Shell	Bur. 14	Spire Chipped
511-1966 B.14d	1	NW180 NE8	70	5.0*	–	3.5	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	4.7*	–	3.7	–	–	1.1	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	5.6	–	3.8	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	5.0*	–	3.9	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	5.1*	–	3.9	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	5.2*	–	4.0	–	–	1.3	–	Shell	Bur. 14	Spire Chipped
511-1966 B.14d	1	NW180 NE8	70	5.5*	5.7	4.0	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	5.7*	–	4.0	–	–	1.3	–	Shell	Bur. 14	Spire Chipped
511-1966 B.14d	1	NW180 NE8	70	6.0*	6.2	4.2	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	6.4*	6.6	4.5	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	7.0*	7.1	5.0	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	7.2*	7.4	5.0	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B.14d	1	NW180 NE8	70	3.1*	–	4.6	–	–	1.6	–	Shell	Bur. 14	Spire Ground

* = incomplete; N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.2 Medium and Large Spire-lopped *Olivella* beads (A1b) from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
MEDIUM SPIRE-LOPPED OLIVELLA BEADS (A1B)													
511-0202	1	NW98 NE48	41	14.7	–	9.5	–	–	2.7	–	Shell	–	Spire Ground
511-0489	1	NW25 NE30	46-61	13.1	–	8.0	–	–	3.6	–	Shell	–	Spire Ground
5511-0556	1	SE157 SW127	15-30	10.6	–	7.6	–	–	3.5	–	Shell	–	Spire Ground
511-0845	1	NW100 NE10	0-15	10.4	–	7.5	–	–	4.2	–	Shell	–	Spire Ground
511-NW61NE25	1	NW61NE25	–	15.4	–	8.7	–	–	1.7	–	Shell	–	Spire Ground
511-NW30NE5	1	NW61NE25	–	12.5	–	7.8	–	–	1.7	–	Shell	–	Waterworn
511-SE15SW90 :6	1	SE15 SW90:6	76-91	13.0	–	8.7	–	–	2.9	–	Shell	–	Spire Ground
511-1966 B21c	1	NW45NE10	55	9.2	–	6.6	–	–	2.3	–	Shell	Bur. 21	Spire Chipped
511-1966 B21c	1	NW45NE10	55	9.7	–	6.9	–	–	2.5	–	Shell	Bur. 21	Spire Chipped
511-1966B21c	1	NW45NE10	55	10.3	–	7.0	–	–	2.1	–	Shell	Bur. 21	Spire Ground
484-323	1	3	0-10	14.1	–	8.8	–	–	2.2	–	Shell	–	Spire Ground
484-341	1	4	30-40	13.9	–	8.4	–	–	2.0	–	Shell	–	Spire Ground
484-422	1	5	20-30	13.7	–	8.5	–	–	1.8	–	Shell	–	Spire Ground
484-508	1	6	40-50	13.2*	–	8.7	–	–	3..0	–	Shell	–	Lip,End Broken
LARGE SPIRE-LOPPED OLIVELLA BEADS (A1C)													
511-0145	1	NW106 NE17	40-50	19.7	–	11.6	–	–	2.4	–	Shell	Below F	Misnumbered 906
511-0378	1	NW160 NE55	15-30	17.9	–	10.9	–	–	4.8	–	Shell	–	Waterworn
511-0519	1	NW90 NE15	46-61	18.4	–	12.1	–	–	3.3	–	Shell	–	Spire Ground
511-0555	1	SE157 SW127	15-30	18.1	–	11.2	–	–	3.4	–	Shell	–	Spire Chipped
511-0626	1	SE157 SW127	61-76	19.3	–	11.7	–	–	4.2	–	Shell	–	Waterworn
511-0796	1	NW25 NE30	122-137	17.4	–	10.2	–	–	2.7	–	Shell	–	Spire Ground
511-0811	1	NW25 NE30	91-107	17.3	–	10.5	–	–	2.2	–	Shell	–	Spire Ground
511-0852	1	NW100 NE10	30-46	16.1	–	10.6	–	–	1.8	–	Shell	–	Spire Ground
511-0862	1	NW80 NE10	61-76	14.0	–	9.9	–	–	5.2	–	Shell	–	Waterworn
511-0885	1	NW90 NE15	61-76	20.6	–	11.7	–	–	2.6	–	Shell	–	Waterworn
511-0890	1	NW90 NE15	76-91	18.3	–	11.1	–	–	3.4	–	Shell	–	Waterworn
511-1008	1	NW0 NE90	91-107	21.3	–	12.1	–	–	3.2	–	Shell	–	Waterworn
511-1016	1	NW0 NE90	107-122	16.1	–	10.2	–	–	3.3	–	Shell	–	Waterworn
511-NW65NE37-50.57	1	NW65 NE37	74	16.2	–	9.7	–	–	2.7	–	Shell	–	Spire Chipped
511-NW61NE36-50.73	1	NW61 NE36	60	16.4	–	9.6	–	–	2.2	–	Shell	–	Waterworn
511-NW140NE0:3	1	NW140 NE0:3	30-46	19.0	–	11.7	–	–	3.2	–	Shell	–	Spire Ground
511-NW150NE0:5	1	NW150 NE0:5	61-76	15.4	–	10.2	–	–	4.3	–	Shell	–	Waterworn
511-SE10SW90:5	1	SE10 SW90:5	61-76	18.6	–	12.1	–	–	3.6	–	Shell	–	Waterworn
511-SE20SW90/4	1	SE20 SW90/4	46-61	19.8	–	11.0	–	–	1.6	–	Shell	–	Waterworn
511-SE20SW90/9	1	SE20 SW90/9	122-137	12.2	–	8.4	–	–	2.4	–	Shell	–	Spire Chipped
511-SE20SW90/9	1	SE20 SW90/9	122-137	17.9	–	10.8	–	–	1.7	–	Shell	–	Waterworn
511-SE20SW90/9	1	SE20 SW90/9	122-137	25.9	–	14.6	–	–	0.8	–	Shell	–	Spire Ground
511-SE20SW90/9	1	SE20 SW 90/9	122-137	17.1	–	9.7	–	–	1.7	–	Shell	–	Waterworn
511-SE20SW90/9	1	SE20 SW 90/9	122-137	18.6	–	10.1	–	–	3.0	–	Shell	–	Waterworn
511-SE20SW90/10	1	SE20 SW90/10	137-152	19.5	–	12.5	–	–	3.8	–	Shell	–	Waterworn
511-SE20SW90/15	1	SE20 SW90/15	213-229	16.7	–	10.5	–	–	2.7	–	Shell	–	Spire Chipped
511-SE20SW90/17	1	SE20 SW90/17	244-259	19.3	–	12.0	–	–	5.9	–	Shell	–	Waterworn
511-SE15SW90:6	1	SE15 SW90:6	76-91	20.0	–	11.8	–	–	4.2	–	Shell	–	Waterworn
511-SE15SW90:6	1	SE15 SW90:6	76-91	21.4	–	12.4	–	–	2.2	–	Shell	–	Waterworn
511-SE15SW90:7	1	SE15 SW90:7	91-107	18.3	–	10.5	–	–	2.2	–	Shell	–	Waterworn
511-SE15SW90:7	1	SE15 SW90:7	91-107	21.0	–	12.2	–	–	2.2	–	Shell	–	Waterworn
	1	SE15 SW90	15-30	18.2	–	11.5	7.8	1.4	3.0	–	Shell	–	–
484-116	1	1	0-10	16.7	–	9.9*	–	–	3.5	–	Shell	–	Waterworn
484-145	1	1	20-30	16.5	–	9.7*	–	–	3.2	–	Shell	–	Spire Chipped
484-146	1	1	20-30	15.5	–	9.6	–	–	4.8	–	Shell	–	Waterworn
484-147	1	1	20-30	22.0	–	13.8	–	–	3.1	–	Shell	–	Spire Chipped
484-149	1	1	20-30	16.7	–	11.2	–	–	3.0	–	Shell	–	Spire Ground
484-151	1	1	20-30	22.1	–	12.5	–	–	1.5	–	Shell	–	Spire Ground
484-256	1	3	0-10	16.8	–	11.5	–	–	5.0	–	Shell	–	Waterworn
484-363	1	4	20-30	19.0	–	10.3	–	–	1.9	–	Shell	–	Ground
484-381	1	5	0-10	15.5	–	10.0	–	–	1.5	–	Shell	–	Waterworn
484-522	1	6	50-60	17.7	–	10.8	–	–	2.9	–	Shell	–	Ground
484-579	1	3	0-10	20.1	–	11.6	–	–	1.5	–	Shell	–	Ground

* = incomplete; N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.3 Oblique Spire-lopped *Olivella* beads from CA-SLO-175

SMALL OBLIQUE SPIRE-LOPPED OLIVELLA BEADS (A2A)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B14o	1	NW180 NE8	70	5.3	–	3.7	–	–	1.2	–	Shell	Bur. 14	Spire Ground

LARGE OBLIQUE SPIRE-LOPPED OLIVELLA BEAD (A2C)

484-128	1	1	10-20	20.5	–	12.4	–	–	4.6	–	Shell	–	Spire Chipped

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.4 Large Applique Spire-lopped *Olivella* beads (A5b) and attachments from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-NW88NE36-52.06a	1	NW88 NE36	80	23.5	–	–	14.3	9.8	–	–	–	Shell	–	Reworked A1c
511-NW88NE36-52.06b	1	NW88 NE36	80	–	–	3.3	–	0.9	–	–	–	Shell	–	In asphalt
511-NW88NE36-52.06c	1	NW88 NE36	80	–	–	–	3.0	–	–	–	–	Shell	–	In asphalt

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.5 End-ground *Olivella* beads from CA-SLO-175

SMALL END-GROUND OLIVELLA BEADS (B2A)

Specimen	*N*	*Unit*	*Depth*	*L*	*Rlen*	*Diam*	*W*	*T*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B12d	1	NW122 NE17	67	4.4	–	3.3	–	–	1.0	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	5.7	–	3.6	–	–	1.1	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	5.7	–	3.7	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	5.5	–	3.8	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	5.8	–	4.0	–	–	1.4	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	5.8	–	4.1	–	–	1.1	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	6.3	–	4.2	–	–	1.1	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	6.0	–	4.3	–	–	1.4	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	5.7	–	4.6	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.3	–	4.6	–	–	1.2	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.3	–	4.6	–	–	1.2	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	6.8	–	4.7	–	–	1.4	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	6.2	–	4.8	–	–	2.2	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.0	–	4.8	–	–	2.0	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.7	–	4.8	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	6.8	–	4.9	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	6.9	–	4.9	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	6.7	–	5.0	–	–	1.2	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.7	–	5.0	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.8	–	5.2	–	–	1.4	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.5	–	5.2	–	–	1.2	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.8	–	5.2	–	–	1.4	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	8.1	–	5.5	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.9	–	5.5	–	–	1.3	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	7.4	–	5.7	–	–	1.0	–	Shell	Bur. 12	Spire Ground
511-1966 B12d	1	NW122 NE17	67	8.0	–	5.8	–	–	1.8	–	Shell	Bur. 12	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.0	–	5.0	–	–	1.5	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	5.0	–	3.3	–	–	1.1	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.7	–	5.0	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	4.9	–	3.7	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.1	–	5.0	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	5.9	–	3.8	–	–	1.1	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.0	–	5.0	–	–	f	–	Shell	Bur.14	Spire Broken
511-1966 B14o	1	NW180 NE8	70	5.5	–	3.9	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.9	–	5.1	–	–	1.4	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	5.7	–	3.9	–	–	1.5	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.8	–	5.1	–	–	1.8	–	Shell	Bur. 14	Spire Ground

Table A.5 End-ground *Olivella* beads from CA-SLO-175 (continued)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
MEDIUM END-GROUND OLIVELLA BEADS (B2B)													
511-1966 B14o	1	NW180 NE8	70	5.2	–	4.0	–	–	1.4	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.9	–	5.1	–	–	1.8	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	5.8	–	4.1	–	–	1.5	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.2	–	5.1	–	–	1.7	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	5.8	–	4.1	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.2	–	5.1	–	–	1.6	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.2	–	4.2	–	–	1.4	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.7	–	5.1	–	–	2.0	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.3	–	4.2	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.4	–	5.2	–	–	1.1	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	5.4	–	4.3	–	–	1.4	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.5	–	5.2	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.0	–	4.3	–	–	1.4	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.4	–	5.2	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.6	–	4.5	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.7	–	4.5	–	–	f	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.1	–	4.5	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.4	–	5.0	–	–	1.0	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.8	–	4.6	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.4	–	4.8	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.7	–	4.8	–	–	1.4	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.1	–	4.8	–	–	1.4	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.0	–	4.8	–	–	1.5	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.0	–	4.9	–	–	1.2	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.1	–	4.9	–	–	1.9	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.2	–	4.9	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	6.7	–	4.9	–	–	1.3	–	Shell	Bur. 14	Spire Ground
511-1966 B14o	1	NW180 NE8	70	7.7	–	4.9	–	–	1.1	–	Shell	Bur. 14	Spire Ground
511-1966 B7c	1	NW182 NE14	73	9.4	–	6.6	–	–	2.4	–	Shell	Bur. 7	Spire Ground
484-148	1	1	20-30	11.2	–	8.9	–	–	4.2	–	Shell	–	Spire Chipped
LARGE END-GROUND OLIVELLA BEADS (B2C)													
484-302	1	3	30-40	16.9	–	11.1	–	–	2.4	–	Shell	–	—

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.6 Barrel *Olivella* and Large Spire *Olivella* beads from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
SMALL BARREL OLIVELLA BEADS (B3A)													
511-SE20SW90/10	1	SE20 SW90/10	137-152	5.9	–	5.5	–	–	2.2	–	Shell	–	Spire Ground
511-1966 B7c	1	NW182 NE14	73	6.0	–	4.4	–	–	1.8	–	Shell	Bur. 7	Spire Ground
MEDIUM BARREL OLIVELLA BEADS (B3B)													
511-357	1	NW20 NE10	76-91	7.9	–	6.8	–	–	3.1	–	Shell	–	Ends Ground
511-810	1	NW160 NE55	46-61	11.0	–	7.0	–	–	5.0	–	Shell	–	Spire Ground
LARGE BARREL OLIVELLA BEADS (B3C)													
511-SE20SW90/10(2)	1	SE20 SW90/10(2)	142-168	13.4	–	10.3	–	–	4.8	–	Shell	–	Spire Chipped
LARGE SPIRE OLIVELLA BEADS (B5C)													
511-520	1	NW95 NE15	46-61	8.4	–	12.1	–	–	3.1	–	Shell	–	Waterworn

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.7 Full Large Lipped *Olivella* bead (E3a) from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-460	1	NW25 NW30	0-15	12.5	–	–	9.8	–	4.7	2.4	–	Shell	–	—

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.8 *Olivella* Saucer beads from CA-SLO-175

Tiny Olivella Saucer bead (G1)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
484-115	1	1	0-10	–	–	4.4	–	–	–	1.1	–	Shell	–	—

Large Normal Olivella Saucer bead (G2b)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-0851	1	NW100 NE10	46-61	7.1	–	–	7.3	–	2.0	2.4	–	Shell	–	—

Symmetrical Irregular Olivella Saucer beads (G6a)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B7b	1	NW182 NE14	73	6.0	–	–	6.0	1.0	1.7	1.5	–	Shell	Bur. 7	Symmetrical
511-1966 B7b	1	NW182 NE14	73	6.0	–	–	5.7	1.4	2.0	1.5	–	Shell	Bur. 7	Symmetrical

Asymmetrical Irregular Olivella Saucer beads (G6b)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-0422	1	NW220 NE0	76-91	7.9	–	–	7.0	1.0	2.0	2.2	–	Shell	–	Asymmetrical
511-1966 B7b	1	NW182 NE14	73	6.2	–	–	5.8	1.5	2.1	1.8	–	Shell	Bur. 7	Asymmetrical

Oval Irregular Olivella Saucer bead (G6c)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B7b	1	NW182 NE14	73	6.5	–	–	5.9	1.4	2.0	1.8	–	Shell	Bur. 7	Oval

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.9 Cupped *Olivella* beads from CA-SLO-175

Cupped Olivella bead (K1)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B7b	1	NW182 NE14	73	5.1	–	–	4.8	1.5	2.3	2.2	–	Shell	Bur. 7	—

Cupped/Lipped Olivella bead (K/E)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-905	1	NW120NE10	0-15	7.2	–	–	6.2	–	3.5	2.1	–	Shell	–	—

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.10 Drilled Whole *Olivella baetica* bead (O.1a) from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
484-577	1	4	10-20	10.9	–	5.6	–	–	1.8	–	Shell	–	Conical Perforation

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.11 *Haliotis* bead, disks, and ring from CA-SLO-175

Haliotis *disk bead*

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*Wt*	*Material*	*Assoc*	*Remarks*
511-1788	1	No location	–	8.2	–	–	7.8	1.4	–	3.0	–	Shell	–	–

Haliotis *disk ornaments*

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*Wt*	*Material*	*Assoc*	*Remarks*
511-1966 B14e	1	NW180 NE8	70	–	–	–	30.2	2.0	—	—		Shell	Bur. 14	Stuck on 511-1966B14b
511-1966 B14j	1	NW180 NE8	70	24.8	–	–	22.8	2.0	–	5.3	–	Shell	Bur. 14	Stuck on 511-1966 B14j
511-0871	1	NW85 NE15	91-107	–	21.2	–	2.0	–	11.3	–	–	Shell	Bur. 3	Serrated edge

Artificial shell ring with incised edges Haliotis rufescens *(J2bI)*

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*Wt*	*Material*	*Assoc*	*Remarks*
511-871	1	NW85 NE15	91-107	–	—	21.2	–	2.0	–	11.3	–	Shell	Bur. 3	Serrated edge

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.12 Appliquéd solid asphaltum plugs and associated specimens from CA-SLO-175

Specimen	*N*	*Descrip*	*Unit*	*Depth*	*L*	*Diam*	*W*	*T*	*Curv*	*Pf Deam*		*Material*	*Assoc*	*Remarks*
11-0869a	1	Plug	NW85 NE15	76-91	20.5*	–	16.6	14.5	–	–		Asphalt	Bur. 3	Broken into 7 pieces
511-0869b	11	G1	NW85 NE15	76-91	–	3.3	–	–	–	0.9		*Olivella*	Bur. 3	1 row around ornament
511-0869c	1	J2bI I	NW85 NE15	76-91	–	11.8	–	1.2	–	6.3		*Haliotis*	Bur. 3	Serrated edge
511-1003	1	Plug	NW85 NE15	107	18.3*	–	14.2*	16.9	–	–			Asphalt	Bur. 3 –
511-1003b	16	G1	NW85 NE15	107	–	3.3	–	–	–	0.9			Shell	Bur. 3 2 rows + 3 impresions
511-1003c	1	J2bII	NW85 NE15	107	–	11.7	–	0.8	–	6.3			Shell	Bur. 3 Serrated edge
511-1005a	1	Plug	NW95 NE15	101	15.8*	–	11.7*	6.8*	–	–	–		Asphalt	Bur. 5 Broken into 10 pieces
511-1005b	24	G1	NW95 NE15	101	–	2.9	–	9.7	–	0.9	–		Shell	Bur. 5 3 rows + 1 impression
511-1005c	1	J2bII	NW95 NE15	101	–	20.0	–	–	–	15.0	–		Shell	Bur. 5 Serrated edge
511-1966 B15b	1	Plug	NW150 NE10	104	15.9*	–	15.3*	22.7*	–	–		Asphalt	Bur. 15	2 pieces fit
511-1966 B15b	18	G1	NW150 NE10	104	–	3.2	–	–	–	0.9		*Olivella*		Bur. 15 2 rows + 1 impression
511-1966 B15b	1	J2aIV	NW150 NE10	104	–	7.6	–	–	–	3.5		*Haliotis*	Bur. 15	Undecorated
511-0868a	1	Plug	NW85 NE15	76-91	22.8	-	21.0	21.0*	–	–		Asphalt	Bur. 3	Broken to 3 pieces
511-0868b	23	G1	NW85 NE15	76-91	-	3.2	–	0.9	–	0.9		*Olivella*	Bur. 3	8 impressions
511-0868c	1	Sequin	NW85 NE15	76-91	0.6*	-	0.6*	–	–			*Haliotis*	Bur. 3	Impression 8.8 x 4.9

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.13 Limpet rings from CA-SLO-175

FLAT-ENDED LIMPET RINGS (H2AIII)

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B7a	1	NW182 NE14	73	7.2	–	–	6.5	1.0	1.1	4.0	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	7.8	–	–	6.7	1.1	1.1	3.9	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	8.4	–	–	8.4	1.3	1.6	5.5	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	8.8	–	–	7.8	1.4	1.5	5.8	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	8.9	–	–	8.2	1.3	1.3	6.0	–	Shell	Bur. 7	Round ends
511-1966 B7a	1	NW182 NE14	73	9.2	–	–	8.1	1.0	1.5	6.0	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	9.3	–	–	8.6	1.4	1.7	5.7	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	9.4	–	–	8.8	1.3	1.7	5.9	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	9.5	–	–	8.0	1.5	1.7	6.1	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	9.5	–	–	8.8	1.9	2.0	6.3	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	9.6	–	–	8.8	1.6	1.8	6.6	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	9.7	–	–	8.7	1.5	1.7	6.2	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	9.9	–	–	8.7	1.4	1.5	6.7	–	Shell	Bur. 7	1 flat end
511-1966 B7a	1	NW182 NE14	73	10.1	–	–	9.3	1.4	1.2	6.0	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	10.3	–	–	8.9	1.6	1.9	6.5	–	Shell	Bur. 7	Flat ends
511-1966 B7a	1	NW182 NE14	73	10.5	–	–	9.2	1.5	1.5	7.8	–	Shell	Bur. 7	Flat ends
511-1966 B13e	1	NW180 NE8	70	8.1	–	–	7.0	1.1	1.2	4.8	–	Shell	Bur. 13	—

PLAIN LIMPET RINGS

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B14n	1	NW180 NE8 70	17.9	–	–	15.3	1.7	1.9	14.1	–	–	Shell	Bur. 14	Round ends
511-1966 B14n	1	NW180 NE8	70	18.9	–	–	14.6	2.0	2.0	15.3	–	Shell	Bur. 14	Round ends
511-1966 B14n	1	NW180 NE8	70	19.1	–	–	15.5	1.9	2.0	16.3	–	Shell	Bur. 14	Round ends

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.14 Perforated whole *Hinnites* from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-0488	1	NW25 Ne30	46-61	98.2	–	–	99.7	–	34.3	3.0	–	Shell	–	Burned

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.15 Spire-lopped *Littorina* (F7) from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-1966 B12d	1	NW112 NE7	67	5.0	–	3.6	–	–	–	0.7	–	Shell	Bur. 12	Spire chipped

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.16 *Dentalium* bead from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*PfDiam*	*WT*	*Material*	*Assoc*	*Remarks*
511-0146	1	NW106 NE17	40-50	6.9	–	2.9	–	–	–	1.9	–	Shell	Below F	–

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.17 Fishhooks from CA-SLO-175

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*
511-0151	1	NW160 NE17	50-60	–	–	36.0	–	4.0	–	–	–	Shell	–	–
511-0078	1	None	Surface	20.8*	23.5	–	16.8	3.3	–	–	–	Shell	–	Notched; Asphaltum

N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.18 Shell beads from CA-SLO-1259

Specimen	*N*	*Unit*	*Depth*	*L*	*R len*	*Diam*	*W*	*T*	*Curv*	*Pf Diam*	*WT*	*Material*	*Assoc*	*Remarks*	*Type*
485-290	1	5	20-30	14.9	–	9.6r	–	–	–	3.4	–	Shell	Feat. 1	Bleached	A1c
485-346	1	6	30-40	12.2	–	10.5	–	–	–	3.2	–	Shell	–	Waterworn	A1c
485-345	1	6	30-40	10.8	–	9.4	–	–	–	4.2	–	Shell	–	Chipped	B3b

r = reconstructed diameter; N = number; L = length; R len = reconstructed length; Diam = diameter; W = width; T = thickness; Curv = height of curvature; Pf Diam = perforation diameter; WT = weight; Assoc = association.

Table A.19 Cores from CA-SLO-175

Specimen	*Unit*	*Depth*	*WT*	*L*	*W*	*T*	*# platforms*	*Material*	*Morphology*
484-005	Sewer Tr.	no depth recorded	29.2	45.5	34.7	23.0	1	M. Chert	ch/sh,int-pl,rec,bif,indet end frg, h-a
484-009	Sewer Tr.	no depth recorded	8.0	31.5	26.0	12.5	2	Fr. Chert	g-c,ct,ct-pl,irr, bip, med
484-053	Abutment 4	no depth recorded	48.5	32.0*	53.0	24.5	1	Fr. chert	ch/sh,int-pl,trap,bif, idet end frg
484-054	Abutment 4	no depth recorded	42.1	47.5	41.5	24.0	1	M. chert	tab-cbl,ct,ct-pl,rec,ch-test,end frg
484-056	Abutment 4	no depth recorded	29.6	53.0	41.7	19.1	2	Fr. chert	flk,int-pl,rec,bif,med frg
484-058	Abutment 4	no depth recorded	190.1	71.5	70.0	38.0	1	Fr. chert	ch/sh,ct,int-pl,irr,uni-dir,med frg
484-059	Abutment 4	no depth recorded	161.4	77.0	54.8	29.0	1	M. chert	tab-cbl,ct,ct-pl,trap,uni-dir,med frg
484-060	Abutment 4	no depth recorded	101.7	65.0	48.0	36.2	1	M. chert	g-c,ct,ct-pl,rec, uni-dir, end frg
484-062	Abutment 4	no depth recorded	158.8	58.0	47.5	44.0	2	Fr. chert	ch/sh,ct,int-pl, rec,ch-test,med frg
484-063	Abutment 4	no depth recorded	127.5	70.6	45.4	33.9	2	Fr. chert	g-c,ct,ct-pl,irr,cbl- test
484-092	Abutment 4	no depth recorded	93.0	66.5	36.7	30.5	2	M. chert	sp-cbl,ct,int-pl,trap, bif,end frg
484-095	Abutment 4	no depth recorded	53.8	47.0	32.5	21.2	1	Fr. chert	tab-cbl,ct,int-pl,rec, uni-dir,med frg
484-096	Abutment 4	no depth recorded	117.7	61.5	46.0	44.0	1	Fr. chert	g-c,ct,ct-pl,circ, cbl-test,idet end frg
484-101	Abutment 4	no depth recorded	37.4	30.0*	47.0	22.4	2	M. chert	tab-cbl,ct,ct-pl,tri, bi-dir,end frg
484-102	Abutment 4	no depth recorded	47.3	42.6*	43.1	23.0	2	M. chert	flk,int-pl,rec,ch- test,med frg
484-119	1	0-10	156.4	71.7	58.0	32.6	1	Fr. chert	ch/sh,ct,ct-pl,tri,ch- test,end frgs
484-127	1	10-20	343.9	106.8	69.5	39.3	1	Fr. chert	sp-cbl,ct,ct-pl,trap, cbl-test,end frg
484-155	1	20-30	57.2	37.0	36.5	31.6	1	Fr. chert	ch/sh,ct,ct-pl,rec,ch- test,med frg
484-194	1	50-60	100.9	66.0	64.5	30.5	1	Fr. chert	flk,int-pl,tri,ch-test, end frg
484-200	1	60-70	96.0	71.2	58.0	28.0	1	Fr. chert	flk,ct,ct-pl,trap, cbl-test,whole
484-219	2	10-20	105.8	107.5	50.6	13.3	2	M. chert	tab-cbl, ct, ct-pl,rec, bif,whole
484-234	2	30-40	69.4	46.2	59.0	31.0	1	Fr. chert	ch/sh,int-pl,trap,ch- test,whole
484-241	2	40-50	152.8	53.0	62.6	42.5	1	Fr. chert	ch/sh,int-pl,tri,bif, mar frg
484-261	3	10-20	65.6	52.0	43.0	30.0	2	M. chert	ch/sh,int-pl,rec,ch- test,med frg
484-262	3	10-20	161.4	88.0	47.0	31.0	1	Fr. chert	sp-cbl,ct,ct-pl,r-rec, cbl-test,end frg
484-263	3	10-20	140.3	78.2	57.0	37.5	1	Fr. chert	sp-cbl,ct,ct-pl,tri,cbl- test,end frg

Table A.19 Cores from CA-SLO-175 *(continued)*

Specimen	*Unit*	*Depth*	*WT*	*L*	*W*	*T*	*# platforms*	*Material*	*Morphology*
484-274	3	20-30	71.5	52.0*	54.5	28.3	2	M. chert	flk,int-pl,circ,bif, end frg
484-275	3	20-30	178.8	76.5	46.5	26.1	1	Fr. chert	ch/sh,ct,int-pl,circ, bif,end frg
484-276	3	20-30	69.8	65.5	41.6	27.5	1	M. chert	sp-cbl,ct,ct-pl,circ, bip,end frg
484-277	3	20-30	59.1	41.5*	59.5	24.0	2	M. chert	ch/sh,int-pl,r-rec,bif, end frg
484-278	3	20-30	54.7	61.0	45.5	28.5	2	M. chert	ch/sh,ct,int-pl,irr,ch- test,indet frg,h-a
484-307	3	40-50	81.0	64.3*	51.5	20.5	1	Fr. chert	tab-cbl,ct,ct-pl,tri, cbl-test,end frg
484-308	3	40-50	156.0	55.6	59.0	36.7	1	Fr. chert	g-c,ct,ct-pl,tri, cbl-test,end frg
484-309	3	40-50	447.0	76.0	70.2	51.0	1	Fr. chert	tab-cbl,int-pl,rec,cbl- test,mar frg
484-310	3	40-50	87.6	101.7	54.4	26.6	1	Fr. chert	sp-cbl,ct,ct-pl,r-rec, cbl-test,end frg
484-311	3	40-50	63.1	51.0	41.5	29.3	2	Fr. chert	ch/sh,int-pl,irr,ch- test,med frg
484-351	4	20-30	62.0	57.8	40.1	29.2	1	Fr. chert	ch/sh,ct,ct-pl,r-rec, ch-test,end frg
484-352	4	20-30	83.3	54.0*	56.6	31.0	2	M. chert	ch/sh,ct,int-pl,tri,ch- test,indet frg
484-353	4	20-30	255.0	104.5	69.4	41.5	1	Fr. chert	ch/sh,int-pl,dia,ch- test,nearcomplete,h-a
484-354	4	20-30	264.5	106.0	72.5	32.0	1	Fr. chert	sp-cbl,ct,ct-pl,trap, cbl-test,end frg
484-355	4	20-30	298.3	105.6	58.2	38.0	1	Fr. chert	ch/sh,ct-pl,irr,ch-test med frg
484-375	4	40-50	58.8	58.8	55.0	19.3	1	M. chert	flk,int-pl,r-rec,uni- dir,indet frg
484-376	4	40-50	110.1	75.8	60.2	26.4	1	Fr. chert	flk,int-pl,rec,uni-dir, near complete
484-385	5	0-10	271.2	62.8	61.0	55.0	2	Fr. chert	ang-cbl,ct,int-pl,rec, multi-dir
484-397	5	10-20	103.0	63.0	41.9	30.7	2	Quartzite	sp-cbl,ct,ct-pl,r-rec, bi-dir
484-409	5	20-30	181.8	109.5	48.6	28.9	1	Fr. chert	g-c,ct,ct-pl,trap,ch- test,med frg
484-426	5	30-40	214.2	67.0*	95.0	30.0	2	Fr. chert	flk,int-pl,tri,ch-test, end frg
484-424	5	30-40	241.9	75.0	61.0	42.2	1	Fr. chert	ch/sh,ct,int-pl,trap, ch-test,mar frg,h-a
484-442	5	40-50	109.2	57.0*	78.0	25.0	2	M. chert	flk,int-pl,rec,bif, end frg
484-444	5	40-50	466.9	94.0	99.5	47.0	2	Fr. chert	sp-cbl,ct,ct-pl,circ, bif,whole
484-453	5	50-60	94.8	61.8	52.0	28.8	2	M. chert	tab-cbl,ct,int-pl,circ,bif,whole
484-450	5	50-60	95.4	74.6	39.2	27.3	2	M. chert	tab-cbl,ct,ct-pl,tri, cbl-test,med frg
484-465	5	60-10	168.0	82.0	60.5	38.0	1	Fr. chert	ang-cbl,ct,ct-pl,r-rec,ch-test,end frg
484-484	6	20-30	255.3	101.2	75.5	32.8	2	Fr. chert	tab-cbl,ct,int-pl,dia, bif,near complete
484-489	6	30-40	65.5	45.0*	39.0	33.0	2	M. chert	tab-cbl,ct,ct-pl,circ, bi-dir,med frg
484-490	6	30-40	96.0	46.0	41.7	48.5	1	M. chert	tab-cbl,ct,ct-pl,trap, cbl-test,indet frg
484-492	6	30-40	35.9	49.5	38.5	18.0	2	M. chert	flk,int-pl,r-rec,bif, whole
484-491	6	30-40	116.1	81.0	60.0	40.3	1	Fr. chert	ch/sh,int-pl,tri,ch- test,indet frg
484-501	6	40-50	92.4	73.0*	50.0	21.7	2	Fr. chert	tab-cbl,ct,int-pl,r- rec,bif,near complete
484-513	6	40-50	44.4	46.6*	44.5	20.2	1	Fr. chert	g-c,ct,int-pl,trap, cbl-test,med frg
484-518	6	50-60	29.6	42.5*	49.9	21.6	1	M. chert	flk,int-pl,r-rec,uni- dir,end frg
484-530	6	60-70	119.0	85.5	51.2	24.5	1	Fr. chert	flk,ct,ct-pl,r-rec, cbl-test,end frg
484-537	6	70-80	49.3	43.2	40.5	20.5	1	Fr. chert	flk,int-pl,rec,ch- test,indet frg
484-575	1	60-70	33.8	39.5	36.0	19.4	1	Fr. chert	ch/sh,ct,int-pl,rec,ch-test,med frg
484-576	1	60-70	48.6	56.0*	25.5	22.2	1	Fr. chert	ch/sh,ct,ct-pl,rec,ch-test,indet frg

Note: All artifact measurements taken in millimeters. unit depths are in centimeters. ch/sh = chunk/shatter; tab-cbl = tabular cobble; flk = flake; ang-cbl = angular cobble; g-c = globular cobble; sp-cbl = split cobble; ct = cortex; ct-pl = cortical platform; int-pl = interior platform; rec = rectangular shape; trap = trapezoidal shape; irr = irregular shape; circ = circular shape; r-rec = rounded rectangular shape; tri = triangular shape; dia = diamond shape; bif = bifacial shape; uni-dir = unidirectional type; cbl-test = cobble test type; ch-test = chunk test type; bi-dir = bidirectional type; bip = bipolar type; multi-dir = multidirectional type; indet end frg = indeterminate end fragment; med frg = medial fragment; end frg = end fragment; mar frg = marginal fragment; h-a = heat affected; Tr. = trench; Width = width; T = thickness; M. chert = Monterey chert; Fr. chert = Fransican chert; * = incomplete.

Table A.20 Cores from CA-SLO-1259

Specimen	*Unit*	*Depth*	*WT*	*L*	*W*	*T*	*# platforms*	*Material*	*Morphology*
485-001	1	0-10	293.9	74.5	58.0	52.0	2	Fr. chert	g-c,ct,int-pl, tri,non-pat,whole
485-017	1	10-20	26.4	38.5	28.0	21.5	2	Fr. chert	g-c,ct,int-pl,r-rec, ch-test,indet end frg
485-044	1	20-30	94.0	55.0	47.0	35.0	1	Fr. chert	g-c,ct,int-pl,round cbl-test,indet end frg
485-050	1	30-40	178.6	85.5	78.5	31.0	1	Fr. chert	g-c,ct,ct-pl,tri, cbl-test,indet end frg
485-060	1	40-50	88.1	55.0	65.0	26.0	1	M. chert	flk,int-pl,trap,uni- dir,indet end frg
485-122	2	30-40	157.8	80.5	45.5	32.0	1	Fr. chert	tab-cbl,ct,ct-pl,rec, cbl-test,indet end frg
485-136	2	40-50	301.7	69.0	48.0	47.5	1	Fr. chert	g-c,ct,ct-pl,rec, cbl-test,med frg,h-a
485-181	3	30-40	129.1	67.0	47.0	29.0	1	Fr. chert	g-c,ct,int-pl,r-rec, cbl-test,bip,whole
485-182	3	30-40	101.7	77.5	52.0	21.0	2	M. chert	tab-cbl,ct,int-pl, rec,bif
485-187	3	30-40	219.9	93.5	56.0	27.0	1	Fr. chert	ch/sh,int-pl,rec,ch- test,med frg
485-199	3	30-40	72.2	72.0	53.5	17.0	2	Fr. chert	flk,ct,int-pl,trap, non-patt,near complete
485-218	4	0-10	195.6	93.0	58.0	33.0	1	Quartzite	flk,int-pl,tri,uni- dir,indet end frg
485-231	4	20-30	199.1	77.0	59.5	40.0	1	Fr. chert	ch/sh,ct,trap,ch-tes med frg
485-232	4	20-30	143.3	77.5	60.0	33.5	1	Fr. chert	ch/sh,ct,int-pl, r-rec,ch-test,indet end frg

Table A.20 Cores from CA-SLO-1259 *(continued)*

Specimen	*Unit*	*Depth*	*WT*	*L*	*W*	*T*	*# platforms*	*Material*	*Morphology*
485-238	4	20-30 Feat. 1	49.8	48.5	29.0	23.0	2	Fr. chert	sp-cbl,ct,ct-pl, r-rect,bip,indet end frg
485-239	4	20-30 Feat. 1	130.6	111.3	53.0	26.0	1	Fr. chert	flk,int-pl,trap,bif, indet frg
485-244	4	30-40	252.5	81.5	67.0	49.5	3	Fr. chert	ch/sh,ct,int-pl,trap, bif, indet end frg
485-246	4	30-40	151.2	73.5	52.0	36.0	1	Fr. chert	sp-cbl,ct,ct-pl,trap, cbl test,indet end frg
485-245	4	30-40	63.4	43.5	41.5	28.5	1	M. chert	ch/sh,ct,int-pl,rec, ch-test,indet end frg
485-278	5	10-20	166.1	85.0	60.0	33.5	2	M. chert	ch/sh,ct,int-plt, r-rect,uni-dir,med frg
485-280	5	10-20	41.0	46.5	40.0	32.5	1	Fr. chert	ch/sh,int-plt,circ,ch-test,indet frg
485-295	5	20-30	213.0	97.0	50.0	39.0	2	M. chert	sp-cbl,ct,ct-plt,r- rec,cbl test,med frg
485-297	5	20-30	436.8	94.0	63.0	61.0	1	Fr. chert	ch/sh,ct,ct-plt,irr,ch-test,indet frg
485-287	5	20-30 Feat. 1	187.1	72.3	70.0	40.0	1	Fr. chert	ch/sh,ct,ct-plt,r-rec, ch-test,med frg
485-310	6	0-10	124.5	66.0	53.0	37.0	2	M. chert	tab-cbl,ct,int-plt,trap, bif,med frg
485-373	2	20-30 Rock Feat.	160.0	82.5	57.5	39.5	1	M. chert	ch/sh,ct,ct-pl,tri, cbl-test,end frg, h-a

Note: All artifact measurements taken in millimeters. unit depths in centimeters. ch/sh = chunk/shatter; tab-cbl = tabular cobble; flk = flake; sp-cbl = split cobble; g-c = globularcobble; ct = cortex; ct-pl = cortical platform; int-pl = interior platform; rec = rectangular shape; r-rec = rounded rectangular shape; tri = triangular shape; circ = circular shape; irr = irregular shape; trap = trapezoidal shape; cbl-test = cobble test type; ch-test = chunk test type; non-pat = non-patterned type; bipolar type; uni-dir = uni-directional type; indet frg = indeterminate fragment; indet end frg = indeterminate end fragment; med frg = medial fragment; bif = bifacial core fragment; h-a = heat affected; Feat. = feature; WT = weight (in grams); L = length; W = width; T = thickness; Fr. chert = Franciscan chert; M. chert = Monterey chert.

Table A.21 Core tools from CA-SLO-175 (Abrams Collection)*

Specimen	*Unit*	*Depth*	*Material*	*Description*
511-40	West of highway	Surface	Chert-Mont	Chopper
511-153	Test pit A	60-70	Chert-Mont	Chopper frag.
511-284	NW120NE10	0-15	Chert-Fran	Chopper frag.
511-301	NW80NE10	30-46	Chert-Fran	Chopper
511-393	NW220NE0	0-15	Chert-Mont	Chopper
511-412	NW220NE0	46-61	Chert-Mont	Chopper
511-465	NW25NE30	15-30	Chert-Fran	Chopper
511-589	Test pit B	30-46	Chert-Fran	Chopper
511-693	Test pit B	152-168	Chert-Mont	Chopper
511-746	NW10SW90	137-152	Chert-Fran	Corehammerstone
511-768	NW80NE10	46-61	Chert-Mont	Chopper
511-775	NW220NE5	46-61	Chert-Fran	Chopper
511-804	NW160NE55	46-61	Chert-Fran	Chopper scraper
511-923	Test pit B	107-122	Chert-Fran	Core chopper
511-924	Test pit B	107-122	Chert-Fran	Core chopper
511-925	Test pit B	107-122	Chert-Mont	Core chopper
511-961	–	Surface	Chert-Fran	Chopper
511-1019	Test pit B	137-152	Chert-Fran	Chopper
511NW25SW90-5	NW25SW90	61-76	Chert	Chopper
511NW30SW90-5	NW30SW90	61-76	Chert	Chopper
511NW30NE5a	NW30NW5	–	Chert-Mont	Chopper
511NW30NE5b	NW30NE5	–	Chert	Core chopper
511NW60NE38-51.18	NW60NE38	43	Chert	Chopper
511NW66NE45-48.95	NW66NE45	123	Chert	Chopper
511NW68NE37-48.12	NW68NE37	154	Chert	Chopper
511NW69NE50-49.55	NW69NE50	114	Chert	Chopper
511NW155NE0:1	NW155NE0	0-15	Chert-Fran	Core scraper
511NW155NE0:3	NW155NE0	30-46	Chert	Chopper
511NW155NE0:6	NW155NE0	76-91	Chert	Core scraper
511NW240-260	NW240-260	–	Chert	Chopper
511NW455NE63.78	NW455NE	46	Chert	Chopper
511SE20SW90-2a	SE20SW90	15-30	Chert	Chopper
511SE20SW90-2b	SE20SW90	15-30	Chert	Chopper
511SE20SW90:6	SE20SW90	76-91	Chert	Core hammerstone
511SE20SW90/9a	SE20SW90	122-137	Chert	Core chopper
511SE20SW90/9b	SE20SW90	122-137	Chert	Core chopper
511SE20SW90/9c	SE20SW90	122-137	Chert	Core chopper
511SE20SW90/12	SE20SW90	168-183	Chert	Core chopper
511SE20SW90/14	SE20SW90	198-213	Chert	Chopper
511SE15SW90:5	SE15SW90	61-76	Chert	Core chopper
511SE15SW90:7	SE15SW90	91-107	Chert	Chopper
511SE15SW90:8	SE15SW90	107-122	Chert	Chopper
511Surface48	–	Surface	Chert	Chopper
511Surface74	–	Surface	Chert-Mont	Chopper
511Surface75	–	Surface	Chert-Fran	Chopper
484-021	–	Surface	Chert-Fran	Graver
484-090	Abutment 4-Mon	–	Chert-Fran	Core

* Based on catalog entries only, not actual inspection of specimens. Mont = Monterey; Fran = Franciscan; depths in centimeters.

Table A.22 Franciscan chert bifaces from CA-SLO-175

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Description*
STAGE 1							
511-253	NW85NW15	15-30	66.0	41.0	22.5	64.2	Complete
511-588	Test pit B	30-46	52.0	41.0	19.0	33.5*	Indet. End
511-839	NW100NE10	76-91	57.4*	61.7	23.0	85.0*	Midsection
511-SE15SW90:4	SE15SW90	46-61	73.0	35.0	25.0	63.3	Complete
511-1966-18	–	Surface	60.0	32.0	12.0	24.6	Complete
484-121	1	0-10	40.0*	22.4*	15.0*	9.5*	Margin
STAGE 2							
511-41	–	Surface	59.0	59.0	25.0	88.5	Complete
511-284	NW120NE10	0- 15	56.0*	42.5	20.5	37.6*	Indet. End
511-463	NW25NE30	0- 15	51.5	29.0	17.0	25.4	Complete
511-704	NW0SW90	61- 76	51.0*	41.5	14.7	35.7*	Proximal End
511-788	NW25NE30	76- 91	49.0*	46.0	12.0	36.3*	Midsection
511-872	NW90NE15	0- 15	35.0*	28.0*	10.0*	8.9*	Indet. End
511-924	Test pit B	107-122	51.4	45.0	22.0	49.0	Complete
511-930	Test pit B	168-183	64.0*	57.0*	19.0	93.4*	Indet. End
511-990	NW0SW90	91-107	61.3*	40.0	15.0	40.6*	Indet. End
511-NW25SW90-5	NW30SW90	69- 76	52.0*	43.0	16.0	39.7*	Midsection
511-NW150NE0:3	NW150NE0	30- 46	110.0	50.0	29.0	126.8	Complete
511-NW155NE0:2	NW155NE0	15- 30	48.0*	41.0*	15.0	28.8*	Indet. End
511-SE20SW90:6	SE20SW90	76- 91	70.0	50.0	18.0	73.6	Complete
511-SURFACE 19	–	Surface	49.0*	39.0	20.0	36.5*	Near Complete
484-034	Abutment 4	Surface	53.6*	45.2	13.9	35.9*	Midsection
484-070	Abutment 4	Surface	43.0*	21.0*	17.0	11.9	Margin
484-344	4	20- 30	15.0*	24.7*	10.0*	3.4	Indet. End
484-345	4	20- 30	27.0*	41.0*	12.0	13.1	Margin
484-393	5	10- 20	46.0*	54.3*	19.4	48.7*	Indet. End
484-467	6	0- 10	38.6*	51.0*	17.7	36.4*	Indet. End
STAGE 3							
511-NW30SW90-6	NW30SW90	76- 91	73.0	44.0	18.0	55.6	Complete
511-SE20SW90:10	SE20SW90	137-152	57.0	40.0	15.0	33.4	Complete
511-SE20SW90: 10(2)	SE20SW90	137-152	100.0	35.0	12.5	49.5	Complete
511-SE20SW90: 1	SE20SW90	0- 23	50.5	23.0	10.0	11.2	Complete
484-429	5	30- 40	19.7*	17.5*	5.7	1.8*	Indet. End
484-470	6	0- 10	32.5	22.0	5.0	4.7	Complete
STAGE 4							
511-496	NW85NE15	40-46	47.0	18.0	8.0	5.9	Complete
511-SE20SW90: 2	SE20SW90	15-30	56.0*	47.0*	11.0*	35.7*	Midsection
484-035	Abutment 4	Surface	24.5*	17.5	7.0	3.6*	Midsection

*= incomplete; ML = maximum length; MW = maximum width; T = thickness; WT = weight; Indet. = indeterminate. Depths in centimeters; length, width, and thickness in millimeters; weight in grams.

Table A.23 Monterey chert bifaces from CA-SLO-175

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Description*
STAGE 1							
511-462	NW25NE30	15-30	51.0	35.0	16.7	26.1	Complete
511-NW70NE15:1	NW70NE15	0-15	79.5	44.5	24.0	77.5	Complete
511-NW73NE38- 51.57	NW73NE38	58	58.5	35.0	10.0	27.1	Complete
511-165NE55-93	Trench NW165	117	71.0	43.0	20.0	71.3	Complete
511-405NE64.05	Trench NW405	18	55.0	37.0	16.5	25.6	Complete
511-SE20SW90:6	SE20SW90	76-91	51.5*	40.0	11.0	23.5*	Indet. End
511-SE20SW90: 10(2)	SE20SW90	137-152	61.5*	55.0	24.0	78.3*	Indet. End
511-SE20SW90:14	SE20SW90	198-213	50.0*	54.5	20.0	57.1*	Midsection
511-SURFACE-22	–	Surface	25.0*	30.5	12.0	14.7*	MIdsection
484-105	Abutment 4	Surface	30.0*	51.7*	15.8*	26.0*	Indet. End
484-544	–	Surface	61.0*	55.8*	22.5	49.6*	Indet. End
STAGE 2							
511-76	–	Surface	52.0*	36.0	13.0	36.2*	Proximal End
511-77	–	Surface	28.5*	52.5	13.0	20.6*	Proximal End
511-203	NW98NE41	49	51.0	33.5	14.0	36.2	Complete

Table A.23 Monterey chert bifaces from CA-SLO-175 *(continued)*

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Description*
STAGE 2							
511-228	NW85NE15	0- 15	44.5*	35.5	15.0	25.2*	Distal End
511-307	NW80NE10	76- 91	33.0*	46.0	13.5	20.7*	Midsection
511-354	NW120NE10	76- 91	60.0*	43.0*	14.0	22.0*	Indet. End
511-379	NW160NE55	15- 30	53.0	16.0*	12.0*	8.5*	Reworked Margin
511-587	Test pit B	30- 46	41.0*	36.0	11.0	17.3*	Indet. End
511-627	Test pit B	61- 76	42.0*	37.6*	18.5	31.8*	Margin
511-635	Test pit B	76- 91	59.4*	49.0*	19.5	44.7*	Indet. End
511-781	NW20NE10	46- 61	35.4*	43.0*	11.6	19.7*	Proximal End
511-816	NW95NE15	15- 30	35.5*	28.5	13.0	14.9*	Indet. End
511-939	Test pit B	15- 30	30.3*	28.6	11.6	10.2*	Proximal End
511-966	–	Surface	54.7*	39.0*	21.0	26.8*	Indet. End
511-967	–	Surface	47.3	29.0	19.7	26.6	Complete
511-973	–	Surface	34.5*	65.0	21.0	40.7*	Indet. End
511-NW30SW90-2	NW30SW90	15- 30	49.0*	38.0	15.0	32.3*	Midsection
511-NW30SW90.5	NW30SW90	61- 76	52.0	41.0	13.0	23.9*	Distal End
511-NW30SW90.6	NW30SW90	76- 91	49.5*	30.0	8.5	10.5*	Indet. End
511-NW30SW95.3	NW30 SW95	30- 46	38.5*	34.0	17.0	21.9*	Indet. End
511-NW36SW90- 10	NW36SW90	137-152	45.0*	40.5*	13.0	21.7*	Proximal End
511-NE30NW5	NE30NW5	0- 15	47.0	39.5	11.5	22.7*	Proximal End
511-NW69NE34- 51.52	NW69NE34	45	49.0*	47.0*	17.0	41.3*	Indet. End
511-NW78NE35- 52.46	NW78NE35	51	49.0*	35.0	17.0	23.4*	Distal End
511-NW104NE15: 2	NW104NE15	15- 30	65.0	29.0	15.5	23.3	Complete
511-140NE-57.4	Trench NE140	27	65.0*	32.0	21.0	48.3*	Indet. End
511-180NE- 58.33	Trench NE180	61	41.0*	38.0	12.0	15.7*	Indet. End
511-NW320NE	Trench NW320	87	55.5*	28.0	18.5	30.8	Complete
511-SE15SW90:3	SE15SW90	15- 30	43.0*	47.5	14.0	30.5*	Proximal End
511-SE15SW90:5	SE15SW90	61- 76	66.0*	49.0*	27.5	89.6*	Near Complete
511-SE15SW90:7	SE15SW90	91-107	83.0	32.0	21.5	43.3	Complete
511-SE15SW90:8	SE15SW90	107-122	76.0	40.0	20.0	52.0	Complete
511-SE20SW90:3	SE20SW90	30- 46	21.0*	26.0	9.0	40.0	Complete
511-SE20SW90: 12	SE20SW90	168-183	69.0*	33.0	11.0	17.9*	Midsection
511-SE20SW90: 14	SE20SW90	198-213	49.0*	39.0	14.5	29.0*	Midsection
511-SE105SW90: 5	SE105SW90	61- 76	51.5	31.0	13.0	15.5*	Midsection
511-SURFACE-15	–	Surface	68.0	37.0	17.0	38.8	Complete
511-SURFACE-16	–	Surface	58.5*	33.5	16.0	29.6*	Near Complete
511-SURFACE-17	–	Surface	61.0	33.0	11.5	35.2	Complete
511-SURFACE-20	–	Surface	32.5*	38.0	11.0	13.0*	Proximal End
511-SURFACE-23	–	Surface	43.0*	36.5	11.0	16.6*	Proximal End
511-SURFACE-38	–	Surface	61.0*	21.5	17.0	17.9*	Near Complete
511-SURFACE-T66	–	Surface	60.0*	47.0	16.5	47.2*	Near Complete
511-B15a	Burial 15	–	50.0	34.0	15.0	25.6	Complete
484-015	Footing trench	Surface	50.0*	33.5	12.2	22.3	Midsection
484-36	Abutment 4	Surface	36.0*	32.6*	11.0	12.7*	Indet. End
484-37	Abutment 4	Surface	34.0*	28.0	14.0	12.7*	Indet. End
484-38	Abutment 4	Surface	30.0*	41.0*	10.6	14.7*	Midsection
484-40	Abutment 4	Surface	55.6*	40.0*	14.0	30.0*	Indet. End
484-44	Abutment 4	Surface	46.0*	34.0*	12.5	19.9*	Indet. End
484-85	Abutment 4	Surface	70.0*	33.0*	14.7	32.3*	Indet. End
484-86	Abutment 4	Surface	18.0*	49.0	21.0	27.6*	Midsection
484-107	1	Surface	37.0*	39.0*	17.3	20.9*	Indet. End
484-140	1	10- 20	35.0*	13.4*	6.0*	2.2*	Margin
484-158	1	30- 40	54.4*	39.4*	14.6	27.0*	Indet. End
484-159	1	40- 50	73.0*	51.0*	27.0	84.1*	Indet. End
484-235	2	40- 50	46.0*	33.0*	13.0	17.8*	Indet. End
484-298	3	30- 40	42.0*	22.0*	11.0*	9.5*	Margin
484-337	4	10- 20	60.6	40.0	19.0	4.3*	Indet. End
484-406	5	20- 30	25.0*	33.2*	14.0*	7.1*	Margin
484-407	5	20- 30	38.6*	58.0*	18.0*	42.5*	Margin
484-427	5	30- 40	25.0*	21.0*	12.0*	4.3*	Margin
STAGE 3							
511-688	Test pit B	152-168	35.0*	33.5*	9.0	10.1*	Distal End

Table A.23 Monterey chert bifaces from CA-SLO-175 *(continued)*

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Description*
STAGE 3							
511-692	Test pit B	152-168	91.0	37.0	11.0	34.0	Complete
511-802	NW160NE55	46- 61	43.0*	30.0*	10.0	14.5*	Midsection
511-937	Test pit B	15- 30	37.0*	29.0	8.4	8.2*	Distal End
511-1009	NW0SW90	107-122	64.3	28.0	10.0	21.0	Complete
511-380SW64.1	Trench NW380	18	29.0*	48.5*	11.5	14.6*	Transverse Longitudinal Fragment
511-NW97NE48- 54.18	NW97NE48	68	62.0	32.0	12.0	23.2	Complete
511-SE20SW90: 4	SE20SW90	46- 61	34.0	30.0	15.0	14.0	Compete
511-SE10SE90: 6	SE10SW90	76- 91	69.0*	44.0*	13.0	49.5*	Indet. End
511-SE20SW90.9	SE20SW90	122-137	30.5*	38.0	12.5	16.2*	Indet. End
511-NW190NE46.5 -58.95	NW190NE46.5	53	59.0	26.0	12.0	15.3	Complete
511-SE10SW90: 3	SE10SE90	30- 46	45.0*	34.0*	9.0	11.4*	Indet. End
511-SE20SW90: 13	SE20SW90	183-178	59.0	32.0	9.5	14.7*	Near Complete
511-SURFACE-21	–	Surface	35.0*	41.5*	10.5*	14.8*	Distal End
484-24	–	Surface	41.5*	38.0	9.3	12.9*	Indet. End
484-39	–	Surface	25.5*	34.0*	13.6	11.1*	Indet. End
484-131	1	10- 20	22.5*	30.0*	6.6	4.6*	Indet. End
484-162	1	30- 40	34.4*	30.5*	6.6*	4.5*	Near Complete
484-221	2	20- 30	22.5*	27.5*	6.8	4.1*	Distal End
484-236	2	40- 50	37.0*	12.0*	6.3*	2.0*	Margin
484-545	–	Surface	32.5*	25.0*	11.7	11.8*	Margin
STAGE 4							
511-227	NW85NE15	0- 15	36.0*	41.0	12.0	13.8*	Indet. End
511-379	NW160NE55	15-30	53.0	16.0	12.0	8.5	Complete
511-813	NW90NE15	30-46	39.0	17.0	8.0	4.7	Complete
511-903	NW120NE10	91-107	35.0*	21.0	9.0	6.6*	Proximal End
511-SE20SW90:3	SE20SW90	30- 46	48.0	30.5	17.0	23.2	Complete
511-SE20SW90:15	NW20SW90	220-229	42.5*	37.0	7.5	14.0*	Distal End
511-B12c	NW112NE7	161	42.0	22.5	10.0	9.0	Complete
484-23	–	Surface	33.0*	33.4*	9.0	10.0*	Medial Frag.
484-396	5	10- 20	20.0*	34.0*	9.7*	7.5*	Margin

*=incomplete; ML = maximum length; MW = maximum width; T = thickness; WT = weight; Indet. = indeterminate. Depths in centimeters; length, width, and thickness in millimeters; weight in grams.

Table A.24 Miscellaneous bifaces from CA-SLO-175

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Mat*	*Description*
511-250	NW85NE15	15-30	*	*	*	*	Coso obsid.	Stage 5 frag; 3.9 microns
511-B21a	Burial 21	174	*	*	*	*	Coso obsid.	Stage 5 frag; 4.1 microns
511-B37c	Burial 37	–	*	*	*	*	Coso obsid.	Stage 5 frag; 5.2 microns
484-06	Sewer tr.	Surface	*	*	13.0*	7.5*	Mont. chert	Margin frag.
484-17	–	Surface	49.5*	*	8.5	*	Mont. chert	Margin frag.; burnt
484-22	–	–	37.2*	32.8*	9.7*	*	Mont. chert	Indet. end
484-65	Abutment 4	Surface	*	*	*	10.7*	Mont. chert	Midsection
484-71	–	Surface	*	*	*	*	Mont. chert	Stage 5; near complete
484-88	–	Surface	*	*	*	*	Mont. chert	Stage 5
484-93	–	Surface	*	*	*	*	Mont. chert	Indet. stage; end frag.
484-206	1	70-80	*	*	*	1.6*	Mont. chert	Midsection
484-248	3	0-10	*	*	*	5.7*	Mont. chert	Margin frag.
484-288	3	20-30	*	*	*	4.1	Mont. chert	Indet. end
484-346	4	20-30	*	*	*	16.6	Franciscan	Margin; frag.

* = Indeterminate.

Table A.25 Chert bifaces from CA-SLO-1259

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Description*
FRANCISCAN CHERT BIFACES							
STAGE 1							
485-046	1	30-40	107.0*	70.0	24.5	219.9*	Indet. End
485-135	2	40-50	90.0	50.0	31.2	113.0	Complete
STAGE 3							
485-160	3	10-20	11.0*	26.7	8.5	3.0*	Medial Frag.
STAGE 4							
485-144	1	30-40	25.4*	21.0*	5.0*	2.1*	Indet. End
MONTEREY CHERT BIFACES							
STAGE 1							
485-080	2	10-20	57.0	43.0*	26.0	55.8	Near Complete
485-191	3	30-40	35.0*	22.5*	16.5*	11.6*	Margin
485-265	4	50-60	84.4*	27.2	10.0	30.0*	Indet. End
485-311	6	0-10	19.5*	35.2*	10.0*	6.1*	Indet. End
485-376	Abutment 1	–	30.0	62.0	15.0*	28.1*	Medial Frag.
STAGE 2							
485-053	1	40-50	56.4*	53.0	13.3	33.9*	Indet. End
485-077	2	10-20	45.2*	39.0*	14.1*	14.5*	Indet. End
485-079	2	10-20	30.0*	59.0	13.1	26.5*	Medial Frag.
485-093	2	20-30	*	32.4*	7.0*	2.3*	Margin
485-097	2	20-30	21.7*	26.4	12.3	5.9*	Indet. End
485-141	1	30-40	29.0*	12.3*	9.8*	3.2*	Margin
485-168	3	20-30	45.4*	34.5*	11.5	18.1*	Margin
485-224	4	10-20	46.0*	49.6	19.0	34.0*	Indet. End
485-249	4	30-40	31.8*	31.0*	17.0	11.4*	Distal End
485-367	–	Surface	32.0*	42.0*	9.6	11.6*	Indet. End
STAGE 3							
485-185	3	30-40	27.8*	25.0	8.6	5.7*	Indet. End.
STAGE 4							
485-153	3	0-10	28.0*	21.1*	8.3*	4.2*	Indet. End.
485-286	5	20-30	27.0*	20.0*	4.6	2.1*	Proximal End
MISCELLANEOUS							
485-086	2	20-30	17.0*	14.8*	9.5*	1.0*	Margin
485-096	2	20-30	13.2*	10.0*	4.1*	0.5	Indet. End
485-175	3	20-30	15.0*	21.3*	3.6*	1.3	Medial Frag.
485-192	3	30-40	19.2*	29.0*	5.5*	3.0	Medial Frag.

* = incomplete; ML = maximum length; MW = maximum width; T = thickness; WT = weight; Indet. = indeterminate; Frag. = fragment. Depths in centimeters; length, width, and thickness in millimeters; weight in grams.

Table A.26 Franciscan chert debitage from CA-SLO-175 (combined 6-mm and 3-mm mesh samples) by depth (in cm)

Flake types	*0-10*	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*	*60-70*	*70-br*	*70-80*	*80-90*	*Total*
Primary Decortication	5	3	4	3	5	1	7	1	0	0	29
Secondary Decortication	10	12	13	7	9	6	1	0	2	0	60
Rectilinear	3	0	1	2	1	0	0	0	0	1	8
Bipolar	1	0	0	1	0	0	0	0	0	0	2
Simple Interior	1	9	4	10	5	5	2	0	0	0	36
Complex Interior	6	3	3	5	6	2	2	2	2	0	31
Alternate	2	2	1	1	2	1	1	0	0	0	10
Early Biface Thinning	8	13	17	16	12	9	6	1	0	1	83
Late Biface Thinning	6	6	15	13	15	6	4	3	0	0	68
Pressure	2	0	6	3	2	4	1	1	0	0	19
Angular Shatter	34	20	15	20	49	27	47	7	4	0	223
Indeterminate Percussion	65	66	64	56	42	45	35	5	1	0	379
Edge Preparation	22	12	22	20	12	14	12	4	1	0	119
Edge Preparation/Pressure	4	0	4	4	6	9	0	2	0	0	29
Indeterminate	21	10	17	16	29	56	38	22	2	0	211
Totals	190	156	186	177	195	185	156	48	12	2	1307

Table A.27 Monterey chert debitage from CA-SLO-175 (combined 6-mm and 3-mm mesh samples) by depth (in cm)

Flake types	*0-10*	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*	*60-70*	*70-br*	*70-80*	*80-90*	*Total*
Primary Decortication	8	2	15	5	4	3	5	3	0	0	45
Secondary Decortication	26	9	17	35	23	7	4	1	2	1	125
Rectilinear	3	3	2	2	1	3	2	0	1	0	17
Bipolar	3	0	1	0	1	0	0	0	0	0	5
Simple Interior	7	7	20	11	17	12	2	0	0	0	76
Complex Interior	18	24	25	19	19	4	5	1	4	0	119
Alternate	12	7	6	6	8	12	3	0	0	1	55
Early Biface Thinning	65	52	90	76	50	39	22	3	9	0	406
Late Biface Thinning	63	57	72	77	58	42	18	6	6	0	399
Pressure	20	15	30	36	55	24	15	8	2	2	207
Angular Shatter	43	44	69	35	24	28	9	11	4	1	268
Indeterminate Percussion	347	253	300	286	189	168	105	15	18	9	1690
Edge Preparation	106	78	122	82	147	130	82	34	17	3	801
Edge Preparation/Pressure	20	23	22	18	40	20	12	4	1	0	160
Indeterminate	189	74	126	162	222	281	151	143	8	5	1361
Total	930	648	417	850	858	773	435	229	72	22	5734

Table A.28 Franciscan chert debitage from CA-SLO-175 unit 1 (3-mm mesh, water screened) by depth (in cm)

Flake types	*0-10*	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*	*60-70*	*70-br*	*Total*
Primary Decortication	1	2	2	1	1	0	7	1	15
Secondary Decortication	2	2	2	3	1	0	1	0	11
Rectilinear	2	0	0	1	0	0	0	0	3
Bipolar	1	0	0	1	0	0	0	0	2
Simple Interior	0	7	0	2	0	3	2	0	14
Complex Interior	1	0	0	1	1	0	1	2	6
Alternate	0	1	0	0	0	1	1	0	3
Early Biface Thinning	3	3	4	3	2	2	0	1	18
Late Biface Thinning	1	3	5	5	7	0	0	3	24
Pressure	2	0	5	1	2	4	1	1	16
Angular Shatter	6	2	2	8	14	13	42	7	94
Indeterminate Percussion	22	17	22	20	14	20	26	5	146
Edge Preparation	3	2	7	7	8	8	4	4	43
Edge Preparation/Pressure	1	0	4	2	6	9	0	2	24
Indeterminate	6	3	9	10	15	46	33	22	144
Total	51	42	62	65	71	106	118	48	563

Table A.29 Monterey chert debitage from CA-SLO-175 unit 1 (3-mm mesh, water screened) by depth (in cm)

Flake types	*0-10*	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*	*60-70*	*70-80*	*Total*
Primary Decortication	1	1	8	4	2	2	5	3	26
Secondary Decortication	5	1	3	13	5	0	1	1	29
Rectilinear	2	2	0	2	1	1	0	0	8
Bipolar	3	0	0	0	0	0	0	0	3
Simple Interior	4	2	6	4	4	3	2	0	25
Complex Interior	5	11	9	4	3	1	1	1	35
Alternate (side struck)	3	0	3	1	2	3	1	0	13
Early Biface Thinning	11	12	12	22	10	9	4	3	83
Late Biface Thinning	11	16	22	42	19	13	5	6	134
Pressure	8	5	12	21	48	18	8	8	128
Angular Shatter	19	18	28	16	7	15	4	11	118
Indeterminate Percussion	117	50	103	79	55	53	36	15	508
Edge Preparation	0	20	44	41	83	83	44	34	349
Edge Preparation/Pressure	13	29	16	8	4	92			
Indeterminate	98	17	66	82	174	226	123	143	929
Total	287	163	330	344	442	443	242	229	2480

Table A.30 Franciscan chert debitage from CA-SLO-1259 (combined 3-mm and 6-mm mesh samples)

				Depth (cm				
Flake types	*0-10*	*10-20*	*20-30*	*20-30 Feature*	*30-40*	*40-50*	*50-60*	*Total*
Primary Decortication	7	9	5	0	8	8	0	37
Secondary Decortication	8	8	11	0	14	4	0	45
Rectilinear	0	0	1	0	0	0	0	1
Bipolar	0	3	0	0	1	0	0	4
Simple Interior	7	11	12	0	8	6	0	44
Complex Interior	5	8	2	1	5	6	0	27
Alternate	3	3	2	0	1	0	0	9
Early Biface Thinning	6	9	16	0	13	6	0	50
Late Biface Thinning	4	10	16	1	12	6	0	49
Pressure	5	11	4	0	5	5	0	30
Angular Shatter	74	57	44	13	54	20	14	276
Indeterminate Percussion	88	147	107	6	92	70	0	510
Edge Preparation	24	34	23	2	30	5	0	118
Edge Preparation/Pressure	3	17	5	1	8	6	0	40
Indeterminate	90	176	276	4	222	148	7	923
Total	324	503	524	28	473	290	21	2163

Table A.31 Monterey chert debitage from CA-SLO-1259 (combined 3-mm and 6-mm mesh samples) by depth (in cm)

Flake types	*0-10*	*10-20*	*20-30*	*20-30 Feature*	*30-40*	*40-50*	*50-60*	*Total*
Primary Decortication	2	9	22	4	8	6	0	51
Secondary Decortication	10	15	38	4	33	12	0	112
Rectilinear	0	1	1	1	1	0	0	4
Bipolar	0	0	1	0	0	0	0	1
Simple Interior	19	24	8	2	21	10	2	86
Complex Interior	7	14	26	1	11	6	1	66
Alternate	3	10	11	0	7	0	0	31
Early Biface Thinning	30	58	59	2	55	17	1	222
Late Biface Thinning	32	40	86	8	87	42	6	301
Pressure	35	60	96	3	41	24	5	264
Angular Shatter	56	51	37	3	59	26	0	232
Indeterminate Percussion	274	558	754	38	583	248	18	2473
Edge Preparation	108	263	242	19	217	105	11	965
Edge Preparation/Pressure	22	57	46	3	71	30	5	234
Indeterminate	558	1367	1772	22	1451	794	18	5982
Total	1156	2527	3199	110	2645	1320	67	11,024

Table A.32 Franciscan chert debitage from CA-SLO-1259 units 1 and 2 (3-mm mesh, water screened) by depth (in cm)

Flake types	*0-10*	*10-20*	*20-30*	*30-40*	*40-50*	*Total*
Primary Decortication	0	1	2	2	4	9
Secondary Decortication	3	7	4	7	1	22
Rectilinear	0	0	1	0	0	1
Bipolar	0	3	0	1	0	4
Simple Interior	3	3	6	3	2	17
Complex Interior	2	5	0	2	4	13
Alternate	2	3	0	0	0	5
Early Biface Thinning	5	5	8	5	4	27
Late Biface Thinning	3	6	10	4	2	25
Pressure	3	7	2	0	2	14
Angular Shatter	28	25	28	33	13	127
Indeterminate Percussion	49	80	59	51	50	289
Edge Preparation	17	26	17	16	2	78
Edge Preparation/Pressure	3	13	3	5	1	25
Indeterminate	82	161	272	207	139	861
Total	200	345	412	336	224	1517

Table A.33 Monterey chert debitage from CA-SLO-1259 units 1 and 2 (3-mm mesh, water screened) by depth (in cm)

Flake types	*0-10*	*10-20*	*20-30*	*30-40*	*40-50*	*Total*
Primary Decortication	0	2	10	0	0	12
Secondary Decortication	4	6	16	18	8	52
Rectilinear	0	1	0	1	0	2
Bipolar	0	0	1	0	0	1
Simple Interior	10	11	4	12	6	43
Complex Interior	4	12	11	4	1	32
Alternate	2	7	4	1	0	14
Early Biface Thinning	12	22	36	25	12	109
Late Biface Thinning	12	19	46	32	20	129
Pressure	23	36	60	20	8	147
Angular Shatter	34	25	24	30	16	129
Indeterminate Percussion	145	361	508	300	148	1462
Edge Preparation	65	186	154	120	70	595
Edge Preparation/Pressure	12	44	25	43	14	138
Indeterminate	526	1292	1659	1348	743	5568
Totals	849	2024	2558	1954	1046	8431

Table A.34 Flake tools from CA-SLO-175

Specimen	*Unit*	*Depth (cm)*	*Flake type*	*Material*
UNIFACES				
484-069	Abutment 4	–	Angular shatter	Monterey chert
484-230	2	30-40	Rectilinear	Franciscan chert
484-328	4	0-10	Indeterminate percussion	Monterey chert
484-329	4	0-10	Indeterminate percussion	Monterey chert
FORMAL				
484-167	1	30-40	Indeterminate percussion	Franciscan chert
BIFACIAL				
484-510	6	40-50	–	Monterey chert drill
484-547	–	Surface	Angular shatter	Franciscan chert
EDGE-MODIFIED FLAKES (CASUAL TOOLS)				
484-002	–	Surface	Secondary decortication	Franciscan chert
484-004	–	Surface	Late biface thinning	Monterey chert
484-016	–	Surface	Secondary decortication	Monterey chert
484-025	–	Surface	Indeterminate percussion	Monterey chert
484-033	Abutment 4	Surface	Simple interior	Franciscan chert
484-048	Abutment 4	Surface	Simple interior	Franciscan chert
484-049	Abutment 4	Surface	Secondary decortication	Monterey chert
484-051	Abutment 4	Surface	Secondary decortication	Franciscan chert
484-057	Abutment 4	Surface	Secondary decortication	Franciscan chert
484-068	Abutment 4	Surface	Complex interior	Monterey chert
484-087	Abutment 4	Surface	Complex interior	Franciscan chert
484-100	Abutment 4	Surface	Indeterminate percussion	Monterey chert
484-103	Abutment 4	Surface	Secondary decortication	Franciscan chert
484-104	Abutment 4	Surface	Complex interior	Monterey chert
484-109	1	Surface	Rectilinear	Monterey chert
484-120	1	0-10	Rectilinear	Franciscan chert
484-123	1	0-10	Late biface thinning	Monterey chert
484-130	1	10-20	Primary decortication	Franciscan chert
484-139	1	10-20	Indeterminate percussion	Monterey chert
484-156	1	20-30	Simple interior	Monterey chert
484-164	1	30-40	Rectilinear	Indeterminate
484-178	1	40-50	Late biface thinning	Monterey chert
484-198	1	60-70	Rectilinear	Franciscan chert
484-213	2	10-20	Middle biface thinning	Monterey chert
484-237	2	40-50	Simple interior	Monterey chert
484-242	–	–	Complex interior	Franciscan chert
484-244	3	0-10	Indeterminate percussion	Franciscan chert
484-245	3	0-10	Angular shatter	Monterey chert
484-247	3	0-10	Simple interior	Monterey chert

Table A.34 Flake tools from CA-SLO-175 *(continued)*

Specimen	*Unit*	*Depth*	*Flake type*	*Material*
EDGE-MODIFIED FLAKES (CASUAL TOOLS)				
484-249	3	0-10	Cobble	Monterey chert
484-250	3	0-10	Early biface thinning	Monterey chert
484-356	4	20-30	Indeterminate percussion	Monterey chert
484-257	3	10-20	Indeterminate percussion	Monterey chert
484-272	3	10-20	Early biface thinning	Franciscan chert
484-273	3	10-20	Primary decortication	Monterey chert
484-281	3	20-30	Complex interior	Franciscan chert
484-286	3	20-30	Early biface thinning	Monterey chert
484-287	3	20-30	Secondary decortication	Monterey chert
484-294	3	30-40	Simple interior	Monterey chert
484-295	3	30-40	Early biface thinning	Franciscan chert
484-296	3	30-40	Primary decortication	Franciscan chert
484-297	3	30-40	Indeterminate percussion	Franciscan chert
484-306	3	40-50	Secondary decortication	Monterey chert
484-318	3	50-60	Rectilinear	Monterey chert
484-321	3	50-60	Primary decortication	Indeterminate
484-327	4	0-10	Rectilinear	Franciscan chert
484-334	4	10-20	Complex interior	Monterey chert
484-343	4	20-30	Rectilinear	Franciscan chert
484-348	4	20-30	Secondary decortication	Franciscan chert
484-349	4	20-30	Rectilinear	Monterey chert
484-357	4	20-30	Simple interior	Monterey chert
484-374	4	40-50	Indeterminate percussion	Monterey chert
484-388	5	0-10	Rectilinear	Franciscan chert
484-389	5	0-10	Indeterminate percussion	Monterey chert
484-390	5	0-10	Indeterminate percussion	Franciscan chert
484-394	5	10-20	Indeterminate percussion	Franciscan chert
484-395	5	10-20	Indeterminate percussion	Franciscan chert
484-414	5	20-30	Early biface thinning	Monterey chert
484-416	5	20-30	Indeterminate percussion	Franciscan chert
484-425	5	30-40	Indeterminate percussion	Monterey chert
484-435	5	30-40	Simple interior	Monterey chert
484-461	5	60-70	Complex interior	Monterey chert
484-468	6	0-10	Simple interior	Monterey chert
484-469	6	0-10	Complex interior	Franciscan chert
484-472	6	0-10	Indeterminate percussion	Monterey chert
484-495	6	30-40	Rectilinear	Monterey chert
484-496	6	30-40	Simple interior	Franciscan chert
484-520	6	50-60	Simple interior	Monterey chert
484-533	6	60-70	Rectilinear	Monterey chert
484-541	6	70-80	Rectilinear	Monterey chert

Table A.35 Flake tools from CA-SLO-1259

Specimen	*Unit*	*Depth (cm)*	*Flake Type*	*Material*
UNIFACES				
485-023	1	10-20	Primary decortication	Monterey chert
485-330	6	20-30	Cobble	Franciscan chert
EDGE MODIFIED FLAKES (CASUAL TOOLS)				
485-010	1	0-10	Rectilinear	Franciscan chert
485-015	1	10-20	Late biface thinning	Monterey chert
485-016	1	10-20	Rectilinear	Monterey chert
485-021	1	10-20	Indeterminate percussion	Franciscan chert
485-084	2	10-20	Indeterminate percussion	Monterey chert
485-087	2	20-30	Indeterminate percussion	Monterey chert
485-091	2	20-30	Bifacial secondary decortication	Monterey chert
485-121	2	40-50	Complex interior	Franciscan chert
485-139	1	30-40	Late biface thinning	Monterey chert
485-170	3	20-30	Indeterminate percussion	Monterey chert
485-176	2	20-30	Indeterminate percussion	Monterey chert
485-193	3	30-40	Primary decortication	Monterey chert

Table A.35. Flake tools from CA-SLO-1259 *(continued)*

Specimen	*Unit*	*Depth*	*Flake type*	*Material*
485-195	3	30-40	Indeterminate percussion	Monterey chert
485-228	4	10-20	Rectilinear	Franciscan chert
485-233	4	20-30	Indeterminate percussion	Monterey chert
485-235	4	20-30	Complex interior	Monterey chert
485-236	4	20-30	Indeterminate percussion	Monterey chert
485-257	4	40-50	Secondary decortication	Indeterminate
485-276	5	10-20	Complex interior	Monterey chert
485-309	6	0-10	Early biface thinning	Monterey chert
485-314	6	10-20	Rectilinear	Monterey chert
485-315	6	10-20	Indeterminate percussion	Monterey chert
485-332	6	20-30	Simple interior	Indeterminate
485-364	Abutment 1	Surface	Bifacial secondary decortication	Monterey chert

Table A.36 Contracting-stemmed projectile points from CA-SLO-175

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
511-044		SURFACE	Chert-Fran	41.0*	34.0*	8.0	11.9	14.0	18.0	–	175	70	70	2.6*	21%*
511-200	NW80NE10	15-30	Chert-Mont	55.0	22.5	10.0	9.2	8.0	11.5	170	170	80	80	2.4	45%
511-230	NW85NE15	0-15	Chert	41.0	21.0	8.0	4.7	–	–	160	165	70	80	1.9	36%
511-247	NW90NE15	0-15	Chert-Mont	47.0	17.5	8.5	4.7	–	–	–	–	–	–	2.6	40%
511-472	NW25NE30	30-46	Chert	46.0	18.5	6.5	4.2	–	–	–	–	–	–	2.4	43%
511-492	NW25NE30	107-122	Chert	33.0*	23.0	9.0	6.1	–	16.0	170	170	80	80	2.6*	39%*
511-492	NW25NE30	107-122	Chert-Fran	33.0* (61.0)	23.0	9.0	6.1*	–	16.0	170	80	80	80	(2.6)	(39%)
511-497	NW85NE15	30-46	Chert-Mont	44.0	26.5	9.0	8.7	11.0	11.5	170	170	90	90	1.6	31%
511-545	Test pit B	30-46	Chert-Mont	51.0*	38.5	10.5	14.0	–	16.0	170	165	70	80	2.4*	30%*
511-546	Test pit B	30-46	Chert-Mont	40.0*	26.0	6.0	4.7*	–	13.0	–	160	70	80	1.8*	36%*
511-547	Test pit B	30-46	Chert-Fran	39.0*	23.0*	7.0	3.8*	–	14.0	160	160	80	80	1.6*	43%*
511-579	Test pit B	15-30	Chert-Mont	42.0* (61.0)	26.0* (33.0)	8.0	7.0*	8.0	17.0	170	170	80	80	(2.3)	(36%)
511-585	Test pit B	30-46	Chert-Fran	48.0*	27.0*	8.0	8.2*	13.0	16.0	344	–	80	80	2.6*	27%*
511-586	Test pit B	30-46	Chert-Fran	36.0	34.0	9.0	7.7	–	8.5	160	150	–	–	1.0	–
511-612	Test pit B	46-61	Chert-Mont	39.0*	34.0	7.0	6.9*	16.0	18.0	–	–	80	75	2.5*	31%*
511-652	Test pit B	76-91	Chert-Mont	32.0	20.5	7.5	5.0	–	–	–	–	–	–	1.5	78%
511-662	Test pit B	107-122	Chert-Mont	48.0*	38.0	9.0	14.0	10.0	24.0	170	170	60	70	1.9*	–
511-687	Test pit B	152-168	Chert-Fran	43.0*	31.0	12.0	13.3	–	20.0	90	170	70	70	2.4*	30%*
511-689	Test pit B	160-168	Chert-Mont	41.5	21.5	5.5*	4.1*	–	–	–	–	–	–	1.9	24%
511-702	NW0SW90	61-76	Chert	30.0	19.0	5.5*	2.7*	–	–	–	–	–	–	1.5	40%
511-723	NW0SW90	15-30	Chert-Fran	51.5*	31.5	9.0	11.5*	18.0*	21.0	175	174	80	80	2.4*	28%*
511-726	NW0SW90	15-30	Chert-Mont	40.5*	27.0	10.0	8.9*	–	17.5	160	160	60	60	1.5*	46%*
511-785	NW120NE10	46-61	Chert-Mont	26.0*	27.0	8.0	4.1*	–	8.0	160	165	90	80	1.5*	15%*
511-801	NW160NE55	46-61	Chert-Fran	62.0	35.0	10.0	14.5	–	15.0	170	170	80	80	1.7	35%
511-855	NW80NE10	30-46	Chert-Fran	41.0* (54.0)	19.0	8.0	6.6*	9.0	11.5	180	180	–	–	(2.8)	(29%)
511-892	NW95NE15	30-46	Chert-Mont	31.0	18.0	6.0	2.4	–	–	–	–	–	–	1.7	45%
511-962	SURFACE		Chert-Mont	40.0* (70.0)	22.0	7.0	7.5	–	17.0	173	174	70	60	(3.1)	(28%)
511-989	NW0SW90	91-107	Chert-Mont	61.0	23.0	7.5	8.8	9.0	12.0	175	170	70	80	2.6	22%
511-NW30 SW90:2	NW30SW90	46-61	Chert-Mont	28.0*	28.0	9.0	5.6*	9.0	18.0	–	–	80	80	–	–
511-NW30 SW90:5	NW30SW90	61-76	Chert-Mont	44.5	27.0	10.0	8.9	–	–	–	–	–	–	1.6	42%
511-NW39 NE5-47.26	NW39NE5	120	Chert	72.5	31.0	11.0	19.6	9.0	9.0	175	167	70	80	2.3	13%
511-NW58 NE33-50.65	NW58NE33	57	Chert-Mont	24.0*	38.0	11.0	6.2	11.0	21.0	–	–	70	90	2.1*	25%*
511-NW86 NE49-53.29	NW86NE49- 53.29	42	Chert Mont	37.0* (54.0)	25.0	9.5	7.8*	–	13.0	170	170	70	80	(2.1)	(31%)
511-NW86 NE49-53.29	NW86NE49	134	Chert-Mont	37.0*	25.0	9.5	7.8	–	13.0	170	170	70	80	2.1*	31%*
511-NW140 E0:3	NW140NE0	30-46	Chert	35.0*	35.0	7.5	9.0*	–	19.0	165	165	80	–	2.2*	31%*
511-NW140 NE0:3	NW140NE0:3	30-46	Chert	35.0*	35.0	7.5	9.0	–	19.0	165	165	80	–	2.2*	31%*

Table A.36 Contracting-stemmed projectile points from CA-SLO-175 (*continued*)

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
511-NW150 NE0:1	NW150NE0:1	0-15	Chert-Mont	25.0*	26.0*	6.0	2.6	6.5	9.0	170	160	80	80	1.3*	30%*
511-NW150 NE0:5	NW150NE0	61-76	Chert-Mont	47.5* (65.0)	21.5	10.0	9.3*	–	11.0	180	170	80	70	(3.0)	(27%)
511-NW153 NE36-56.59	NW153NE36	143	Chert-Fran	37.0	19.0	7.0	4.3	10.5	15.0	165	160	70	70	1.9	35%
511-NW155 NE01B	NW155NE0	0-15	Chert	53.5	28.0	9.0	11.3	–	–	170	–	70	60	1.9	42%
511-NW155 NE0:4	NW150NE0:4	46-91	Chert-Mont	33.5*	31.0	7.0	5.4*	9.0	12.5	150	150	70	80	1.7*	27%*
511-NW175 NE67	NW175NE67		Chert-Mont	53.0	29.0	9.0	8.1	–	–	–	–	–	–	1.8	–
511-SE10 SW90:2B	SE10SW90	15-30	Chert-Fran	40.0	29.0*	7.5	5.5*	8.0	14.5	150	150	80	80	1.3*	42%*
511-SE10 SW90:5/A	SE10SW90	61-76	Chert-Mont	47.0	21.0	7.0	7.3	9.0	16.0	180	179	70	80	2.2	24%
511-SE10 SW90:5/B	SE10SW90	61-76	Chert-Fran	47.0*	29.5	11.0	15.9*	12.0	–	–	–	–	–	2.5*	38%*
511-SE10 SW90:7	SE10SW90	76-91	Chert-Mont	43.0*	27.0	9.0	8.5	–	11.5	160	170	70	70	1.7*	39%*
511-SE15 SW90:7	SE15SW90:7	91-107	Chert-Mont	60.0	30.0	9.0	12.4	16.5	25.0	160	160	80	80	2.0	51%
511-SE15 SW90:8	SE15SW90	107-122	Chert-Fran	55.0	23.0	8.0	8.4	7.0	15.0	170	170	70	70	2.3	16%
511-SE20 SW90:3/B	SE20SW90	30-46	Chert-Mont	33.0	18.0	6.5*	2.8*	–	–	–	–	–	–	1.8*	36%*
511-SE20 SW90:4	SE20SW90	46-61	Chert-Mont	41.0	25.0	8.0*	6.5*	9.0	–	–	–	–	–	1.6*	39%*
511-SE20 SW90:5	SE20SW90:5	61-76	Chert-Mont	43.0* (57.0)	19.5	10.0	7.0*	–	12.5	170	170	65	70	(2.9)	(36%)
511-SE20 SW90:6B	SE20SW90:6B	76-91	Chert-Mont	65.0	21.5	9.0	11.5	9.0	14.0	176	176	80	70	3.0	21%
511-SE20 SW90:6/C	SE20SW90	76-91	Chert-Fran	66.5	27.5	9.0	14.8	12.0	18.0	170	170	80	80	2.4	24%
511-SE20 SW90:9	SE20SW90:9	122-137	Chert-Mont	53.0	27.5	10.0	10.8	–	15.0	170	170	70	80	1.9	26%
511-SE20 SW90:9	SE20SW90:9	122-37	Chert-Mont	53.0	27.5	10.0	10.8	–	15.0	170	170	70	80	1.9	26%
511-SE20 SW90:13	SE20SW90:13	183-198	Chert-Fran	32.0*	36.0	9.0	6.9	13.0	17.0	170	160	80	90	2.6	23%*
511-1966 SURFACE 29	SURFACE 29		Chert	51.0* (54.0)	14.0	9.5	5.7*	–	–	–	–	–	–	(3.8)	(25%)
511-1966 SURFACE30	SURFACE 30		Chert-Fran	69.5	33.0	11.5	20.0	–	24.5	170	170	70	60	2.1	33%
511-1966 SURFACE31	SURFACE 31		Chert-Mont	43.0	28.5	8.5	8.5	8.0	16.0	–	–	–	–	1.5	36%
511-1966 SURFACE32	SURFACE 32		Chert-Mont	54.0	38.0	9.0	12.0	–	14.0	170	170	60	70	1.4	27%
511-1966 SURFACE76	SURFACE 76		Chert-Mont	59.5	26.5	7.0	10.3	10.5	16.0	170	170	70	80	2.2	23%
511-1966 SURFACE79	SURFACE 79		Chert-Mont	53.5*	37.0	8.5	15.0*	11.0	18.0	175	170	80	70	2.0*	25%*
511-1966-26	SURFACE26		Chert-Mont	41.0* (51.5)	19.5	7.0	5.6*	5.5	13.0	175	170	70	70	(2.6)	(34%)
511-1966-33	SURFACE33		Chert-Fran	48.0	24.0	7.0	5.3	–	15.0	170	170	70	70	2.0	27%
511-1966-71	SURFACE 71		Chert-Mont	39.5*	25.5	7.0	5.8*	12.0	–	–	–	–	–	2.2*	23%*
511-1966-77	SURFACE77		Chert-Mont	41.5* (70.5)	19.0	6.0	5.4*	8.0*	13.0	175	175	80	80	(3.7)	(21%)
511-B13a	BURIAL 13	145	Chert-Mont	49.0*	25.5	7.0	5.8*	–	10.0	175	170	80	80	2.7*	18%*
511-B13b	BURIAL13b	150	Chert-Mont	64.0* (88.0)	19.0	7.0	8.4*	7.0	15.0	178	177	70	80	(4.6)	(21%)
511-B14c	BURIAL14c	86	Chert-Mont	39.0	17.0	6.5	3.7	6.0	10.0	175	170	80	70	2.2	17%
511-B20a	BURIAL 20		Chert-Mont	39.5*	33.0	8.5	6.8*	6.0	7.0	160	160	80	80	5.7*	40%*
484-084	ABUTMENT 4		Chert-Mont	45.0	24.0	9.5	6.2	–	11.0	160	160	80	80	1.8	42%
484-099	ABUTMENT 4		Chert-Mont	38.0*	27.5*	7.0	5.0*	–	15.0	170	170	60	70	1.5*	21%*

Table A.36 Contracting-stemmed projectile points from CA-SLO-175 (*continued*)

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
484-210	2	0-10	Chert-Mont	51.0	29.0*	8.0	7.7*	5.0	19.0	160	160	80	75	1.5*	47%*
484-222	2	20-30	Chert-Fran	35.0*	31.0*	12.0*	10.6*	8.0	24.5	–	–	80	80	–	–
484-313	3	40-50	Chert-Mont	29.0*	27.5	8.0	5.0*	10.0*	17.0	170	170	70	70	2.3*	34%*
484-399	5	10-20	Chert	42.0*	28.0	14.0	11.0	9.0	19.0	–	–	70	80	–	–

*= incomplete; () estimated measurement depths in centimeters; length, width, and thickness in millimeters; weight in grams ML = maximum length; MW = maximum width; T = thickness; WT = weight; WB = basal width; NW = neck width; DSA1 = distal shoulder angle 1; DSA2 = distal shoulder angle 2; PSA1 = proximal shoulder angle 1; PSA2 = proximal shoulder angle 2; LW = length width ratio; MWP = maximum width position.

Table A.37 Año Nuevo Long Stemmed projectile points from CA-SLO-175

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
511-45	–	Surface	Chert-Fran	65.0	31.0	15.0	20.7	–	–	–	–	–	–	2.0	75%
511-473	NW25NE30	30-46	Chert-Fran	64.0	21.0	9.5	10.9	–	–	–	–	–	–	3.0	45%

Table A.38 Rossi Square-stemmed projectile points from CA-SLO-175

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
511-584	Test pit B	30-46	Chert-Mont	7.0 (45.0)	22.0	7.0	6.2	20.5	20.8	–	–	93	95	(2.0)	(46.7%)
484-229	2	30-40	Chert-Mont	56.0* (57.0)	36.0* (39.0)	11.0	20.1	18.0	18.0	170	170	80	80	(1.4)	(28%)

Table A.39 Large Concave Base projectile points from CA-SLO-175

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
511-358	NW160NE55	107-122	Chert-Fran	44.0	29.0	9.0	9.9	–	–	–	–	–	–	1.5	–
511-481	NW25NE30	46-61	Chert-Mont	45.5	25.0	8.0	8.2	25.0	–	–	–	–	–	1.5	–
511-SE20 SW90:10	SE20SW90	137-152	Chert-Mont	39.0	21.0	7.0	5.0	2.0	–	–	–	–	–	1.8	–
484-503	6	40-50	Chert	19.5*	22.0*	6.0	2.2*	22.0	19.0	–	–	80	90	–	–

Table A.40 Large Side-notched projectile points from CA-SLO-175

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
511-323	NW95NE15	30-46	Chert-Mont	47.0* (85.0)	23.0	11.0	11.9*	13.0	14.0	185	188	90	100	3.6	21%
511-663	Test pit B	107-122	Chert-Mont	58.0	26.0	8.5	12.6	23.5	15.0	180	180	176	180	2.2	29%
511-686	Test pit B	152-168	Chert-Mont	33.0*	32.0*	7.5*	6.4*	16.5	25.0	180	180	140	150	–	–
484-160	1	30-40	Chert-Mont	35.0* (53.0)	25.0	9.0	7.3	19.0	14.0	170	170	140	150	(2.1)	(24%)
484-280	3	20-30	Chert-Fran	47.5* (48.0)	26.5	8.5	9.6	26.5	17.5	160	160	140	140	(1.8)	(11%)

Table A.41 Lanceolate projectile points from CA-SLO-175

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
511-735	NW0SW90	122-137	Chert-Fran	71.0	24.0	9.5	15.4	–	–	–	–	–	–	2.9	–
511-806	NW160NE55	46-61	Chert-Mont	43.0*	30.0*	10.0	14.3	–	–	–	–	–	–	–	–
511-886	NW90NE15	76-91	Chert-Mont	58.0	19.0	11.0	11.2	–	–	–	–	–	–	–	–
511-1966	SURFACE		Chert-Fran	65.0	26.5	11.0	17.5	10.0	–	–	–	–	–	2.4	(47%)
484-196	1	50-60	Chert-Mont	61.5	40.5	12.0	29.7	–	–	–	–	–	–	–	–

Table A.42 Double Side-notched projectile points from CA-SLO-175

Specimen	*Unit*	*Depth*	*Material*	*ML*	*MW*	*TH*	*WT*	*WB*	*NW*	*DSA1*	*DSA2*	*PSA1*	*PSA2*	*LW*	*MWP*
511-B12a	NW112NE7	117	Chert-Fran	35.0	14.5	9.5	1.6	–	7.0/9.5	165/180	168/180	90/70	90/70	2.4	42%
511-B38a	BURIAL 38		Chert-Fran	31.0* (33.0)	12.5	10.0	1.2*	–	7.0	170	170	80	80	(2.6)	(42%)
511-B40a	BURIAL 40		Chert	36.0* (40.0)	15.0	4.5	1.9*	–	9.0	170	170	80	70	(2.6)	(34%)
511-B41a	BURIAL 41		Chert	38.0* (46.0)	14.5	5.0	2.4	–	8.0/9.0	170/180	170/180	70/90	90/70	(3.1)	(36%)
511-B41b	BURIAL 41		Chert	35.0* (38.0)	12.0	4.0	1.3*	–	9.0	170	170	70	70	(3.1)	(38%)

Footnote for tables A.37–A.42: *= incomplete; () estimated measurement depths in centimeters; length, width, and thickness in millimeters; weight in grams ML = maximum length; MW = maximum width; T = thickness; WT = weight; WB = basal width; NW = neck width; DSA1 = distal shoulder angle 1; DSA2 = distal shoulder angle 2; PSA1 = proximal shoulder angle 1; PSA2 = proximal shoulder angle 2; LW = length width ratio; MWP = maximum width position.

Table A.43 Small Concave Base projectile points

Specimen	Unit	Depth	Material	ML	MW	TH	WT	WB	NW	DSA1	DSA2	PSA1	PSA2	LW	MWP
511-a	– –	–	Obsidian	17.0*	10.0	–	–	11.0	–	–	–	–	–	–	–
511-200SW	– –	–	Obsidian	27.0	16.0	–	–	6.0	–	–	–	–	–	–	–

*= incomplete; depths in centimeters; length, width, and thickness in millimeters; weight in grams ML = maximum length; MW = maximum width; T = thickness; WT = weight; WB = basal width; NW = neck width; DSA1 = distal shoulder angle 1; DSA2 = distal shoulder angle 2; PSA1 = proximal shoulder angle 1; PSA2 = proximal shoulder angle 2; LW = length width ratio; MWP = maximum width position.

Table A.44 Projectile point fragments from CA-SLO-175

Specimen	Unit	Depth	Material	ML	MW	TH	WT	WB	NW	DSA1	DSA2	PSA1	PSA2	LW	MWP
511-350			Obsidian	–	–	–	–	–	–	–	–	–	–	–	–
511-369	NW160NE55	15-30	Chert-Mont	41.0* (53.0)	20.0	6.0	5.4*	–	–	–	–	–	–	(2.6)	(37%)
511-426	NW220NE5	0-15	Chert-Mont	24.5* (48.0)	16.0	6.0	2.2	7.5	13.5	180	170	70	70	(3.0)	(27%)
511-447	N220NE5	91-107	Chert-Mont	20.5*	13.5*	3.0	1.0*	–	–	–	–	–	–	–	–
511-625	Test pit B	61-76	Chert-Fran	28.0*	24.0*	8.0	6.0*	–	–	–	–	–	–	–	–
511-634	Test pit B	76-91	Chert-Fran	51.5*	20.5*	8.0	7.3*	–	–	–	–	–	–	–	–
511-799	NW160NE55	46-61	Chert-Mont	33.0*	15.0*	4.0*	2.3	–	–	–	–	–	–	–	–
511-856	NW80NE10	30-46	Chert-Mont	35.0*	25.0	8.0	4.7*	–	–	–	–	–	–	–	–
511-926	Test pit B	168-183	Chert-Fran	32.0*	21.0*	9.0*	6.1*	–	–	–	–	–	–	–	–
511-958		SURFACE	Chert-Mont	31.5*	20.5*	6.0*	3.4*	–	–	–	–	–	–	–	–
511-NW75 NE41:52.32	NW75NE41	53	Chert-Mont	25.0	34.0	10.0	8.7*	34.0	–	–	–	–	–	0.7	–
511-NW150 NE0	NW150NE0:5	61-76	Chert-Mont	18.5*	28.0*	5.0	2.8*	28.0*	–	–	–	–	–	–	–
511-SE20 SW90:10(2)	SE20SW90	141-152	Chert-Mont	51.0	23.0	7.5	8.7	–	–	–	–	–	–	–	–
511-B27a	NW12NE61	55.25	Chert-Fran	72.0*	20.0	14.0	19.9	–	–	–	–	–	–	–	–
511-b			Obsidian	–	–	–	–	–	–	–	–	–	–	–	–
484-125	1	1-10	Chert-Mont	17.0*	19.0*	7.5*	1.9	–	–	–	–	–	–	–	–
484-525	6	50-60	Chert-Mont	–	–	–	–	–	–	–	–	–	–	–	–
484-546	SURFACE		Obsidian	–	–	–	–	–	–	–	–	–	–	–	–

*= incomplete; () estimated measurement depths in centimeters; length, width, and thickness in millimeters; weight in grams ML = maximum length; MW = maximum width; T = thickness; WT = weight; WB = basal width; NW = neck width; DSA1 = distal shoulder angle 1; DSA2 = distal shoulder angle 2; PSA1 = proximal shoulder angle 1; PSA2 = proximal shoulder angle 2; LW = length width ratio; MWP = maximum width position.

Table A.45 Projectile points from CA-SLO-1259

Specimen	Unit	Depth	Material	ML	MW	TH	WT	WB	NW	DSA1	DSA2	PSA1	PSA2	LW	MWP
CONTRACTING-STEMMED															
485-027	1	10-20	Chert-Mont	63.5	24.4	8.2	11.5	–	19.7	–	–	85	82	2.6	37.3%
485-048	1	30-40	Chert-Mont	52.3	31.3	8.3	9.1	–	16.0	180	190	70	70	1.3	35%
485-115	2	30-40	Chert-Fran	45.0	26.0	9.5	6.7	–	21.0	–	–	70	70	1.7	44%
485-321	6	10-20	Chert-Mont	37.5	24.0	7.0	4.5	–	–	–	–	72	73	1.6	53.3%
SQUARE-STEMMED (ROSSI)															
484-167	3	20-30	Chert-Fran	–	–	–	2.5*	19.0	18.2	–	–	93	95	–	–
484-371	Abutment 4	Surface	Chert-Fran	–	–	5.0*	3.7*	20.0	17.5	180	182	94	93	–	–
STEMMED CONCAVE BASE															
485-304	5	30-40	Chert-Mont	42.0	21.0	7.3	5.4	15.5	17.0	–	–	94	90	2.0	38%
FRAGMENTS															
485-002	1	0-10	Chert-Fran	–	–	12.0*	8.8	–	19.0	205	195	89	87	–	–
485-003	1	0-10	Chert-Mont	–	19.0	5.4	2.6*	–	–	–	–	–	–	–	–
485-127	–	–	Obsidian**	–	–	–	–	–	–	–	–	–	–	–	–
485-143	1	30-40	Chert-Mont	–	–	3.0*	0.2*	–	–	–	–	–	–	–	–

* = incomplete; () estimated measurement ** = Coso, 3.2 microns depths in centimeters; length, width, and thickness in millimeters; weight in grams ML = maximum length; MW = maximum width; T = thickness; WT = weight; WB = basal width; NW = neck width; DSA1 = distal shoulder angle 1; DSA2 = distal shoulder angle 2; PSA1 = proximal shoulder angle 1; PSA2 = proximal shoulder angle 2; LW = length width ratio; MWP = maximum width position.

Table A.46 Milling equipment from CA-SLO-175

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WS*	*EX*	*Material*	*H-A*
MILLING STONES									
511-23	1.2S/18.4E	Surface	*	*	66.9	flat	yes	Sandstone	yes
511-28	2.05/3E	Surface	*	*	79.3	shc 3.2 de	no	Granitic	no
511-39	"west of highway"	Surface	*	*	40.7	flat	no	Igneous	yes
511-340SW	NW340SW 60.82	106	*	*	43.9	shc	yes	Granitic	yes
511-NW56	NW56NE49 NE49:51.17	0-15	*	*	56.8	basin	yes 23.8 di 2.0 de	Granitic	yes
511-10NE	NW10NE 45.23	87	*	*	74.1	flat	yes	Granitic	no
511-1270SW	NW270SW 60.44	71	*	*	43.0	shc	yes	Sandstone	yes
511-NW148 NE20:55.76	NW148NE20	90-100	121	111	109.0	shc 14.0 de	no	Sandstone	yes
511-280SW	NW280SW 65.75	0-15	175	160	123.0	shc	no 36.0 de	Sandstone	no
484-030	Abutment 4		*	*	48.8	shc	* 7.8 de	Granitic	?
485-374	2	20-30	*	25.0	55.6	flat	yes	Granitic	yes
BOWL MORTARS									
511-NW390SW-61.50	NW390SW	96	*	*	*	*	*	Granitic	
511-NW155NE0:4	NW155NE0	46	*	*	*	*	*	Granitic	
511-NW108NE18-53.65	NW108NE18	71	*	*	*	*	*	Granitic	
511-NW280NE-59.49	NW280NE	106	*	*	*	*	*	Granitic	
511-SE15SW90-6	SE15SW90	70-91	*	*	*	*	*	Granitic	
511-NW109NE41-54.17	NW109NE41	41	*	*	*	*	*	Granitic	
511-NW240SW-56.25	NW240SW	183	*	*	*	*	*	Granitic	
511-NW71NE18-51.33	NW71NE18	130	*	*	*	*	*	Granitic	
511-NE189NE58-57.42	NW189NE58	98	*	*	*	*	*	Granitic	
484-412	5	20-30	*	*	*	*	*	Granitic	

* = incomplete bowl mortars. Note: All artifact measurements taken in millimeters. unit depths in centimeters. ML = maximum length; MW = maximum width; T = thickness; WS = working surface; EX = exterior shaping; H-A = heat affected; shc = shallow concave; di = diameter; de = depth.

Table A.47 Handstones from CA-SLO-175

Specimen	Unit	Depth	ML	MW	T	WT	Material	Morphology
511-37	"West of HWY"	Surface	56.0*	90.7*	34.0	202.9*	Sandstone	unsh,circ, unif,p.c.,h-a
511-38	"West of HWY"	Surface	123.6*	48.3*	55.5*	380.9* p.c.	Sandstone	unsh,oval,unif,
511-143	Test pit A NW106/NE17	40-50	109.3	66.8	39.0	379.6*	Sandstone	unsh,subrect, unif,p.s.,h-a
511-144	Test pit A NW106/NE17	40-50	100.0*	43.7*	51.5	265.8*	Sandstone	unsh,oval, unif,p.s.,h-a
511-743	NW0/SW90	122-137	58.8*	77.0	36.7	211.8*	Sandstone	unsh,oval,unif, p.s.
511-889	NW90/NE15	61-76	48.4*	82.6*	28.2	114.0*	Sandstone	sh,oval,bif, flat,h-a
511-NW150 NE0:3	Trench NW150/NE0	30-46	131.2	84.0	29.1	503.9	Sandstone	unsh,oval,unif, p.s.,h-a
NW66/NE46 49.00	Trench NW66/NE46	121	112.5	80.1*	38.8	483.1	Sandstone	sh,oval,bif,h-a, p.s.
NW108/NE36 54.74	Trench NW108/NE36	36	147.5	99.4	46.5	907.2	Sandstone	sh,oval,bif,s.s.
NW145/NE0:3	Trench NW145/NE0	30-46	116.2*	86.3*	59.6	907.2	Igneous	h-a,unsh,indet(w), bif,flat
511-NW240/	Trench	no depth	50.9*	97.4	59.4	338.4	Igneous	unif,p.c.,

Table A.47 Handstones from CA-SLO-175 (*continued*)

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Material*	*Morphology*
260 (#2)	NW240-260	recorded						unsh,oval,h-a,
511-NW240/ 260 (#2)	Trench NW240-260	no depth recorded	96.8	85.0	57.6	907.2	Igneous	unsh,oval,bif, p.c.
511-NW79/ NE40 49.05	Trench NW79/NE40	152	70.2*	47.7*	31.7	138.4*	Igneous	unsh,circ,h-a, unif,p.s.
511-NW99/ 511-51.30	Trench NW99/NEZ41	126	74.1	72.9	44.6	307.3	Igneous	unsh,circ,h-a, unif,p.s.
511-955	No Provenience	Surface	60.5*	86.2*	45.4	334.6*	Igneous	sh,oval,bif,flat
511-959	No Provenience	Surface	141.4*	114.7	68.0	1587.6*	Igneous	ind,subrect(w), unif,p.s.
511-20-NE 45.87	Trench NW20/NE	104	122.7	103.2	40.2	680.4	Sandstone	unsh,oval,unif, p.c.
511-NW150 NE:60.11	Trench NW150/NE	0-15	97.4	74.2	45.8	480.0	Igneous	oval,bif,h-a, flat
511-70 center 57.71	Trench NW70-center	0-15	129.4*	101.5*	63.9	907.2*	Igneous	unsh,oval,unif, p.c.
511-NWNE15 51.40	Trench NW70/NE15	94	96.8	89.2	35.7	390.7	Sandstone	sh,oval,bif,flat
511-NW92/ NE41 51.05	Trench NW92/NE41	121	113.2	59.6	37.8	370.9	Igneous	sh,elong(w),bif, flat
511-SE10/ SW90:2	SE10/SW90	15-30	106.1	103.2	74.5	918.5	Sandstone	unsh,circ,unif, p.c.
511-SE10/ SW90:4	SE10/SW90	46-61	100.9*	96.9	59.1	907.2	Sandstone	unsh,circ,unif,p.c.
511-SE10/ SW90:5	SE10/SW90	61-76	55.7*	84.1	41.4	320.0*	Igneous	unsh,oval,h-a, unif,p.s.
511-SE20/ SW90/7	SE20/SW90	91-107	107.3	78.9	59.1	680.4*	Igneous	unsh,oval,h-a unif,p.s.
511-SE20/ SW90 7/D	SE20/SW90	91-107	109.9	105.1	45.9	680.4	Igneous	unsh,circ,h-a, unif,p.c.
511-1966 Surface 49	No Provenience	Surface	114.8	93.0	36.9	535.2	Sandstone	sh,oval,bif, flat
511-1966 Surface 82	No Provenience	Surface	142.6	95.5	61.9	907.2	Sandstone	unsh,subrect, unif,p.c.
484-020	Backdirt Salvage	no depth recorded	82.8	80.4	42.6	405.6	Igneous	unsh,circ,unif,p.s.
484-029	Abutment 4	no depth recorded	76.2	64.6	40.3	302.2	Igneous	unsh,sub-rect,unif, flat
484-031	Abutment 4	no depth recorded	102.6	79.0	44.5	551.3	Igneous	sh,oval,bif,p.s.
484-047	Abutment 4	no depth recorded	70.2*	73.9	23.1	176.2	Igneous	unsh,oval,h-a, unif,p.s.
484-157	1	30-40	67.1	65.5	39.3	273.3	Igneous	funsh,circ,unif,s.s.
484-193	1	50-60	92.7	65.0	44.9	452.0	Sandstone	unsh,oval,unif,flat
484-204	1	70-80	89.6	69.9	33.5	302.4	Igneous	unsh,oval,unif,s.s.
484-573	1	30-40	86.6	76.7	32.4	326.6	Sandstone	sh,circ,unif,flat

h-a = heat-affected; unsh = unshaped; sh = shaped; circ = circular; subrect = subrectangular; ind = indeterminate; (w) = wedge-shaped; elong = elongated; unif = unifacial; bif = bifacial; p.c. = plano-convex; p.s. = plano-subconvex; s.s. = subconvex/subconvex; * = incomplete; ML = maximum length; MW = maximum width; T = thickness; WT = weight in grams; HWY = highway. Note: All artifact measurements taken in millimeters. Unit depths are in centimeters.

Table A.48 Pestles and picks from CA-SLO-175

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Material*	*Morphology*
PESTLES								
511-NW196NE46-57.61	NW196NE46	100	–	–	–	–	Granite	
511-Surface T53	–	Surface	–	–	–	–	Granite	
511-NW217NE58-54.01	NE217NE58	128	–	–	–	–	Granite	
511-532	NW90NE15	46-21	–	–	–	–	Granite	
511-NW108NE41-54.00	NW108NE41	57	–	–	–		Sandstone	
511-NW125NE-53.83	NW125NE	109	–	–	–	–	Granite	
511-1966NW305SW90/7	NW305SW90	91-107	–	–	–		Granite	
511-NW109NE56-55.06	NW107NE56	89	–	–	–		Granite	
511-NW113NE40-53.90	NW113NE40	76	–	–	–		Granite	
511-NW196NE46-57.60	NW196NE46	100	–	–	–		Granite	
511-1966-1966T57	–	Surface	–	–	–	–	Granite	

Table A.48 Pestles and picks from CA-SLO-175 (*continued*)

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Material*	*Morphology*
511-531	NW90NE15	46.61	–	–	–	–	Granite	
511-NW108NE18-53.48	NW108NE18	57	–	–	–		Granite	
511-1966SurfaceT56	–	Surface	–	–	–	–	Granite	
484-027	Backdirt Salvage	no depth recorded	185.0	83.5	78.4	2004.4	Granite	sub-rectangular, large,unshaped
484-080	Abutment 4	no depth recorded	1256.2	62.2	58.8	742.7	Sandstone	sub-rectangular, unshaped
484-081	Abutment 4	no depth recorded	176.9	78.2	54.9	901.5	Sandstone	elongated, unshaped, triangular in cross section
484-228	2	20-30	139.8*	83.2	49.5	768.1	Sandstone	sub-rectangular, unshaped
PICKS								
511-SurfaceT52	–	Surface					Shale	
511-1966B10a	NW226NE7	145					Shale	

ML = maximum length; MW = maximum width; T = thickness; WT = weight in grams. Note: Artifact sizes in millimeters; unit depth in centimeters. * = incomplete.

Table A.49 Net weights from CA-SLO-175

Specimen	*Unit*	*Depth*	*L*	*W*	*TH*	*WT*	*Material*
511-1966Surface14	–	Surface	–	–	–	–	Sandstone
511-756	NW0SW90	30-46	–	–	–	–	Sandstone
511-1966Surface13	–	Surface	–	–	–	–	Sandstone
511-1966Surface13	–	Surface	–	–	–	–	Sandstone
511-1966B36a	NW204NE40	Not recorded	–	–	–	–	Sandstone
511-NW169NE53-57.06	NW169NE53	83	–	–	–	–	Sandstone
511-512	NW90NE15	46-61	–	–	–	–	Granite
511-NW173NE46-57.50	NW173NE46	79	–	–	–	–	Granite
511-NW140SE-53.43	NW140SW	87	–	–	–	–	Granite
511-NW123NE18.4	NW123NE18	46-61	–	–	–	–	Granite
511-NW350SW-62.74	NW350SW	49	–	–	–	–	Granite
511-NW74NE37-51.90	NW74NE27	70	–	–	–	–	Sandstone
484-18	Footing Trench	–	69.4	46.6	35.2	149.9	Sandstone
484-078	Abutment 4	–	55.3	51.2	30.0	130.1	Sandstone
484-126	1	10-20	70.8	62.9	23.5	148.1	Sandstone
484-398	5	10-20	–	69.1	44.1	232.1	Igneous

L = length; W = width; TH = thickness; WT= weight in grams.

Table A.50 Net weights from CA-SLO-1259

Specimen	*Unit*	*Depth*	*L*	*W*	*TH*	*WT*	*Material*
485-051	1	30-40	86.6	66.5	56.2	355.5	Granitic
485-105	2	30-40	38.3	36.1	28.0	55.0	Sandstone

L = length; W = width; TH = thickness; WT = weight in grams.

Table A.51 Pitted stones from CA-SLO-175

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Material* *di*	*Pit Dim.* *de*		*Remarks*
484-028	Abutment 4	no depth recorded	104.8	76.8	27.7	325.5	Sandstone 21.4	29.8 2.2	2.2	
484-075	Abutment 4	no depth recorded	82.6*	88.1	36.8	373.2	Igneous 22.2	22.2 2.0	2.1	
484-077	Abutment 4	no depth recorded	88.6	77.6	40.5	378.6	Sandstone	*	*	frg,h-a
484-082	Abutment 4	no depth recorded	59.7*	48.6*	38.3	153.3	Sandstone	*	*	frg,h-a
484-174	1	40-50	85.1	58.9	31.1	373.3	Siltstone 18.0	17.4 1.5	1.5	
484-215	2	10-20	60.3	55.8	29.3	140.3	Igneous 16.1	17.6 1.2	1.3	
484-214	2	10-20	88.6	77.6	40.5	378.6	Sandstone 23.5	23.5 1.1	2.6	
484-224	2	20-30	67.8	52.8	52.5	125.7	Igneous	22.0	4.0	

Table A.51 Pitted stones from CA-SLO-175 (*continued*)

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Material*	*Pit Dim.*		*Remarks*
							22.2	6.0		
484-233	2	30-40	90.5	85.6	77.9	653.2	Sandstone	20.6	2.1	
							20.0	1.8		
							20.0	1.0		
484-265	3	10-20	73.0	58.8	50.1	331.4	Sandstone	23.6	3.3	
							23.6	1.8		
484-266	3	10-20	100.3	68.9	49.6	399.0	Sandstone	32.3	4.2	
							24.3	2.0		
484-282	3	20-30	83.1	77.4	35.3	289.2	Igneous	22.2	2.1	
							22.2	2.1		
484-411	5	20-30	150.5	130.2	68.5	1027.6	Sandstone	33.6	4.5	
484-434	5	30-40	96.6	78.7	67.2	693.0	Igneous	19.2	3.2	
							25.5	2.0		
484-514	6	40-50	121.2	102.1	69.5	1212.5	Igneous	31.5	5.8	

ML = maximum length; MW = maximum width; T = thickness; WT = weight; Dim. = dimension; di = diameter; de = depth; frg = fragment = h-a = heat affected; * = incomplete.

Table A.52 Pitted stones from CA-SLO-1259

Specimen	*Unit*	*Depth*	*ML*	*MW*	*T*	*WT*	*Material*	*Pit Dim.*		*Remarks*
							di	*de*		
485-369	Sur. of Midden	no depth recorded	103.0	84.8	47.0	487.6	Sandstone	19.2	4.1	
							20.0	1.5		
485-354	Abutment 1	no depth recorded	94.2	80.0	53.2	347.9	Sandstone	21.0	2.5	
							15.4	1.0		
485-365	Abutment 1	no depth recorded	95.4	–	61.4	433.6	Sandstone	–	–	frag,h-a
485-355	Abutment 1	no depth recorded	–	99.5	38.2	358.0	Granitic	28.1	1.2	
							23.3	1.5		
485-047	1	30-40	98.0	70.1	45.5	452.7	Sandstone	22.0	2.0	
485-061	1	40-50	–	113.7	43.1	448.7	Sandstone	38.2	2.9	
							25.6	3.3		
485-062	1	40-50	112.1	62.0	**45.9**	443.4	Sandstone	34.5	2.4	
							20.5	1.6		
							18.9	1.0		
485-106	2	30-40	68.1	60.1	36.2	205.4	Granitic	17.6	0.6	
							16.4	0.9		
485-174	2 (rock feature)	20-30	90.1	72.8	25.7	254.8	Sandstone	22.2	2.1	
							23.0	2.2		
485-132	2	40-50	107.3	64.8	24.69	273.8	Sandstone	22.6	1.6	
							16.8	1.2		
485-134	2	40-50	85.1	76.5	51.8	411.5	Sandstone	28.4	3.0	h-a
							di	*de*		
							20.5	3.3		
							18.1	2.7		
							18.1	1.0		
485-240	4 (rock feature)	20-30	92.6	61.6	39.4	253.2	Sandstone	27.6	4.2	
							22.5	1.5		
					485-324	6	10-20	75.2	63.8	30.5
204.3	Granitic	18.6	1.6							
								18.30	0.8	
485-343	6	20-30	96.0	78.7	39.2	405.6	Sandstone	24.9	2.8	
								21.7	2.7	

ML = maximum length; MW = maximum width; T = thickness; WT = weight; Dim. = dimension; di = diameter; de = depth; frg = fragment = h-a = heat affected; * = incomplete.

Table A.53 Bone awls from CA-SLO-175

Specimen	*Unit*	*Depth*	*L*	*W*	*T*	*WT*	*Curv*	*Remarks*
511-0349	NW120 NE10	30-46	16.1* *	4.6* *	4.0* *	–	–	Tip Frag.
511-0376	NW160 NE55	15-30	19.7* *	5.3* *	4.5* *	–	–	Tip Frag.
511-0391	NW120 NE10	30-46	21.6* *	4.3*	3.5* *	–	–	Mid Frag.
511-0400	NW220 NE0	0-15	21.2* *	4.6*	3.0*	–	–	Mid Frag.- Polished
511-0434	NW220 NE15	0-15	16.5* *	6.0* *	3.9* *	–	–	Tip Frag.
511-0499	NW85 NE15	30-46	17.3* *	5.2* *	3.9* *	–	–	Tip Frag.- Polished
511-0509	NW90 NE15	30-46	10.8* *	6.8* *	4.3* *	–	–	Mid Frag.
511-0510	NW90 NE15	30-46	22.0* *	8.4*	3.4* *	–	–	Mid Frag.- scorched

Table A.53 Bone awls from CA-SLO-175 (*continued*)

Specimen	*Unit*	*Depth*	*L*	*W*	*T*	*WT*	*Curv*	*Remarks*
511-0537	NW85 NE15	91-100	202.0	17.6	13.0	14.7	–	Deer cannon
511-0538	NW85 NE15	91-100	154.0	16.8	11.0	–	–	Deer cannon
511-0551	SE157 SW127	15-30	17.2* *	7.1*	3.2* *	–	–	Mid Frag.- polished
511-0552	SE157 SW127	15-30	25.0* *	6.9*	3.2* *	–	–	Mid Frag.- polished, scorched
511-0553	SE157 SW127	15-30	25.1* *	8.7*	3.3*	–	–	Mid Frag.- polished, scorched
511-0659	SE157 SW127	91-100	30.5* *	11.5*	3.3*	–	4.2	Mid Frag.- polished, scorched
511-0660	SE157 SW127	91-100	25.5* *	11.6*	3.8*	–	4.7	Tip Frag.- polished, burnt
511-0661	SE157 SW127	91-100	26.8* *	7.9*	3.6*	–	5.2	Mid Frag.- polished, scorched
511-0860	NW80 NE10	61-76	17.0* *	8.9* *	5.2*	–	–	Mid Frag.- polished, burnt
511-1015	NW0 NW90	107-122	32.0* *	8.1* *	6.2* *	–	–	Tip Frag.- polished
NW30 NE5	NW30 NE5	74	28.4* *	8.0* *	4.1* *	–	–	Tip Frag.- polished, burnt
SE10 SW90/6	SE10 SW90/6	76-91	46.8*	6.3*	3.4*	–	–	Tip Frag.- Asphaltum trace
SE10 SW90/9	SE10 SW90/9	122-137	25.7* *	6.2* *	3.1* *	–	–	Tip Frag.- polished
SE15 SW90/8	SE15 SW90/8	107-122	48.9* *	10.1*	5.6* *	–	–	Tip Frag.- polished
511-1966 B25b	NW107 NE42	37	–	–	–	–	–	Tip- Missing Item
484-154	1	20-30	23.6*	6.5* *	3.3*	1.0*	–	Tip Frag.-reused as punch
484-441	5	40-50	47.6*	8.1* *	3.6* *	–	–	Tip Frag.-beveled edges

* = incomplete. ** = dimension at break; measurements in mm; L = length; W = width; T = thickness; WT = weight in grams; Curv = curvate.

Table A.54 Bone strigils from CA-SLO-175

Specimen	*Unit*	*Depth*	*L*	*W*	*T*	*WT*	*Curv*	*Remarks*
511-0444	NW220 NE5	76-91	30.9* *	12.2* *	3.0* *	–	4.6	Deer rib- Spilt; midsection, polished, burnt
511-0451	NW95 NE15	76-91	18.0* *	6.2*	2.1*	–	–	Deer rib- Spilt; midsection, polished, burnt
511-0498	NW85 NE15	30-46	21.0* *	7.1*	1.9* *	–	–	Deer rib- Split; midsection, scorched
511-0891	NW90 NE15	76-91	111.8* *	21.1* *	3.7* *	–	5.0* *	Deer rib- Split; midsection, assoc. with Bur. 5
511-0983	NW90 NE15	91-107	153.0* *	29.8* *	1.9	6.0*	–	Elk rib- Tip frag., assoc. with Bur. 5

* = incomplete; * * = dimensions at break; measurements in mm; L = length; W = width; T = thickness; WT = weight in grams; Curv = curvate.

Table A.55 Bone spatulas from CA-SLO-175

Specimen	*Unit*	*Depth*	*L*	*R len*	*W*	*T*	*WT*	*Curv*	*Remarks*
511-0475	NW25NE30	30-46	30.8* *	9.2*	2.2* *	–	–	–	Large mammal
511-0533	NW220 NE0	107-122	303.0* *	306.9	32.9* *	5.0	40.0*	8.8	Elk tibia, d, Giff.M1, assoc. with Bur. 2
511-0877	NW90NE15	0-15	15.1* *	–	5.2*	1.9* *	–	–	Large mammal edge frag
511-0981	NW90 NE15	91-107	323.5* *	344.0	23.6	6.4	49.0* *	10.8	Deer tibia, p, Asphaltum on end, Giff.M5b, assoc. with Bur. 5
SE20 SW90/13	SE20 SW90/13	183-198	17.1* *	5.5* *	2.4* *	–	–	–	Large mammal, Tip frag., Asphaltum on end, Giff.M5b
511-1966 Bur14a	NW180 NE8	70	289.7	25.3	13.8	7.8	39.6	–	Elk tibia, p, polished, Giff.M5a, Assoc with Bur. 14

* = incomplete; * * = dimensions at break; measurements in mm; L = length; W = width; T = thickness; WT = weight in grams; Curv = curvate; Giff. = Gifford 1940; p = proximal; d = distal.

Table A.56 Bone needles from CA-SLO-175

Specimen	*Unit*	*Depth*	*L*	*R len*	*W*	*T*	*Perf*	*Remarks*
511-0534	NW220 NE0	107-122	84.5* *	92.3	10.3	4.2	2.0	Large mammal, Giff.p3a, Assoc with Bur. 2
511-0535	NW220 NE0	107-122	60.7* *	64.0	7.5	4.3	2.4	Deer splint, Giff.p11, assoc with Bur. 2
511-536a	NW220 NE0	107-122	58.4*	60.4	6.3	4.4	2.1	Deer splint, Giff.p11, assoc with Bur. 2
511-536b	NW220 NE0	107-122	55.2* *	–	6.2	3.6	2.6	Deer splint, Giff.p11, assoc with Bur. 2
511-536c	NW220 NE0	107-122	53.8* *	–	6.8	4.2	f	Deer splint, Giff.p11, assoc with Bur. 2

Table A.56. Bone needles from CA-SLO-175 (*continued*)

Specimen	*Unit*	*Depth*	*L*	*R len*	*W*	*T*	*Perf*	*Remarks*
511-536d	NW220 NE0	107-122	40.4* *	–	5.5* *	3.5* *	f	Deer splint, Giff.p11, assoc with Bur. 2
511-536e	NW220 NE0	107-122	34.1* *	–	5.7* *	2.6* *	f	Deer splint, Giff.p11, assoc with Bur. 2
511-0830	NW95 NE15	61-76	53.9* *	54.9	6.5	3.7	1.5	Deer splint

* = incomplete; * * = dimensions at break; measurements in mm; Giff. = Gifford 1940; f = fragmented; L = length; R len = reconstructed length; W = width; T = thickness; Perf = perforation.

Table A.57 Bone whistles from CA-SLO-175

Specimen	*Unit*	*Depth*	*L*	*W*	*T*	*Perf*	*WT*	*Remarks*
511-1966 B14b	NW180NE8	70	240.0	36.7	31.2	13.1	124.3	Elk tibia, p, Cordage impression, Giff.FF1a
511-1966 B14d	NW180NE8	70	162.0	26.5	25.2	10.2	21.6	Wildcat femur, Asphaltum, Giff.FF1d11
511-1966 B14f	NW180NE8	70	161.0	26.4	24.9	9.5	22.5	Wildcat femur, Asphaltum, Giff.FF1d11
511-1966 B14g	NW180NE8	70	223.0	31.3	27.8	17.0	2.3*	Elk tibia, p, Cordage Impression, Giff.FF1a
511-1966 B14h	NW180NE8	70	229.0	34.1	29.1	14.9	95.2	Elk tibia, p, Cordage impression, Giff.FF1a
511-1966 B14j	NW180NE8	70	250.0	39.9	33.0	11.9	139.2	Elk tibia, p, Cordage impression, Giff.FF1a

* = incomplete; measurements in mm; Giff. = Gifford 1940; p = proximal; L = length; W = width; T = thickness; Perf = perforation; WT = weight in grams.

Table A.58 Bone pins from CA-SLO-175

Specimen	*Unit*	*Depth*	*L*	*W*	*T*	*WT*	*Remarks*
511-0147	NW106 NE17	50-60	26.5* *	3.5* *	4.5* *		Small mammal, burnt, Tip frag., hollow
511-0500	NW85 NE15	30-46	12.8* *	4.3* *	3.7* *	–	Large mammal, burnt, solid, cylindrical
511-0658	SE157 SW127	91-107	22.5* *	7.9* *	4.5* *		Large mammal, Mid frag., burnt, solid, oval
511-0673	SE157 SW127	122-137	22.1* *	4.8* *	2.6* *		Large mammal, Mid frag., solid, oval, polished
511-0982 Bur. 5	NW90 NE15	91-107	256.0	6.2	4.0	5.0	Bird radius, Proximal, hollow, Giff.A4b1, assoc with
511-1006	NW0 NE90	91-107	16.8* *	4.4* *	3.4* *	–	Large mammal, solid, oval
511-1966 B14i Bur. 14	NW180 NE8	70	128.0	8.2	7.1	2.7	Bird radius, Proximal, hollow, Giff.A4al, assoc with
484-191	1	50-60	20.5*	5.0*	3.3*	0.6*	Solid, oval, Midsection, burnt, polished

* = incomplete; * * = dimensions at break; measurements in mm; Giff. = Gifford 1940; L = length; W = width; T = thickness; WT = weight in grams.

Table A.59 Identified bird and mammal remains from CA-SLO-175

Provenience	*Materials*
1. FISH	
484-170: unit 1, 30-40 cm. 1/8"	Skull fragment, singed
2. PACIFIC POND TURTLE (CLEMMYS MARMORATA)	
484-152: unit 1, 20-30 cm. 1/8"	Carapace fragment
3. SNAKE	
484-192: unit 1, 50-60 cm. 1/8" wet	One whole vertebra
4. NORTHERN FULMAR (FULMARUS GLACIALIS)	
484-299: unit 3, 30-40 cm. 1/4"	Whole right coracoid
5. ANSERIFORMES - "DUCK"	
484-132: unit 1, 10-20 cm. 1/8"	Distal right femur, cut off shaft
484-402: unit 5, 10-20 cm. 1/4"	Distal right tibiotarsus, chopped off shaft
484-516: unit 6, 50-60 cm. 1/4"	Whole left coracoid
6. COTTONTAIL RABBIT (SYLVILAGUS SP.)	
484-117: unit 1, 0-10 cm. 1/8"	Right ilium of pelvis
484-152: unit 1, 20-30 cm. 1/8"	Maxilla fragment, singed
484-170: unit 1, 30-40 cm. 1/8"	Right ischium of pelvis; distal right femur fragment
484-181: unit 1, 40-50 cm. 1/8	Right mandible fragment without teeth, singed; distal right femur, chopped off shaft
484-253: unit 3, 0-10 cm. 1/4"	Right mandible with incisor and 3 premolars/molars

Table A.59 Identified bird and mammal remains from CA-SLO-175 *(continued)*

Provenience	*Materials*
484-268: unit 3, 10-20 cm. 1/4"	Right ilium and acetabulum of pelvis
484-285: unit 3, 20-30 cm. 1/4"	Premaxilla with incisor
484-299: unit 3, 30-40 cm. 1/4"	Right mandible with incisor and 3 premolars/molars
484-364: unit 4, 20-30 cm. 1/4"	Right mandible with one molar; glenoid fossa and neck of left scapula
484-382: unit 5, 0-10 cm. 1/4"	Glenoid fossa and neck of right scapula
484-432: unit 5, 30-40 cm. 1/4"	Glenoid fossa and neck of left scapula; right ischium of pelvis
7. *Ground Squirrel* (Otospermophilus beecheyi)	
484-268: unit 3, 10-20 cm. 1/4"	Upper incisor
484-505: unit 6, 40-50. 1/4"	Lower incisor
8. *Pocket Gopher* (Thomomys bottae)	
484-152: unit 1, 20-20 cm. 1/8"	Four lower incisor fragments; upper incisor fragment
484-170: unit 1, 30-40 cm. 1/8"	Lower incisor fragmen; upper incisor fragment
484-181: unit 1, 40-50 cm. 1/8"	Left mandible with incisor; right mandible fragment without teeth; three molars
484-192: unit 1, 50-60 cm. 1/8" wet	Shaft, left tibia.
484-268: unit 3, 10-20 cm. 1/4"	Right mandible with incisor; one premolar; two molars
484-285: unit 3, 20-30 cm. 1/4"	Left mandible without teeth, two pieces; lower incisor
484-316: unit 3, 40-50 cm. 1/4"	Premaxilla and maxilla without teeth
484-364: unit 4, 20-30 cm. 1/4"	Proximal right femur without epiphysis
484-402: unit 5, 10-20 cm. 1/4"	Whole left femur, distal epiphysis not fused
484-418: unit 5, 20-30 cm. 1/4"	Lower incisor
9. *Wood Rat* (Neotoma sp.)	
484-432: unit 5, 30-40 cm. 1/4"	Left mandible without teeth
10. *Carnivore*	
484-181: unit 1, 40-50 cm. 1/8"	Whole phalanx, singed
484-285: unit 3, 20-30 cm. 1/4"	Two whole phalanges, one singed
484-418: unit 5, 20-30 cm. 1/4"	Whole canine tooth
484-487: unit 6, 20-30 cm. 1/4"	Whole canine tooth
11. *Dog/coyote* (Canis sp.)	
484-152: unit 1, 20-30 cm. 1/8"	Whole phalanx
484-231: unit 2, 30-40 cm. 1/4"	Proximal left humerus, chopped off shaft
484-432: unit 5, 30-40 cm. 1/4"	Right lower first molar
12.*Gray Fox* (Urocyon cinereoargenteus)	
484-253: unit 3, 0-10 cm. 1/4"	Whole right radius
13. *Badger* (Taxidea taxus)	
484-364: unit 4, 20-30 cm. 1/4"	Right upper first molar
484-499: unit 6, 30-40 cm. 1/4"	Right acetabulum fragment, burned
14. *Sea Otter* (Enhydra lutris)	
484-285: unit 3, 20-30 cm. 1/4"	Whole metapodial
15. *Pinniped*	
484-516: unit 6, 50-50 cm. 1/4"	Distal phalanx, cut off shaft, singed
16. *Harbor Seal* (Phoca vitulina)	
484-418: unit 5, 20-30 cm. 1/4"	Premolar/molar and associated jaw fragment
17. *Deer* (Odocoileus hemionus)	
484-132: unit 1, 10-20 cm. 1/8"	One half distal epiphysis of metapodial, unfused
484-152: unit 1, 20-30 cm. 1/8"	Proximal first phalanx, chopped off
484-170: unit 1, 30-40 cm. 1/8"	Molar/premolar fragment; metatarsal shaft fragment
484-181: unit 1, 40-50 cm. 1/8"	Whole carpal-tarsal, singed
484-253: unit 3, 0-10 cm. 1/4"	Right mandible fragment without teeth, chopped off; epiphysis, proximal first phalanz, unfused
484-268: unit 3, 10-20 cm. 1/4"	Whole right astragalus
484-364: unit 4, 20-30 cm. 1/4"	One half distal epiphysis of metapodial, unfused
484-455: unit 5, 50-60 cm. 1/4"	Whole upper molar tooth
484-483: unit 6, 10-20 cm. 1/4"	Five fragments, axis bone; whole first phalanx, proximal epiphysis unfused
484-487: unit 6, 20-30 cm. 1/4"	Whole naviculo-cuboid; whole first phalanx, proximal epiphysis unfused
484-499: unit 6, 30-40 cm. 1/4"	Whole lower incisor tooth; whole lower premolar tooth
484-505: unit 6, 40-50 cm. 1/4"	Metatarsal shaft fragment, chopped off; whole third phalanx, singed

Table A.60 Fish remains from CA-SLO-175

Unit/Bulk sample	*Depth*	*Element*	*Species*	*Common*
Unit 1	20-30	vertebra	*Scorpaenichthys marmoratus*	cabezon
Unit 1	20-30	vertebra	*Scorpaenichthys marmoratus*cabezon	
Unit 1	20-30	vertebrae	*Hexagrammos spp.*	greenling
Unit 1	20-30	atlas frag	*Scorpaenidae?*	rockfish
Unit 1	20-30	vertebrae	unidentified	caudal?
Unit 1	30-40	vertebra	*Scorpaenichthys marmoratus*	cabezon
Unit 1	30-40	vertebra	*Stichaeidae*	prickleback
Unit 1	30-40	vertebra	*Cyprinidae?*	minnow
Unit 1	30-40	vertebrae	unidentified	
Unit 1	40-50	verteba	*Hexagrammos spp.*	greenling
Unit 1	40-50	vertebra	*Cyprinidae?*	minnow
Unit 1	40-50	vertebrae	unidentified	
Unit 1	50-60	vertebra	*Sebastes spp.*	rockfish
Unit 1	70-bedrock	vertebra	*Sebastes spp.*	rockfish
Unit 2	40-50	vertebra	*Scorpaenichthys marmoratus*	cabezon
Unit 2	40-50	vertebra	*Hexagrammos spp.*	greenling
Unit 5	10-20	articular	unidentified	
Unit 6	40-50	vertebra		shark
Unit 6	60-70	vertebra		shark
Trench monitoring		operculum?	unidentified	
—			unidentified	
Bulk sample 1	60-80	vertebrae	Clupeidae	herring and sardine
Bulk sample 1	60-80	vertebrae	Atherinidae	silversides
Bulk sample 1	60-80	vertebrae	Stichaeidae	pricklebacks
Bulk sample 1	60-80	pharyngeal tooth	*Amphistichus rhodoterus*	redtail surfperch
Bulk sample 1	60-80	rib fragment,	Teleostei spine pterygiophore	bony fish
Bulk sample 1	130-150	vertebrae	Clupeidae	herring and sardine
Bulk sample 1	130-150	vertebrae	Atherinidae	silversides
Bulk sample 1	130-150	vertebrae	Stichaeidae	pricklebacks
Bulk sample 1	130-150	vertebrae	Embiotocidae	surfperches
Bulk sample 1	130-150	pharyngeal tooth	*Amphistichus rhodoterus*	redtail surfperch
Bulk sample 1	130-150	vertebrae and other fragments	Teleostei	bony fish
Bulk sample 2	10-20	vertebrae	Clupeidae	herring and sardine
Bulk sample 2	10-20	vertebrae	*Engraulis mordax*	northern anchovy
Bulk sample 2	10-20	vertebrae	*Atherinops affinis*	top smelt
Bulk sample 2	10-20	scale	Atherinidae	silversides
Bulk sample 2	10-20	vertebrae	Osmeridae	smelts
Bulk sample 2	10-20	vertebra	*Gobiesox* sp.	clingfish
Bulk sample 2	10-20	vertebra	*Gibbonsia metzi*	striped kelpfish(?)
Bulk sample 2	10-20	tooth	*Raja stellulata*	big skate(?)
Bulk sample 2	10-20	vertebra, suborbital	*Sebastes* sp.	rockfish
Bulk sample 2	10-20	vertebrae	*Hexagrammos* sp.	rock or kelp greenling
Bulk sample 2	10-20	vertebrae	Embiotocidae	surfperches
Bulk sample 2	10-20	lower pharyngeal	*anerodon furcatus*	white seaperch
Bulk sample 2	10-20	fragments	Teleostei	bony fish
Bulk sample 2	70-80	vertebrae	Clupeidae	herring and sardine
Bulk sample 2	70-80	vertebrae	*Engraulis mordax*	northern anchovy
Bulk sample 2	70-80	vertebrae, ceratohyal	*Xiphister* sp.	rock or black prickleback
Bulk sample 2	70-80	vertebrae	Osmeridae	smelts
Bulk sample 2	70-80	vertebrae	Cottidae	sculpins
Bulk sample 2	70-80	vertebrae	*Sebastes* sp.	rockfishes
Bulk sample 2	70-80	scales, other fragments	Teleostei	bony fish
Bulk sample 2	70-80	vertebrae	Embiotocidae	surfperches
Bulk sample 2	70-80	vertebrae	*Hexagrammos* sp.	rock or kelp greenling
Bulk sample 2	70-80	vertebrae	*Ophiodon elongatus*	lingcod

Table A.61 Identified vertebrate remains from CA-SLO-1259

Provenience	*Materials*
1. FISH	
485-248: unit 4, 30-40 cm. 1/4"	Skull fragment
2. COTTONTAIL RABBIT (SYLVILAGUS SP.)	
485-116: unit 2, 30-40 cm. 1/8"	Whole left calcaneus
485-289: unit 5, 20-30 cm. Feat. 1 1/4"	Distal right tibia, chopped off shaft
3. POCKET GOPHER (THOMOMYS BOTTAE)	
485-059: unit 1, 40-50 cm. 1/8"	Upper incisor.
485-131: unit 2, 40-50 cm. 1/8"	Upper incisor.
485-320: unit 6, 10-20 cm. 1/4"	Whole left tibia
4. DOG/COYOTE (CANIS SP.)	
485-007: unit 1, 0-10 cm. 1/8" wet	Right lower first molar with associated jaw fragment
5. TULE ELK (CERVUS ELAPHUS)	
485-049: unit 1, 30-40 cm. 1/8"	Eighteen premolar/molar fragments from 1 tooth
6. DEER (ODOCOILEUS HEMIONUS)	
485-169: unit 3, 20-30 cm. 1/4"	Proximal radius fragment, split down shaft
485-221: unit 4, 0-10 cm. 1/4"	Weathered cervical vertebra fragment
485-248: unit 4, 30-40 cm. 1/4"	Mandible fragment without teeth, burned, chopped off

Table A.62 Shellfish remains (by weight in grams) from CA-SLO-175 unit 1 column sample (10 x 10 cm 1/8" mesh)

	0-10	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*	*Total*	*Proportion*
Mytilius californianus	103.3	119.9	242.8	284.3	338.5	115.7	1204.5	79.88
Balanus sp.	17.5	17.3	27.4	44.5	42.7	10.1	159.5	10.58
Tegula funebralis	11.4	6.9	25.6	27.5	35.5	8.8	115.7	7.67
Mopalia muscosa	0.3	0.4	0.3	0.4	3.3	0.3	5.0	0.33
Cancer sp.	0.6	0.4	0.2	0.5	0.7	0.5	2.9	0.19
Strongylocentrotus purpuratus	2.2	–	0.7	0.5	1.0	0.3	4.7	0.31
Protothaca staminea	1.1	0.4	0.1	0.4	–	1.6	3.6	0.24
Acmea mitra	0.1	–	0.1	0.2	0.2	0.1	0.7	0.04
Crepidula adunca	–	–	0.1	–	0.1	0.1	0.3	0.02
Haliotis rufescens	–	–	–	0.4	0.1	–	0.5	0.03
Unidentified	0.5	1.7	1.2	0.9	5.2	0.8	10.3	0.68
Helix sp.	0.1	–	–	–	–	–	0.1	0.01
Total	137.1	147.0	298.5	359.6	427.3	138.3	1507.8	99.98

Table A.63 Shellfish remains (by weight in grams) from CA-SLO-175 unit 2 column sample (10 x 10 cm 1/8" mesh)

	0-10	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*	*Total*	*Proportion*
Mytilus californianus	171.5	134.0	202.0	259.1	251.0	115.7	1133.3	81.15
Balanus sp.	14.8	9.1	24.2	26.7	22.1	14.8	111.7	8.00
Tegula funebralis	15.3	10.7	14.6	35.0	19.6	14.7	109.9	7.87
Mopalia muscosa	1.4	1.1	1.0	0.7	1.8	1.0	7.0	0.50
Cancer sp.	2.4	0.4	0.5	4.0	0.9	0.4	8.6	0.61
Strongylocentrotus purpuratus	0.5	0.7	0.2	0.9	0.3	0.2	2.8	0.20
Protothaca staminea	–	–	0.9	–	–	–	0.9	0.06
Acmea mitra	0.4	–	0.2	0.4	–	0.5	1.5	0.11
Crepidula adunca	–	0.8	0.2	–	0.9	0.7	2.6	0.19
Haliotis rufescens	–	–	–	–	0.1	1.2	1.3	0.09
Unidentifiable	4.4	0.8	1.2	3.2	1.4	2.4	13.4	0.96
Collisella sp.	0.4	–	0.5	–	0.1	–	1.0	0.07
Olivella biplicata	–	–	0.2	–	0.7	–	0.9	0.06
Cryptochiton stelleri	–	–	–	–	–	1.2	1.2	0.09
Helix sp.	0.1	–	–	0.4	–	–	0.5	0.04
Total	211.2	157.6	245.7	330.4	298.9	152.8	1396.6	100.00

Table A.64 Shellfish remains from CA-SLO-175 Bulk Sample #2 (70-80 cm), 5.9 liters, 1/8" mesh

	Weight of shell (gm)	*Proportion*
Mytilius californianus	277.8	78.8
Balanus sp.	23.6	6.7
Tegula funebralis	32.2	9.1
Mopalia muscosa	1.7	0.5
Cancer sp.	1.3	0.4
Strongylocentrotus purpuratus	2.0	0.5
Protothaca staminea	1.2	0.3
Acmea mitra	0.1	0.1
Clinocardium nuttallii	0.3	0.1
Tresus nuttallii	1.4	0.4
Acanthina spirata	1.3	0.4
Pollicipes polymerus	0.1	0.1
Unidentified	9.3	2.6
Total	352.3	100.0

Table A.65 Shellfish remains (by weight of shell in grams) from CA-SLO-1259 unit 4 column samples (20 x 20 cm)

	0-10	*10-20*	*20-30*	*30-40*	*40-50*	*50-60*	*Total*	*Proportion*
Mytilus californianus	–	–	3.0	0.2	–	–	3.2	22.38
Tegula funebralis	–	–	0.3	–	–	–	0.3	2.10
Cryptochiton stelleri	–	–	8.3	–	–	–	8.3	58.04
Mopalia muscosa	–	–	0.1	–	–	–	0.1	0.70
Protothaca staminea	–	–	0.3	–	–	–	0.3	2.10
Balanus sp.	–	–	1.2	0.1	–	–	1.3	9.09
Unidentified	–	–	0.3	–	0.2	0.3	0.8	5.59
Total	0.0	0.0	13.5	0.3	0.2	0.3	14.3	100.00

Table A.66 Shellfish remains from CA-SLO-1259 unit 6 column samples (20 x 20 cm)

	0-10	*10-20*	*20-30*	*30-40*	*40-50*	*Total*	*Proportion*
Mytilus californianus	0.7	86.9	121.6	8.5	0.5	218.2	73.74
Balanus sp.	0.1	19.0	18.3	2.1	–	39.5	13.35
Tegula funebralis	–	9.5	10.8	1.6	–	21.9	7.40
Protothaca staminea	–	0.4	–	–	–	0.4	0.14
Olivella biplicata	–	3.0	–	–	–	3.0	1.01
Unidentified	–	0.4	0.4	0.4	–	1.2	0.41
Acmea adunca	–	0.1	0.2	–	–	0.3	0.10
Mopalia muscosa	–	1.2	1.2	0.9	–	3.3	1.12
Unidentified Snail	–	–	8.0	–	–	8.0	2.70
Haliotis rufescens	–	–	0.1	–	–	0.1	0.03
Total	0.8	120.5	160.6	13.5	0.5	295.9	100.00

Table A.67 Invertebrate taxa represented at Little Pico Creek

Taxon	*Common name*
Acanthina spirata	angular unicorn
Acmea mitra	white capped limpet
Balanus sp.	barnacle
Balanus nubilus	barnacle
Cancer sp.	crab
Collisella sp.	limpet
Collisella pelta	shield limpet
Crepidula adunca	slipper
Cryptochiton stelleri	gumboot chiton
Cumingia californica	California cumingia
Haliotis cracherodii	black abane
Haliotis rufescens	red abalone
Helminthoglypta umbilicata	land snail (non-native)
Hinnites giganteum	giant rock scallop
Ischnochiton sp.	white chiton
Katharina tunicata	black Katy chiton
Lacunae marmorata	chink
Lottia asmi	limpet

Table A.67 Invertebrate taxa represented at Little Pico Creek *(continued)*

Taxon	*Common name*
Lottia gigantea	owl limpet
Mopalia muscosa	mossy chiton
Mytilus californianus	California mussel
Nucella caniculata	dogwinkle
Nucella emarginata	emarginate dogwinkle
Nucella lamellosa	dogwinkle
Ocenabra circumtexta	triton
Olivella biplicata	olive shell
Pollicepes polymerus	leaf barnacle
Protothaca staminea	rock clam
Septifer bifurcatus	bifurcate mussel
Strongylocentrotus purpuratus	purple sea urchin
Tegula brunnea	brown turban
Tegula funebralis	black turban
Tresus nuttallii	gaper clam
Unidentifiable	

Table A.68 Summary of burial data from CA-SLO-175

Burial	*Sex*	*Age (yrs)*	*Position*	*Orientation*	*Association*
1	–	child 10+	supine arms/legs flexed on right side	vert:North/South face:West/SW	gravestone marker
2	F	18-22	flexed on left side	vert:E/W face:North	bone needles, spatula
3*	F	23-30	prone, flexed, head down	vert:E/W	3 plugs of asphaltum inlaid with *Olivella* Tiny Saucer beads, *Haliotis* ring and pendant, 2 bone hair pins; strigil
4	–	child 3-4	flexed on right side	no record	gravestone marker 2 pestles
5	F	17-25	prone, flexed; head to right side	vert:NW/SE face:Southwest	bone spatula; 2 strigils; pin; asphaltum plug with *Olivella* Tiny Saucers beads
7	–	child 5-7	flexed on left side	vert:N/S face:West	gravestone marker 7 *Olivella* Spire-lopped beads; 7 other *Olivella* beads; 17 Limpet beads
8	F	25-30	flexed sitting	face:South	none
9	M	25-30	flexed on left side	vert:N/S face:East	none
10	?	?	–	–	shale pick
11	F	25+	flexed on left side	vert:N/S	projectile point face: East
12	–	child 6-9	flexed sitting	face:S/E	1 Double-side notched point; 1 biface; beads: 11 *Olivella* Spire-lopped, 26 Small End-ground *Olivella*, 1 Littorina
13	M	21-30	flexed on left side	vert:N/S face:East	Small Stemmed chert point; Lozenge point; 1 Limpet shell bead
14	M	25-35	flexed sitting	downturned skull facing South	4 deer tibia whistles; 2 bobcat femur whistles, 1 stigril; 1 hollow bone tube; 1 Lozenge point; 1 chert scraper; asphaltum plug inlaid with shell hemitite; beads: 26 *Olivella* Spire-lopped 1 *Olivella* Oblique Spire-lopped, 39 *Olivella* Small end ground; 536 *Olivella* Tiny Saucer
15	–	child 10-14	flexed sitting	facing West	biface, various pieces of asphaltum
16	F	25+	flexed on left side	vert:E/W face:South	none
17	F	18+	no record	no record	none
18	–	child 9-13	flexed on right side	vert:NE/SW face:South	tarring pebble
19	M	21-30	flexed on right side	vert:NW/SE face:SW	none
20	–	child 5-6	flexed sitting	face:West	Small Stemmed projectile point
21	–	child 6-7	flexed sitting	face:SW beads	obsidian biface, hemitite, 3 *Olivella* Spire-lopped
22	–	child 13-15	flexed on right side	vert:E/W	under a rock cairn
23	–	child 5-8	flexed on left side	vert:NE/SW face:NW	none
24	F	17+	flexed on right side	vert:NW/SE face:SW	gravestone marker sandstone net weight

Table A.68 Summary of burial data from CA-SLO-175 *(continued)*

Burial	*Sex*	*Age (yrs)*	*Position*	*Orientation*	*Association*
27*	M	29+	prone, legs flexed left/right	vert:NE/SW face?	none
28	F	?	supine, flexed knee	vert:N/S	none
29	?	18+	femur, fragmented skull only	?	none
31	?	25+	*highly fragmented*	?	none
32	M	25+	flexed semireclining on right side	vert:frag. face:South	none
34*	M	35+	flexed on left side	vert:N/S face:West	stone grave marker
35	M	25+	flexed sitting	face:N/W	rock cairn beneath
36	F	19-20	flexed on right side	vert:N/S	sandstone net weight face:east
42	M	20-20	none recorded	none recorded	
GROUP *I*					
25	F	23-30	supine extended left leg bent	vert:E/W	gravestone marker; sandstone net weight; bone awl tip; chert scraper
26	F	30+	supine extended	vert:E/W	"shell over burial"
30	F	14-18	supine extended	vert:E/W	none
33	M	30+	flexed on left side	vert:N/S face:N/E	none
GROUP *II*					
37	M	25-35	supine	East	pitted hammerstone, biface, obsidian
38	M	19-30	supine	West	Double Side-notched point, 3 talc schist disks
39	M	21-40	supine	East	gravemarker (?), 2 shell beads
40	M	19-23	supine, knees flexed over chest	West	Double Side-notched point
41	M	25-35	prone		2 Double Side-notched points

vert = vertebral column; * = not located in 1992 inventory.

Appendix B

Excavations in the Central Coast Region

SANTA CRUZ COUNTY

Site	*Reference*
CA-SCR-7	D. Jones and Hildebrandt 1990
CA-SCR-9	Hylkema 1991
CA-SCR-20	Hylkema 1991
CA-SCR-35	Sweeney 1986
CA-SCR-38/123	Hylkema 1991
CA-SCR-93	Breschini and Haversat 1981
	Bourdeau 1986
CA-SCR-132	Hylkema 1991
CA-SCR-177	Cartier 1993b

MONTEREY COUNTY

Site	*Reference*
CA-MNT-63	T. Jones 1994
CA-MNT-73	T. Jones 1994
CA-MNT-98	Breschini and Haversat 1991d
CA-MNT-101	Pritchard 1984
	Dietz 1987
CA-MNT-103	Dietz and Jackson 1981
CA-MNT-105	Dietz and Jackson 1981
CA-MNT-107	Dietz and Jackson 1981
CA-MNT-108	Breschini and Haversat 1989
CA-MNT-110	Dietz and Jackson 1981
CA-MNT-111	Dietz and Jackson 1981
CA-MNT-112	Dietz and Jackson 1981
CA-MNT-113	Dietz and Jackson 1981
CA-MNT-114	Dietz and Jackson 1981
CA-MNT-115	Dietz and Jackson 1981
CA-MNT-116	Dietz and Jackson 1981
CA-MNT-117	Dietz and Jackson 1981
CA-MNT-118	Dietz and Jackson 1981
CA-MNT-119	Dietz and Jackson 1981
CA-MNT-120	Dietz and Jackson 1981
CA-MNT-121	Dietz and Jackson 1981
CA-MNT-126	Dietz and Jackson 1981
CA-MNT-129	Dietz and Jackson 1981
	Breschini and Haversat 1991b
CA-MNT-170	Breschini and Haversat 1980
	Dietz 1991
CA-MNT-185	Cartier 1979
CA-MNT-228	T. Jones et al. 1992
	Dietz et al. 1988
	T. Jones and D. Jones 1992
CA-MNT-234	Breschini and Haversat 1991e
CA-MNT-238	Gibson et al. 1976
CA-MNT-250	Meighan 1955
CA-MNT-281	Pohorecky 1976

MONTEREY COUNTY *(continued)*

Site	*Reference*
CA-MNT-282	Pohorecky 1976
CA-MNT-298	Howard 1975
	Roop and Flynn 1978
	Dietz and Jackson 1981
	Dietz 1987
CA-MNT-376	T. Jones 1994
CA-MNT-386/387	Cartier 1993a
CA-MNT-391	Dietz and Jackson 1981
	Cartier 1993a
	Gibson 1988a
CA-MNT-759/H	T. Jones and Haney 1992
CA-MNT-1084	Breschini and Haversat 1991b
CA-MNT-1215	Breschini et al. 1984
CA-MNT-1223	T. Jones 1988
CA-MNT-1227	T. Jones and Haney 1992
CA-MNT-1228	T. Jones and Haney 1992
CA-MNT-1232/H	T. Jones and Haney 1992
CA-MNT-1233	T. Jones and Haney 1992
CA-MNT-1235	T. Jones n.d.
CA-MNT-1236	T. Jones n.d.
CA-MNT-1255	Breschini and Haversat 1986
CA-MNT-1277/H	T. Jones and Haney 1992
CA-MNT-1286	Bourdeau 1985
CA-MNT-1481	Breschini and Haversat 1992
CA-MNT-1485/H	Breschini and Haversat 1992
CA-MNT-1286/H	Breschini and Haversat 1992

SAN LUIS OBISPO COUNTY*

Site	*Reference*
CA-SLO-2	Greenwood 1972
CA-SLO-7	Breschini and Haversat 1988
	Gibson 1988c
CA-SLO-8	Breschini and Haversat 1988
	Gibson 1988c
CA-SLO-10	Dallas n.d.
CA-SLO-45	C.D. King 1970
CA-SLO-50	C.D. King 1970
CA-SLO-51	Greenwood 1972
CA-SLO-52	Greenwood 1972
	Schumacher 1875, 1877
	King 1970
CA-SLO-56	Moriarty and Burns 1962
CA-SLO-61	Greenwood 1972
CA-SLO-94/95	Horne 1981
CA-SLO-98	Gibson 1982a
CA-SLO-99	Breschini et al. 1988
CA-MNT-229	Dondero 1984

SAN LUIS OBISPO COUNTY *(continued)*

Site	*Reference*
CA-SLO-156	Reinman 1961
CA-SLO-157	Reinman 1961
CA-SLO-158	Reinman 1961
CA-SLO-159	Reinman 1961
CA-SLO-160	Reinman 1961
CA-SLO-165	Gibson 1992a
	T. Jones et al. 1994
	Salls et al. 1989
	Singer 1986
	Singer and Atwood 1987
CA-SLO-187	Gibson 1979c
CA-SLO-214	Hoover and Sawyer 1977
CA-SLO-239	Clemmer 1962
CA-SLO-266	Bouey and Basgall 1991
CA-SLO-267	Bouey and Basgall 1991
CA-SLO-297	Smith and La Fave 1961
CA-SLO-288	Horne 1981
CA-SLO-298	Horne 1981
CA-SLO-372	Baker 1977
CA-SLO-406	Tainter 1971
	C.D. King 1982
CA-SLO-433	Gibson 1990
CA-SLO-459	Reddell 1970
CA-SLO-460	Gibson 1979b
CA-SLO-463	Hoover 1973
CA-SLO-497	Dallas 1992
CA-SLO-576	Horne 1981
CA-SLO-584	Greenwood 1972
CA-SLO-585	Greenwood 1972
CA-SLO-617	Gibson 1988d
CA-SLO-626	Gibson 1984b, 1984c
CA-SLO-692	Breschini and Haversat 1991c
CA-SLO-697	Gibson 1979b
CA-SLO-801	Gibson 1981a
CA-SLO-812	Gibson 1993
CA-SLO-832	Zahnhiser and Brown 1980
CA-SLO-877	Breschini and Haversat 1991a
	Gibson 1988b
CA-SLO-977	Dallas 1992
CA-SLO-978	Gibson 1981b
CA-SLO-1066	Gibson 1982b
CA-SLO-1081	Gibson 1984a
CA-SLO-1199	Gibson 1987
CA-SLO-1305	T. Jones et al. 1994

* See also Breschini et al. 1983:594-595.

SANTA BARBARA COUNTY

Site	*Reference*
CA-SBA-125	Carter 1941
CA-SBA-205	Lathrap and Hoover 1975
CA-SBA-210	Glassow 1990
CA-SBA-530	Glassow 1990
CA-SBA-539	Glassow 1990
CA-SBA-551	Glassow 1990
CA-SBA-552	Glassow 1990
CA-SBA-662	Glassow 1990
CA-SBA-663	Glassow 1990
CA-SBA-670	Glassow 1990
CA-SBA-687	Woodman et al. 1991
CA-SBA-689	Woodman et al. 1991

SANTA BARBARA COUNTY *(continued)*

Site	*Reference*
CA-SBA-690	Glassow 1990
CA-SBA-913	Woodman et al. 1991
CA-SBA-914	Woodman et al. 1991
CA-SBA-931	Glassow 1990
CA-SBA-1040	Glassow 1990
CA-SBA-1742	Woodman et al. 1991
CA-SBA-1743	Woodman et al. 1991
CA-SBA-1762	Woodman et al. 1991
CA-SBA-1810	Woodman et al. 1991
CA-SBA-1860	Woodman et al. 1991
CA-SBA-1888	Woodman et al. 1991
CA-SBA-1891	Woodman et al. 1991
CA-SBA-1896	Woodman et al. 1991
CA-SBA-1910	Woodman et al. 1991
CA-SBA-1917	Woodman et al. 1991
CA-SBA-1991	Woodman et al. 1991
CA-SBA-1992	Woodman et al. 1991
CA-SBA-1993	Woodman et al. 1991
CA-SBA-1994	Woodman et al. 1991
CA-SBA-1995	Woodman et al. 1991
CA-SBA-1996	Woodman et al. 1991
CA-SBA-2120	Woodman et al. 1991
CA-SBA-2126	Woodman et al. 1991

Appendix C

Estimation of Stature from Skeletal Remains at CA-SLO-175

LARA C. WEINHEIMER

THE INITIAL DATA which served as the basis of estimation of stature for individuals in the population from CA-SLO-175, Little Pico Creek, were the metric observations of skeletal material from forty-one burials and the sex determination for those burials. From these data, that estimation was derived if the necessary skeletal material for this analysis was present. A subsequent determination was undertaken of a correlation between the estimates given for the tibia and femur in determining stature as well as the accuracy of the Genoves equations in relation to this population.

METHODS

Of the forty-one burials, only eighteen had enough data for a stature analysis. The other twenty-three burials could not be used because they either could not be sexed or were too young to determine sex with any certainty.

The eighteen burials with adequate data were separated by sex and then into groups based on bones available for analysis. After separation, a specific formula for stature (table C.1), depending on sex, was assigned to each burial. The stature formulas are specific for Mongoloid individuals and are based on long bone analysis by S. Genoves (1967:76).

When bones from both sides were present, the bone of the right hand side was used. In addition, the tibia was used preferentially to the femur for both males and females because the formula for stature based on tibia length has a smaller deviation for error. The Minitab statistical program was used to determine stature, correlations between the femur and tibia, accuracy of the Genoves equation for this population and to graph the correlations (table C.2).

A correlation of male stature based on the femur versus male stature based on the tibia gave a result of 0.894, which

Table C.1 Stature formulas (in cm)

MONGOLOID MALES

Femur: stature = 2.26fem + 66.379 ± 3.417
Tibia: stature = 1.96tib + 93.752 ± 2.812

MONGOLOID FEMALES

Femur: stature = 2.59fem + 49.742 ± 3.816
Tibia: stature = 2.72tib + 63.781 ± 3.513

Table C.2 Estimated stature for burials from CA-SLO-175 (in cm)

MALES		
Burial #	*Femur length*	*Estimated stature*
37	44.4	166.723 ± 3.417
38	42.1	161.525 ± 3.417
39	44.4	166.723 ± 3.417
40	43.5	164.689 ± 3.417
42	40.9	158.813 ± 3.417
Burial #	*Tibia length*	*Estimated stature*
13	40.05	172.250 ± 2.812
14	36.75	165.782 ± 2.812
19	38.00	168.232 ± 2.812
33	37.15	166.566 ± 2.812
41	34.85	162.058 ± 2.812
FEMALES		
Burial #	*Femur length*	*Estimated stature*
11	40.4	154.378 ± 3.816
24	40.4	154.378 ± 3.816
Burial #	*Tibia length*	*Estimated stature*
2	34.20	156.805 ± 3.513
5	37.25	165.101 ± 3.513
8	35.70	160.885 ± 3.513
16	33.75	155.581 ± 3.513
26	34.00	156.261 ± 3.513
36	32.00	150.821 ± 3.513

Table C.3 Data for equation correlation between stature and long bones (in cm)

MALES				
Burial #	*Femur lgth*	*Tibia lgth*	*Stature by femur*	*Stature by tibia*
13	47.2	40.05	173.051	172.250
14	44.4	36.75	166.723	165.782
37	44.4	38.50	166.723	169.212
39	44.4	37.50	166.723	167.252
41	41.7	34.85	160.621	162.058
FEMALES				
Burial #	*Femur lgth*	*Tibia lgth*	*Stature by femur*	*Stature by tibia*
2	40.90	34.20	155.673	156.805
5	44.30	37.25	164.479	165.101
8	43.00	37.50	161.112	160.885
16	40.00	33.75	153.342	155.581
26	40.25	34.00	153.990	156.261
36	39.00	32.00	150.752	150.821

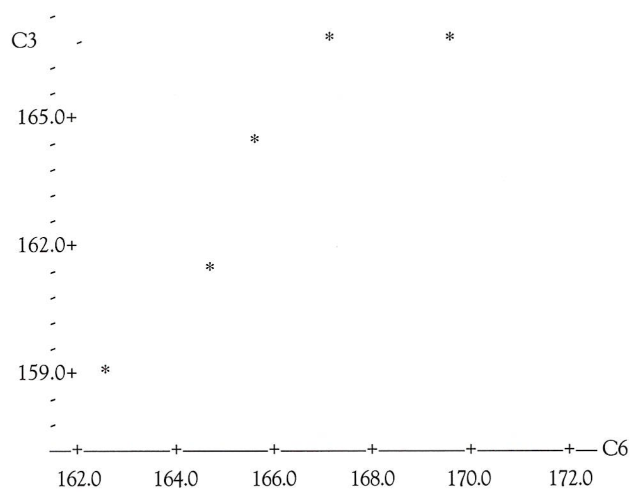


FIGURE C.1 Plot of male stature based on femur and tibia. C3 = male stature based on femur length; C6 = male stature based on tibia length.

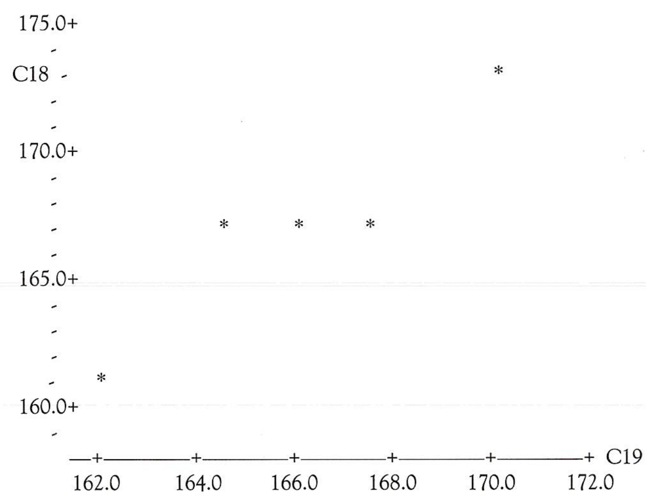


FIGURE C.2 Plot of male stature based on femur and tibia of same individual. C18 = male stature based on femur length; C19 = male stature based on tibia length.

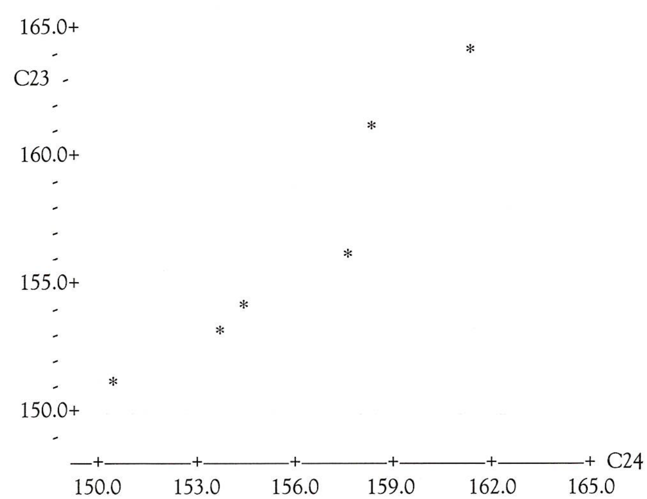


FIGURE C.3 Plot of female stature based on femur and tibia of same individual. C23 = female stature based on femur length; C24 = female stature based on femur length.

is slightly higher than the correlation received by Genoves (1967) of 0.828 for the same male bones (fig. C.1). In addition, correlations were determined between the femur and tibia of the same individual and the estimates for stature to ascertain the fit of Genoves stature equations to this data. If Genoves equations are relevant to this population, one would expect a high correlation between the femur and tibia. Only burials that contained both femur and tibia measurements were applicable for this analysis. Table C.3 presents the correlational data for males and females of the femur and tibia.

The correlation between statures based on the femur and that of the tibia is 0.946 in males and therefore demonstrates the accuracy of the Genoves equations. The female data also shows the precision of the Genoves equation for statures based on the same bones with a result slightly higher at 0.979 (figs. C.2 and C.3).

CONCLUSION

The preceding data determines the heights of the individuals in the Little Pico population. The first correlation between male stature by tibia and male stature by femur of different individuals within the population gave a result of 0.894. This high correlation demonstrates that the two groups (male femur and male tibia statures) represent individuals from the same population as expected. Since our correlation is higher than that given by Genoves, one can be reasonably assured of its validity. In addition, the data from the Little Pico site lend support for the Genoves equations. The high correlations between statures based on femurs and tibias of the same individuals (0.946 for males and 0.979 for females) demonstrates that the Genoves equation accurately reflects this population.

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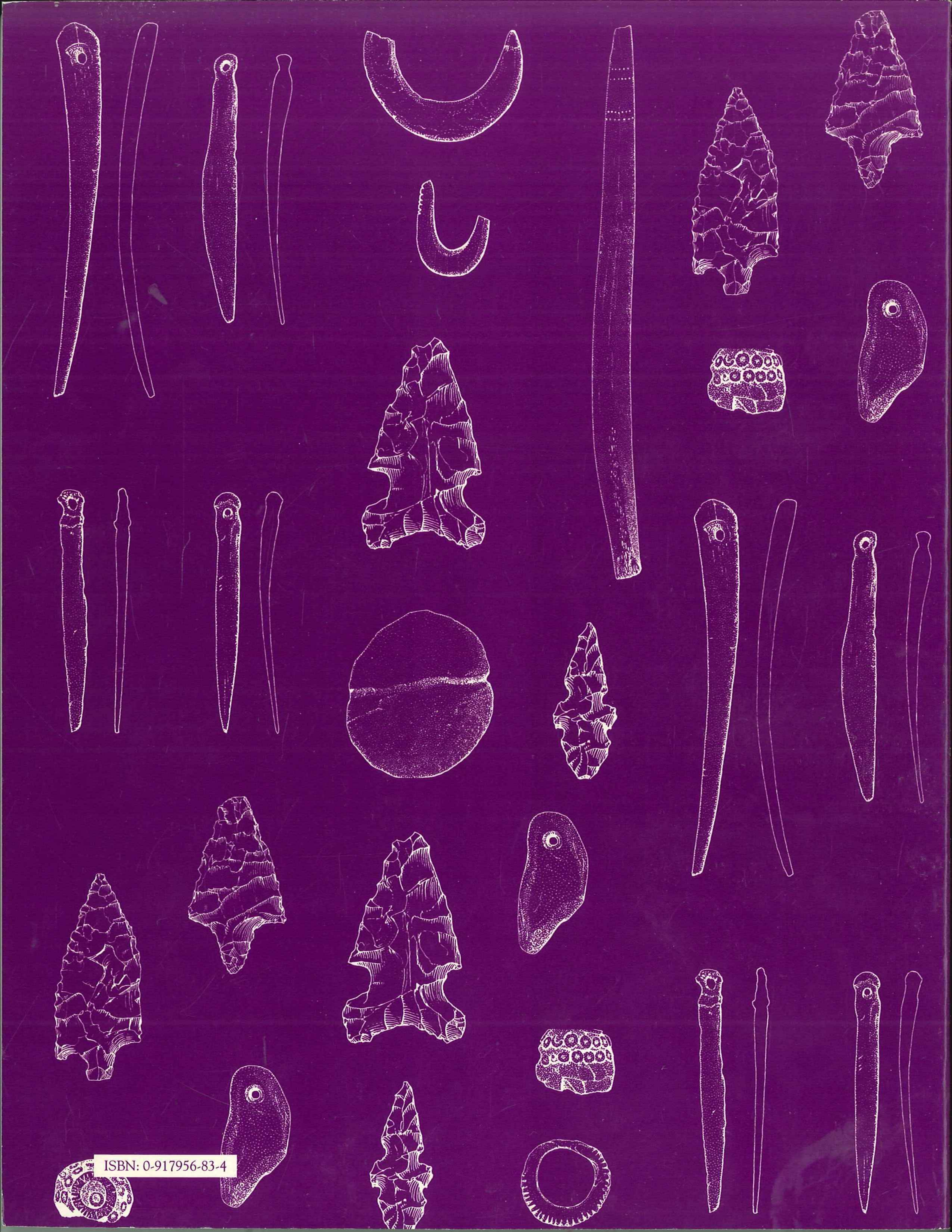

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