Archaeological Investigations at the Big Cut Site (CA-KER-4395), Buena Vista Lake, California

Mark Q. Sutton, Jill K. Gardner, and Kenneth W. Gobalet

Abstract

In 1995 a brief archaeological investigation was conducted at the Big Cut site (CA-KER-4395) located along the northwest shore of Buena Vista Lake in the southern San Joaquin Valley. Research was aimed both at documenting the level of damage to the site from modern development and vandalism as well as at general issues of function, seasonality, and chronology. While the site had been impacted, it appeared to have relatively good subsurface integrity, at least in 1995. Although the data are quite limited, the site is thought to have been a temporary camp occupied on a seasonal basis, perhaps associated with the nearby Bead Hill site. Fish and mollusks appear to have been important resources, while terrestrial animals were of lesser importance. Evidence suggests two significant occupations, one during the Middle Archaic and one during the Emergent Period.

Introduction

In 1995 archaeologists from California State University, Bakersfield (CSUB), began a research program within the Coles Levee Ecological Preserve located along the northwestern shore of Buena Vista Lake in Kern County, California. Coles Levee is owned and operated by the Atlantic Richfield Company (ARCO), and the CSUB work was aimed at gaining an understanding of archaeological resources in the area, information that could be useful in the management of the Coles Levee Preserve. A number of sites were recorded in the mid-1990s, and several were investigated at various levels of detail.

One of these sites was CA-KER-4395, also known as the “Big Cut” site (Figure 1). The purpose of the work at Big Cut was to record the site and determine its nature, extent, content, age, function, and integrity in order to assess its research value.

Natural Background

Buena Vista Lake is situated at the southwest end of the San Joaquin Valley, which is bordered by the Sierra Nevada and Tehachapi Mountains to the east and southeast, the San Emigdio Mountains to the south, and the Temblor and Diablo ranges to the west. The Elk Hills lie along the northwestern shore of Buena Vista Lake. Without impoundments the Kern River would empty into the Buena Vista lake Basin, and the Buena Vista Slough flows north from Buena Vista Lake to Tulare Lake, some 80 km to the north (see Figure 1).

Prior to contact, the landscape of the southern San Joaquin Valley was considerably different than it is today. A network of interconnecting lakes, rivers, streams, and sloughs that were charged by the Sierra Nevada snowpack dominated the southern portions of the San Joaquin Valley. As a result of these water sources, an otherwise xeric land was the home of biotic

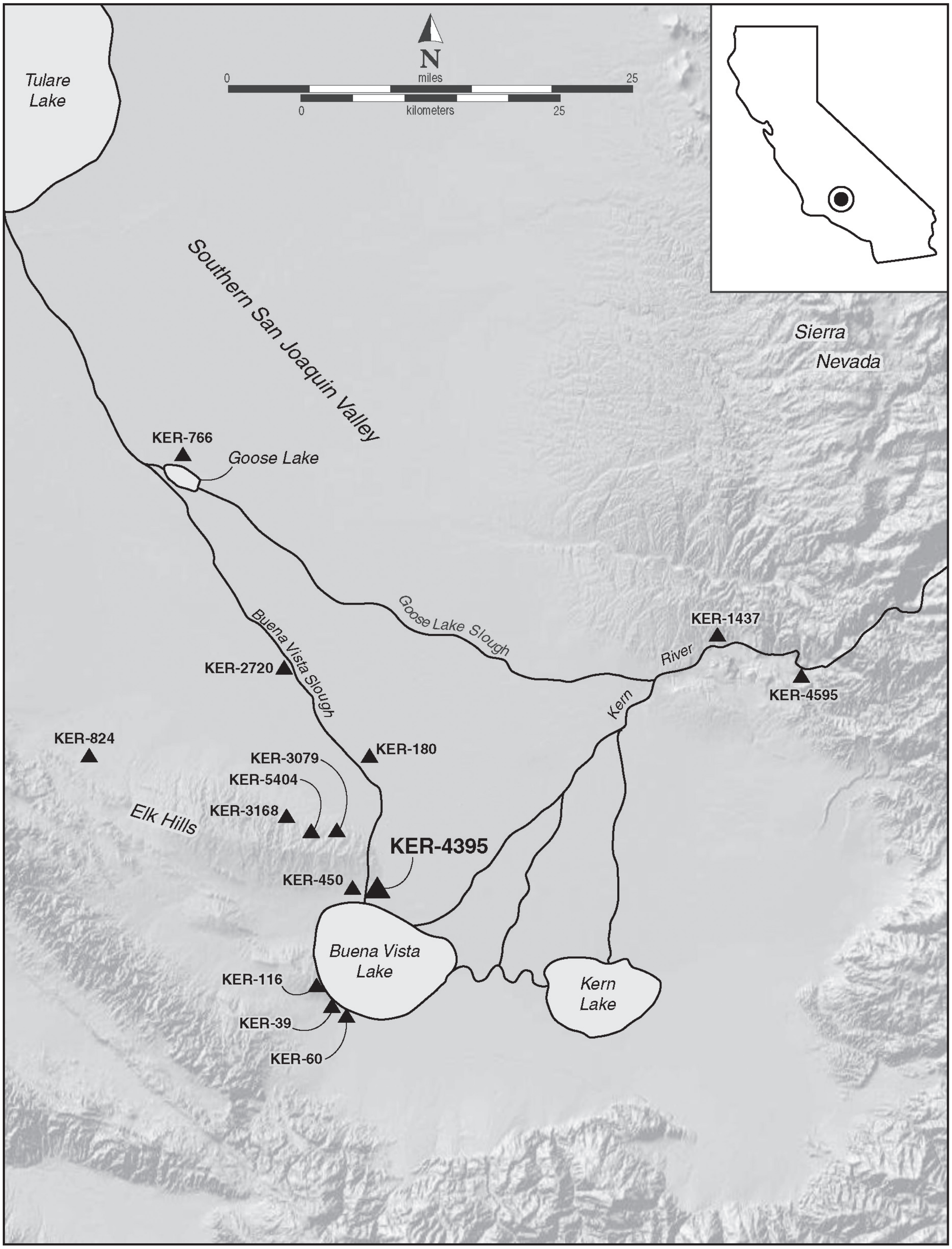

Figure 1. Location of the Big Cut site (CA-KER-4395) and other sites discussed in the text.

communities usually associated with a mesic environment. In historic times, however, the diversion and channelization of the Kern River dramatically affected the physiography of the valley, with Buena Vista and Kern lakes becoming dry basins utilized as farmland.

Climate

The climate of the southern San Joaquin Valley is characterized by hot, dry summers and mild, semiarid winters. The Sierra Nevada provides a barrier for the valley against most of the cold air that moves southward during the winter, while the Coast Ranges, with elevations that typically range from 150 to 800 m (500 to 2,500 ft) asl, mitigate the marine weather patterns of the Pacific Ocean. The average yearly precipitation in the southern San Joaquin Valley is about 16.3 cm (6.4 in), falling mostly in the winter. Dense fog, caused when moist air is trapped in the valley by a high pressure system, is common during the winter months. Occasionally this condition, known locally as “tule fog,” will continue day and night for up to three weeks (Felton 1965:103).

Plant Communities

The principal plant communities dominating the southern San Joaquin Valley are the Lower Sonoran Grassland, the Alkali Sink Association, and the Freshwater Marsh Association (Twisselmann 1967:88-93, 115-117). Each of these communities is represented within the Buena Vista Lake area, although the Freshwater Marsh Association was considerably more prominent prior to the diversion of the Kern River (see above).

Fauna

An extensive variety of vertebrates were once present in the southern San Joaquin Valley, but many are no longer found in the region. Environmental pressures brought about after European contact (after about AD 1770), created primarily through hunting, mining (many of the large mammals were killed to provide food for the gold rush miners), and farming, has radically altered the faunal makeup of the region. In addition, the desiccation of the lakes, rivers, and sloughs greatly reduced the numbers of mollusks, fishes, amphibians, and waterfowl in the area. Extensive introduction of exotic species also contributed to this demise, especially of the native fishes (e.g., Moyle 2004).

Ethnographic Background

The Native American populations that inhabited much of the San Joaquin Valley during ethnographic times were known as the Yokuts. The Yokuts have been studied by several ethnographers, including Powers (1877), Kroeber (1925), Gayton (1948), Latta (1977), and Wallace (1978a, 1978b).

The Southern Valley Yokuts, primarily the Tulamni tribe, occupied the region around Buena Vista Lake (see Spier 1978; Wallace 1978a, 1978b). Their primary village, known as *Tulamniu*, was located somewhere on the western or northwestern shore of Buena Vista Lake “where the hills come close to the water” (Kroeber 1925:478). The Tulamni emphasized fishing, fowling, and the collection of shellfish, roots, and seeds. Fish were the primary food resource.

European contact with the Tulamni was first recorded in 1772, when a group of Spanish soldiers led by Captain Don Pedro Fages entered the San Joaquin Valley (Smith 1939:22). Given the view of the lake from the village, Fages assigned the name Buena Vista (beautiful view) to *Tulamniu* (Bolton 1931:215) before traveling west toward what is now San Luis Obispo.

When California was annexed by the United States, the San Joaquin Valley was overrun with settlers, and Indian lands passed into American hands. The few remaining Tulamni were sent to the Tejon Reservation established at the base of the Tehachapi Mountains or to the Fresno Reservation near Madera. These reservations failed to prosper, and the Indians who remained on them were moved to the Tule River Reservation in 1859. At one time it was estimated that the population of the Southern Valley Yokuts numbered approximately 9,500. After European contact, however, that number dramatically decreased, due primarily to introduced diseases (Osborne 1992:41-42).

Prehistoric Background

Building on the work of Beardsley (1954), Fredrickson (1973, 1974) and others, Rosenthal et al. (2007) provided the most recent synthesis of Central Valley prehistory. They divided the prehistory of the region into five periods: Paleoindian (11,500 to 8,550 BC), Lower Archaic (8,550 to 5,550 BC), Middle Archaic (5,550 to 550 BC), Upper Archaic (550 BC to AD 1100), and Emergent (AD 1100 to historic contact) (Rosenthal et al. 2007:150-159). This overall scheme is summarized below, with details provided that are specific to the southern portion of the Central Valley where Buena Vista Lake is situated.

Paleoindian

There is evidence of human habitation in the southern San Joaquin Valley, particularly around lakes, dating to at least 11,000 years ago (e.g., Riddell and Olsen 1969; Fredrickson and Grossman 1977; Wallace and Riddell 1988; Wallace 1991; Fenenga 1992, 1993; Siefkin 1999). While relatively few Paleoindian habitation sites have been identified in the southern valley, in the Tulare Lake Basin north of Buena Vista Lake, numerous isolated fluted projectile points (Clovis or "Clovis-like"), along with other artifacts presumed to be Paleoindian in age (see Fredrickson and Grossman 1977; Sampson 1991; Rondeau and Hopkins 2008) have been collected from the surface in several locations, most notably from the southern shoreline.

Lower Archaic

As with the Paleoindian Period, isolated finds characterize much of Lower Archaic occupation of the Central Valley. These include Lake Mojave, Silver Lake, and Pinto points, as well as chipped stone crescents, many of which have been found along the shoreline of Tulare Lake (Sutton 1989; Wallace and Riddell 1991; Fenenga 1992).

Only one Lower Archaic site (CA-KER-116) has so far been firmly documented in the Buena Vista Lake area (Fredrickson and Grossman 1977; Hartzell 1992). Radiocarbon assays from KER-116 produced dates ranging between 7175 and 6450 BC (Fredrickson and Grossman 1977; Hartzell 1992). One other site (CA-KER-3168) with a possible Lower Archaic component is present in the Elk Hills northwest of Buena Vista Lake (Culleton et al. 2005:159, 277).

Middle Archaic

Sites dating to the early part of the Middle Archaic in the Central Valley are relatively rare, although the later portions of this time period are better represented, particularly in the northern part of the valley (Rosenthal et al. 2007:153). Artifact assemblages of the later Middle Archaic (after about 2,550 BC) are characterized by specialized tools and features, a wide variety of nonutilitarian artifacts, trade items, and faunal and botanical specimens that suggest permanent residence (Rosenthal et al. 2007:154).

In the southern San Joaquin Valley, obsidian and shell beads/ornaments dating to the Middle Archaic have been found at a few sites. In particular, *Olivella* Grooved Rectangle beads have been found at several sites in the southern San Joaquin Valley, including CA-KER-824 (Bramlette et al. 1982), CA-KER-3079 (Cuelleton et al. 2005:68), and CA-KER-5404 (Culleton et al. 2005:220). These artifacts provide evidence of a Middle Archaic occupation in this region

(Rosenthal et al. 2007:155; also see Kennett et al. 2007:546). It is possible that these beads reflect some participation in the Western Nexus interaction sphere between southern California and the northwestern Great Basin (Sutton and Koerper 2009).

Upper Archaic

The Upper Archaic is much better represented in the Central Valley than earlier periods, although once again more is known about the northern part of the valley (Rosenthal et al. 2007:156-157). Artifact assemblages dating to this period include bone tools and ornaments, a variety of shell beads, obsidian bifaces, ceremonial blades, mortars, pestles, and polished charmstones (or plummets) (e.g., Seals 1993; Shapiro and Tremaine 1995; Sutton 1996).

A number of sites with Upper Archaic components are known in the Buena Vista Lake Basin (e.g., Wedel 1941; Hartzell 1992; Culleton et al. 2005). The deposits at these sites during this period contained food debris and house floors demonstrating the importance of both aquatic and terrestrial resources and reflecting year-round occupation (Hartzell 1992:304-305; Rosenthal et al. 2007:157).

Emergent Period

In many parts of the Central Valley, there is much more substantial evidence of the Emergent Period (Rosenthal et al. 2007:157) than of previous eras. Emergent occupations witnessed the end of many Archaic technologies and the demise of ancient cultural traditions, the latter becoming "similar to those existing at the time of European-American contact" (Rosenthal et al. 2007:157). It was during this time that bow and arrow technology developed, eventually replacing the atlatl.

Cottonwood Triangular projectile points are commonly recovered from Emergent Period sites in the Tulare and Buena Vista lake basins. *Olivella* and clam beads and drills, hopper mortars and other ground stone tools, bird bone whistles and tubes, and soapstone pipes are common in archaeological deposits of this age. In addition, pottery was acquired in the Tulare Lake Basin by exchange with groups in the foothills (Rosenthal et al. 2007:158).

Site Description

The Big Cut site (KER-4395) was named for a large bulldozer cut at its northern end that caused severe damage to the northwestern portion of the site. The soil was most likely removed many decades ago for use in the nearby levee constructed as part of the channelization of the Buena Vista Slough. Several dirt roads cross the site, as does a buried gas pipeline. In addition, several vandal pits are present.

The site is located on a low mound on the eastern edge of an embayment at the outlet of the Buena Vista Slough at an elevation of 91 m (300 ft) asl (see Figure 2). The mound measures some 300 by 200 m (about 55,000 m^2), is at least 2 m in height, and has a midden deposit that is at least 80 cm deep (based on the exposures in the bulldozer cut).

Many artifacts are present on the surface of the site in 1995, including groundstone tools, small triangular projectile points, bifaces, cores, hammerstones, debitage, and shell beads. Considerable quantities of freshwater shell (cf. *Anodonta*) are also present, as well as burned and unburned bone.

Research Goals

The goals of the project were limited. First, we wanted to record the site and establish the extent of the damage in order to make a determination of its integrity. This was accomplished by a detailed examination and mapping of the surface, conducted on April 22, 1995, at which time a surface collection was made. The most obvious impacts to the site were the bulldozer cut, the

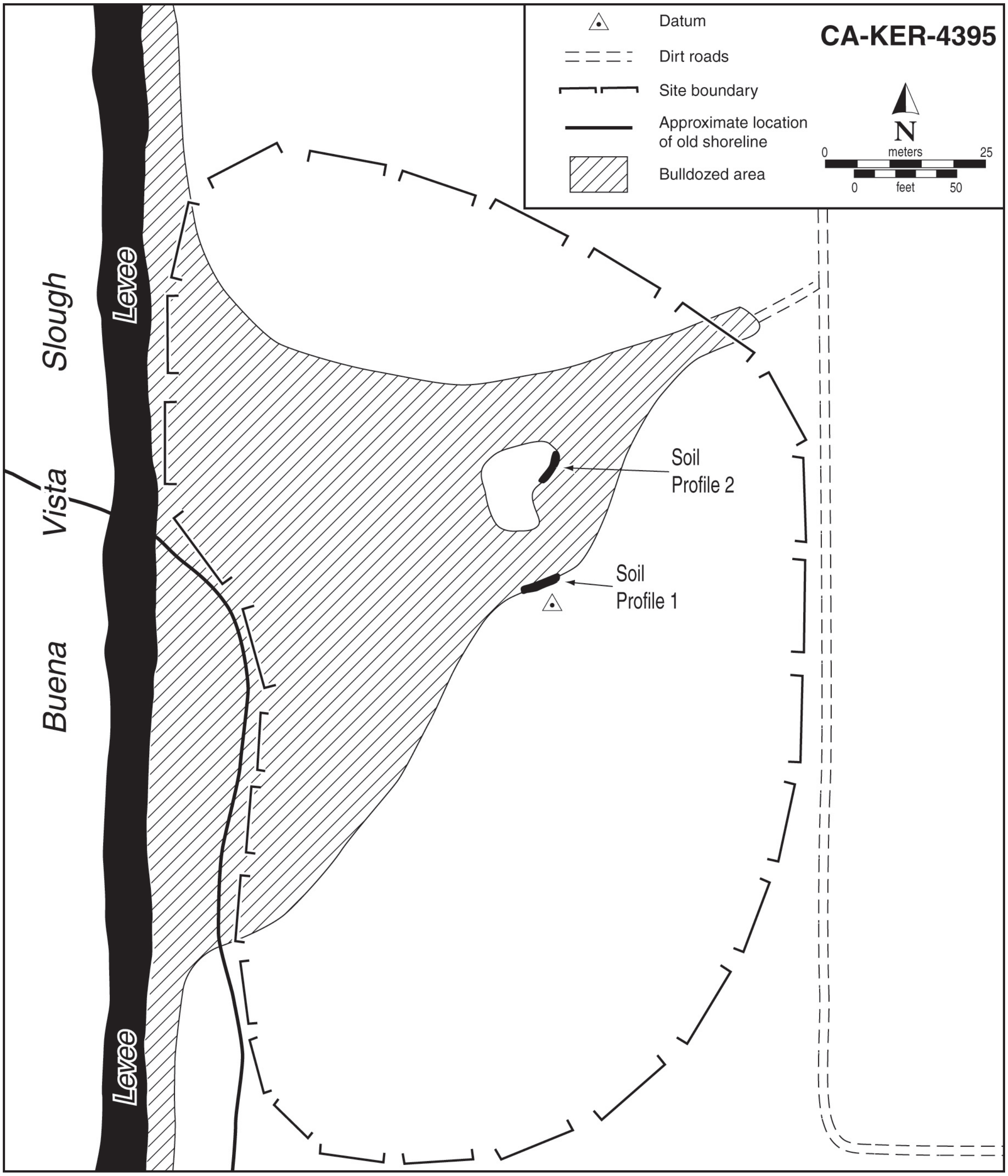

Figure 2. Map of the Big Cut site (CA-KER-4395).

roads, and several vandal pits. Most of the damage was in the northern portion of the site, while the southern portion appeared to be largely intact.

The second goal of the project was to obtain data that could be useful in the determination of the content, age, function, and seasonality of KER-4395. Given that the site was on the shoreline of Buena Vista Lake, it was anticipated that the subsistence focus of the site would be oriented toward lacustrine resources.

Field Methods

Field work at the site consisted of the judgmental collection of certain artifacts, the exposure and recordation of two stratigraphic profiles, and the collection of soil samples from each stratum. No formal units were excavated, and no features were observed. Artifacts considered temporally and/or functionally diagnostic (e.g., points, beads, obsidian) were surface collected on August 19, 1995, with the artifacts being mapped relative to the main site datum.

Two soil exposures on either side of the bulldozer cut (Figure 2) were profiled, and soil samples were taken from the identified strata. Both profiles were of the cut bank only, and neither was excavated below the level of the bulldozer cut. Profile 1 was located on the southern edge of the bulldozer cut and was "stepped" to minimize the removal of undisturbed soil. Profile 2 was located on the northern edge of the bulldozer cut. All soils removed to create the profiles were dry screened through 1/8-in mesh, and all cultural materials were saved and bagged by profile. Bulk soil samples were taken from each stratum for constituent analysis. The samples varied in volume from 1.5 to 5.6 liters and were removed by trowel and placed in paper bags.

Laboratory Methods

All recovered materials were catalogued; individual artifacts received separate numbers, but debitage of the same material, faunal remains, and botanical remains were grouped and received one number per stratum sample. Metric attributes (length, width, thickness, and weight) were obtained for each artifact.

The bulk soil samples were weighed, their volume determined, and catalogued. One half of each sample was dry-screened and then wet-screened (with tap water) through No. 35 mesh. The processed samples (50 percent of the originals) were then dried, and a 20 percent subsample (comprising a 10 percent sample of the original) was examined under a dissecting microscope. Recovered materials were placed in vials, after which they were identified to the degree possible and catalogued.

Results

The surface collection and soil profile work resulted in the recovery of 58 artifacts, 210 pieces of debitage, and some ecofactual material. In addition, information on another 15 uncollected artifacts was recorded.

Stratigraphy and Soils

Profiles 1 and 2 revealed four general soil strata (A-D), all in the same order and relative thickness, although their descriptions differed slightly. The soil exposure mapped in Profile 1 was 90 cm in height, while the soil exposure in Profile 2 was 70 cm. Neither profile revealed the bottom of the cultural deposit, so its depth remains unknown. The stratigraphy of the site is shown in the drawing of Profile 1 (Figure 3).

Stratum A consisted of a loose, grayish brown (Munsell value of 10YR 5/2, dry), silty loam. This layer was thin and seemed to be a recent windborne deposit. Stratum B consisted of a compact, dark grayish brown (10YR 4/2, dry), silty loam that formed the uppermost cultural deposit. This stratum was thicker in Profile 1.

Stratum C consisted of a grayish brown (10YR 5/2, dry), silty loam that contained more clay than Stratum B. This layer formed the bulk of the midden deposit exposed in the profiles. Stratum D, the lowest exposed stratum, consisted of a dark gray (10YR 4/1, dry), silty loam. Only the upper portion of this stratum was exposed in the profiles, and its depth is unknown. Both Strata C and D contained considerable rodent disturbance.

While the depth of the cultural deposit was not determined, it was abundantly clear that a well-developed midden was present across at least a portion of the site. The midden contained considerable artifactual and ecofactual materials, and it appeared that most of the site deposit was relatively undisturbed, with the obvious exception of the bulldozer cut.

Midden Constituent Analysis

Soil samples were taken from each of the strata in both profiles, with two (upper and lower) being taken from Stratum C (a total of 11 samples), and were processed as described above. Profile 1 contained a considerable amount of material (see Table 1), while Profile 2 (Table 2) contained less. Of the eight constituents in common, Profile 1 contained more (in some cases significantly more) of five of the constituents (*Anodonta*, debitage, mammal bone, snail shell, and fish bone, in order of frequency). These differences are not likely attributable to the difference in total sample size volume (1.6 liters for Profile 1 and 2.17 liters for Profile 2), as Profile 1 (the smaller of the sample size total) had the greater frequencies of constituents (including an *Olivella* bead).

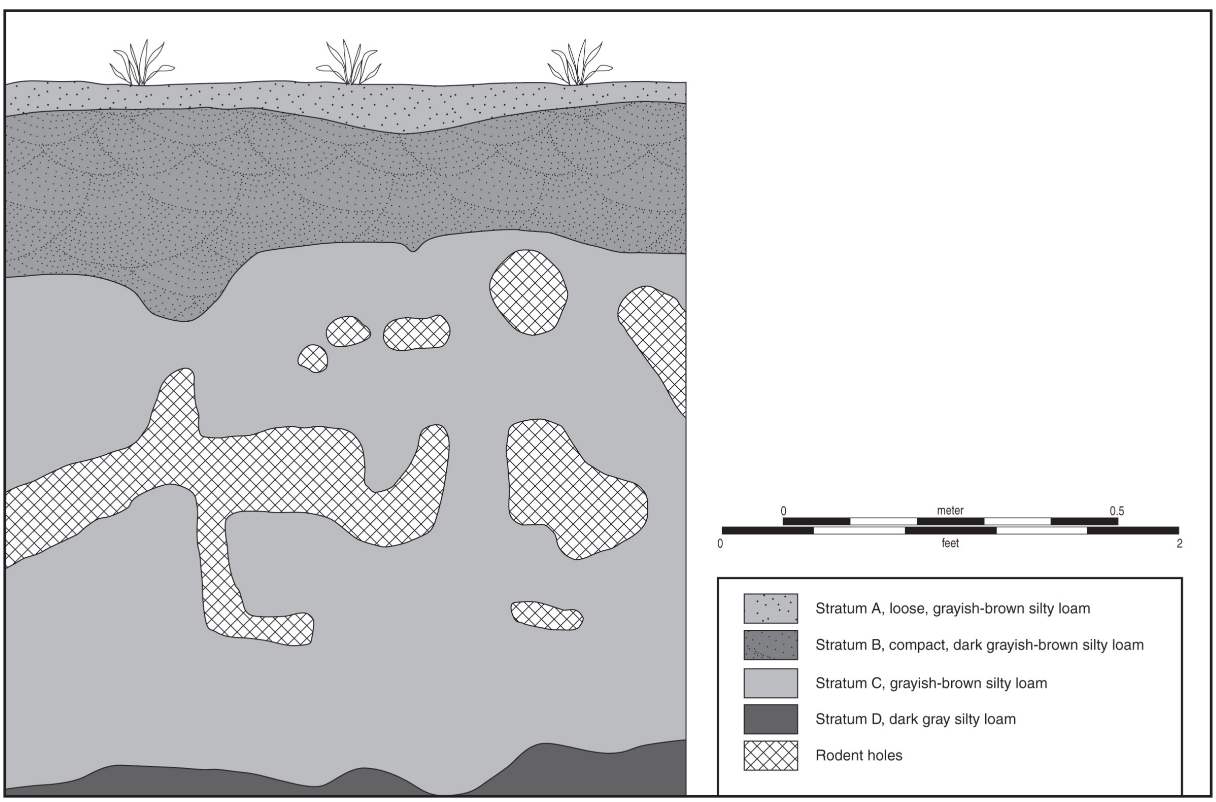

Figure 3. Map of Profile 1 at the Big Cut site (CA-KER-4395).

Table 1. Soil Sample Results[a] for Profile 1 at CA-KER-4395.

Constituent	Stratum A	Stratum B	Stratum C (upper)	Stratum C (lower)	Stratum D	Total Weights
sample size (mL)[b]	400	390	320	330	160	1,600
debitage[c]	3.7	–	0.1	–	–	3.8
Olivella bead	–	–	–	–	0.1	0.1
Anodonta californiensis	7.8	0.1	31.8	66.5	49.7	155.9
Physa gyrina[d]	0.1	–	–	–	–	0.1
Planorbidae	1.7	0.01	0.4	1.7	0.02	3.83
seed fragments	0.1	–	–	–	–	0.1
mammal bone	0.1	–	–	0.3	0.5	0.9
fish bone	0.1	0.01	–	0.4	0.2	0.71
snake vertebrae	–	–	0.01	–	–	0.01

[a] By weight (in grams, except sample size). Charcoal was found only in trace amounts, none of which was associated with features, so it is excluded from this table.
[b] For each sample, 50 percent of the soil was processed and 20 percent of that soil was analyzed for identification of the constituents, a total of 10 percent of the original sample. The mL measurement in this table represents the amount of soil that was completely processed.
[c] All of the debitage was chert.
[d] One intact shell.

Note: A soil sample (Cat. No. 082) was also taken from "Stratum E," which was mixed soil from rodent holes. That sample (150 mL) was processed in the same manner as the others and contained one chert flake, 25.2 g of *Anodonta* shell, 0.15 g of Planorbidae shell, a complete *Physa gyrina* shell, 3.7 g of mammal bone, and 0.43 g of fish bone.

Most of the mammal remains from the soil samples could not be identified beyond size category, but most were burned and are considered to be cultural constituents. The debitage from the two profiles does not show a significant difference (Table 3) other than that Profile 1 contained only chert and Profile 2 had one quartz flake. The two profiles demonstrate that chert was the dominant material type.

While the quantity of fish bone recovered was relatively small, fish made up the vast majority of the recovered faunal remains, and seven species were identified (see below), most of which were found in Profile 1. The soils from Profile 1 contained some 93 percent of the *Anodonta* shell as well as most of the fish bone, suggesting that Profile 1 may have been an activity area for the processing of mollusks and fish (see below for details).

Material Culture

The material culture recovered from the Big Cut site included ground and flaked stone artifacts and beads of stone, shell, and glass. A few fire-affected rocks were observed in the course of the investigations (some were collected), but it seems likely that others are present at the site. In addition, there are unconfirmed reports of human remains from the site, apparently two cranial fragments and the head of a long bone. No human remains were observed or collected during our 1995 investigations.

Table 2. Soil Sample Results[a] for Profile 2 at CA-KER-4395.

Constituent	Stratum A	Stratum B	Stratum C (upper)	Stratum C (lower)	Stratum D	Totals
sample size (mL)[b]	560	500	370	390	350	2,170
debitage[c]	0.1	0.2	–	–	0.1	0.4
Anodonta californiensis	0.7	0.9	4.7	3.0	1.6	10.9
Physa gyrina[d]	0.01	–	–	–	–	0.01
Planorbidae	0.01	0.7	0.7	0.9	0.3	2.61
seed fragments	0.3	–	–	–	–	0.3
mammal bone	0.01	0.03	0.3	1.1	0.9	2.34
fish bone	–	0.01	0.1	0.02	0.02	0.15
snake vertebrae	–	–	–	0.2	–	0.2

[a] By weight (in grams, except sample size). Charcoal was found only in trace amounts, none of which was associated with features, so it is excluded from this table.
[b] For each sample, 50 percent of the soil was processed and 20 percent of that soil was analyzed for identification of the constituents, a total of 10 percent of the original sample. The mL measurement in this table represents the amount of soil that was completely processed.
[c] All but one of the debitage was chert, the exception being a quartz flake.
[d] One intact shell.

Table 3. Summary of Debitage Recovered from CA-KER-4395.

Material	Surface	Profile 1	Profile 2	Totals
basalt	3	–	10	13
chert	1	92	91	184
obsidian	2	2	3	7
quartz	1	–	4	5
rhyolite	1	–	–	1
Totals	8	94	108	210

Ground Stone

Seventeen ground stone artifacts (Tables 4 and 5) were documented, although many other pieces were noted but not collected. The nine collected specimens include one metate fragment, one mano fragment, one bowl fragment, two fragments of a steatite pipe, one fragment of an unidentified tool, and three stone beads. In general, the ground stone assemblage appears to be fairly diverse and is indicative of a variety of subsistence activities.

Milling Equipment

Four pieces of milling equipment were collected, another eight fragments were documented (see Table 4), and many other pieces undoubtedly remain undiscovered. The pieces collected include one sandstone metate fragment (Cat. No. 048), one mano fragment (Cat. No. 052), one bowl fragment (Cat. No. 053; a body piece from a fairly large bowl), and one fragment of unidentified granitic ground stone (Cat. No. 050).

Table 4. Provenience and Attributes of Ground and Flaked Stone Artifacts at CA-KER-4395.

Cat. No.	Artifact	Provenience	Material	Length	Width	Thickness	Weight	Fig.
Ground Stone Artifacts								
048	metate fragment	surface	sandstone	55.5	44.8	43.2	130.3	–
052	mano fragment	surface	granitic	85.1	69.7	47.4	327.5	–
–	mano fragment (not collected)	surface	–	–	–	–	–	–
–	mano fragment (not collected)	surface	–	–	–	–	–	–
053	bowl fragment	surface	granitic	161.2	143.3	73.1	1,616.7	–
–	bowl fragment (not collected)	surface	quartzite	–	–	–	–	–
–	bowl fragment (not collected)	surface	quartzite	–	–	–	–	–
–	bowl fragment (not collected)	surface	quartzite	–	–	–	–	–
–	bowl fragment (not collected)	surface	quartzite	–	–	–	–	–
–	bowl fragment (not collected)	surface	quartzite	–	–	–	–	–
–	bowl fragment (not collected)	surface	quartzite	–	–	–	–	–
084	pipe fragment	surface	steatite	60.7	27.4	11.8	21.9	4
085	pipe fragment	surface	steatite	22.6	16.0	3.0	1.1	–
050	unidentified fragment	surface	granitic	63.5	59.2	43.2	186.8	–
Flaked Stone Artifacts								
087	Cottonwood Triangular point	surface	chert	21.4	11.4	5.4	1.4	5a
088	Cottonwood Triangular point	surface	chert	19.9	8.6	4.3	0.9	5b
089	Cottonwood Triangular point midsection	surface	chert	13.8	10.4	3.3	0.5	5c
–	Cottonwood Triangular point (not collected)	surface	–	20.0	13.0	4.0	–	–
094	Elko Corner-notched point	surface	obsidian	29.1	20.2	6.2	2.9	6a
095	Gypsum point	surface	obsidian	29.7	20.5	5.8	3.0	6b
006	Humboldt point	surface	obsidian	38.4	36.7	10.2	12.7	6c
086	stemmed point base	surface	obsidian	21.2	17.0	7.1	3.1	6d
091	biface fragment (distal)	surface	chert	45.6	19.1	7.2	6.2	–
–	biface, complete (not collected)	surface	obsidian	32.5	16.0	7.0	–	–
–	biface fragment (not collected)	surface	chert	24.0	14.0	9.0	–	–
–	biface fragment (not collected)	surface	chert	26.0	25.0	7.6	–	–
–	biface fragment (not collected)	surface	–	37.0	25.0	0.5	–	–
–	biface fragment (not collected)	surface	obsidian	–	–	–	–	–
001	modified flake	surface	chert	56.7	38.8	18.3	41.1	–
003	modified flake	surface	basalt	50.2	17.9	6.0	5.1	–
049	hammerstone fragment	surface	quartzite	53.1	44.4	19.3	58.5	–

Note: Metrics in millimeters and grams.

Table 5. Provenience and Attributes of Stone Beads at CA-KER-4395.

Cat. No.	Provenience	Material	Diameter	Thick	Perforation Diameter	Perforation Type	Burned	Comments
012	surface	steatite	5.7	2.5	1.9	parallel	no	2.1 mm perforation diameter on reverse
013	surface	steatite	5.3	1.6	2.0	parallel	no	worn on one edge
046	surface	calcite	6.8	2.2	1.8	parallel	yes	possible string wear

Note: Metrics in millimeters.

Steatite Pipe

Two fragments of what appears to be a single steatite pipe (Table 4) were found next to each other on the surface. The larger fragment (Cat. No. 084) (Figure 4) is from a tubular pipe with an exterior diameter of approximately 35 mm and an interior diameter of approximately 16 mm. The finished squared edge of one end is present, and the outside surface of the specimen is highly polished. The interior of the pipe is not polished but exhibits a series of longitudinal grooves, likely the result of "gouging" out the interior of the pipe during manufacture. The smaller fragment is of an identical material and surface treatment. The steatite is light green in color (although the polished surface is almost black) and is fairly grainy, and its source is unknown.

Wooden and cane tubular pipes were typically used by the Yokuts, while steatite pipes were less common (see Kroeber 1925:Plate 30c-d; Wallace 1978a:456). Kroeber (1925:538) reported that the Yokuts denied the use of stone pipes and did not consider smoking tobacco as important as eating it.

Stone Beads

Three stone disk beads were found on the surface, two of steatite and one of calcite (Table 5). While stone beads are generally considered to have little temporal significance, they have "a wide areal distribution in California but everywhere appear to be confined to chronologically late archaeological deposits" (Fenenga 1952:345; also see Olsen and Payen 1983).

Flaked Stone

Seventeen flaked stone artifacts were recorded (Table 4), with 11 being collected and the others left in place. The 17 artifacts included eight projectile points, six bifaces, two modified flakes, and one hammerstone.

Projectile Points

Of the eight projectile points that were recorded, four were Cottonwood Triangular forms (see Table 4 and Figure 5), all made from Temblor chert presumably from the Temblor Range a short distance to the northwest. Cottonwood Triangular points are often called "Tulamniu Triangular" when they are found in the southern San Joaquin Valley and date to the Emergent Period.

Two "dart" points, one Elko Corner-notched (Cat. No. 094) and one Gypsum (Cat. No. 095), were also found (Table 4). The Elko point (Figure 6a) is complete but appears to have been rejuvenated, while the Gypsum point (Figure 6b) is reminiscent of a Rose Spring form but larger. The presence of dart points suggests that there may have been some occupation of the site before ca. AD 1100, when the bow and arrow is thought to have diffused into the area (Bennyhoff 1994). Both of the dart points were obsidian and were submitted for obsidian analysis (see below).

Figure 4. Steatite pipe fragment (Cat. No. 084) from the Big Cut site (CA-KER-4395).

Figure 5. Cottonwood Triangular points from the Big Cut site (CA-KER-4395): (a) Cat. No. 087; (b) Cat. No. 088; (c) Cat. No. 089.

Figure 6. Large projectile points from the Big Cut site (CA-KER-4395): (a) Elko (Cat. No. 094); (b) Gypsum (Cat. No. 095); (c) Humboldt (Cat. No. 006); (d) stemmed (Cat. No. 086).

One fairly large obsidian specimen (Cat. No. 006) (Table 4 and Figure 6c) is classified as a Humboldt form, as it has a rather deep basal notch. The point is complete but has apparently been broken and rejuvenated such that it appears as a sharpened stub almost as wide as it is long. This specimen was sourced to the Coso Volcanic Field and has the smallest hydration rim of any of the tested specimens (see below).

The final point appears to be the base of a small stemmed type. The specimen (Cat. No. 086) (Table 4 and Figure 6d) is obsidian and was broken somewhere in its midsection.

Bifaces

Six bifaces, one complete and five fragments, were recorded, but only one was collected (Table 4). The collected specimen (Cat. No. 091) is the distal portion of a well-made chert biface, perhaps the end of a projectile point. The presence of other bifaces on the surface suggests that bifaces were brought to the site in relatively finished form.

Debitage

A total of 210 pieces of debitage of chert, basalt, obsidian, rhyolite, and quartz were collected (see Table 3), although many more were observed at the site but not collected. Of that number, 203 came from the soils in Profiles 1 and 2, while the rest were found on the surface. The vast majority of the excavated debitage was chert (n = 184). As noted above, the likely source of the chert is the Temblor Range, while the sources of the basalt, rhyolite, and quartz are unknown. Obsidian debitage (n = 7) was uncommon and generally originated from the Coso Volcanic Field located some 170 km to the northeast (see discussion below).

Shell Beads

Thirty-eight shell beads were collected from the site (Table 6). Of these, 35 were *Olivella* (33 from the surface and one from each profile), two were *Haliotis* disk beads, and one was a clamshell (cf. *Tivela*) disk bead (an additional clam tube bead was noted but not collected). A complete and apparently unmodified *Olivella* shell (Cat. No. 068) was also found, and it measured 12.3 mm long and 6.9 mm in diameter. Many more beads are present on the surface and in the deposit, primarily *Olivella* types. A number of concentrations of shell beads were also noted on the surface.

Olivella Beads

A total of 35 *Olivella* beads of 12 types were found (Table 6). One of these is an A1a small spire-lopped bead (see Bennyhoff and Hughes 1987:118). This type has no firm temporal significance, although it is more common in the Late Period (Bennyhoff and Hughes 1987:117).

Three of the beads are Class B. These include one B2b medium end-ground bead (Bennyhoff and Hughes 1987:122), a type "most common in the Early period [ca. 8,000 to 5,000 BC] and Phase 1 of the Late period" (ca. AD 500 to 1,200) (Bennyhoff and Hughes 1987:121). One bead is a B3b medium barrel that has no firm temporal significance (Bennyhoff and Hughes 1987:122). The third Class B bead is a very small B5 spire found in a soil sample; this type generally dates to the Late Period (Bennyhoff and Hughes 1987:122).

A single D3 oval punched bead (Bennyhoff and Hughes 1987:127) was also found. In California, this bead type is thought to date to the Middle/Late Period transition, about AD 500.

Table 6. Provenience and Attributes[a] of Shell Beads at CA-KER-4395.

Cat. No.	Provenience	Type[b]	DI	TH	PD	PT	Burned	Comments
015	surface	A1a	6.1	9.4	1.5	–	no	–
014	surface	B2b	7.4	10.5[c]	2.1	–	yes	partly burned
016	surface	B3b	6.6	5.8[c]	3.4	–	no	both ends ground
098	Profile 1	B5	3.2	2.6	2.2	–	no	both ends ground
037	surface	D3	8.4	3.6	2.5	punched	no	discolored on edge
020	surface	E1a	6.1	3.0	1.7	parallel	no	–
022	surface	E1a	6.1	2.6	2.5	parallel	no	–
036	surface	E1a	8.0	3.7	1.9	parallel	no	–
038	surface	E1a	7.0	2.6	1.9	parallel	yes	in two pieces
040	surface	E1a	7.2	1.6	2.2	parallel	no	–
041	surface	E1a	7.4	1.5	2.0	parallel	no	1/2 of bead
042	surface	E1a	7.2	2.2	2.2	parallel	no	1/2 of bead
043	surface	E1a	6.3	1.9	2.1	parallel	no	3/5 of bead; possible string wear
044	surface	E1a	5.1	1.4	1.8	parallel	no	broken
090	surface	E1a	6.5	3.4	1.7	conical	no	–
033	surface	E1b	10.3	4.0	1.8	biconical	no	–
034	surface	E1b	10.4	4.1	1.0	conical	no	string wear
066	Profile 2	E1b	8.3	3.0	2.4	conical	yes	string wear, broken, burned
017	surface	E2b	6.1	3.8	2.0	conical	no	–
021	surface	E2b	6.2	3.3	1.8	parallel	no	possible string wear
031	surface	E2b	9.2	4.6	2.0	parallel	no	–
032	surface	E2b	8.5	4.2	2.0	parallel	no	–
035	surface	E2b	8.7	4.2	2.0	parallel	no	–
024	surface	G1	2.4	1.0	0.6	conical	no	–
027	surface	G1	3.3	1.0	1.2	parallel	no	–
054	surface	G1	1.9	0.7	0.8	parallel	no	very small bead
025	surface	H1a	4.9	1.3	0.9	parallel	no	–
026	surface	H1a	4.3	1.3	0.8	parallel	no	–
029	surface	H1a	4.3	1.4	0.9	parallel	yes	–
018	surface	K1	3.9	1.9	1.5	conical	no	2 small striations on dorsal surface
019	surface	K1	4.5	2.5	1.7	parallel	no	–
023	surface	K1	4.4	1.7	1.7	parallel	no	–
028	surface	K1	5.1	3.0	1.7	parallel	no	–
039	surface	K1	5.0	2.6	2.0	parallel	yes	–
092	surface	N2	9.5	1.8	–	grooved	no	Grooved Rectangle (see Figure 7)
045	surface	disk	5.8	1.7	1.0	parallel	no	*H. rufescens*, possible string wear
047	surface	disk	4.7	1.4	2.0	parallel	no	*H. rufescens* epidermis bead
030	surface	disk	5.7	1.2	2.1	parallel	no	clamshell, possible residue
–	surface	tube	6.0	Not Collected				clamshell, 18 mm long

[a] In millimeters. DI = diameter; TH = thickness; PD = perforation diameter; PT = perforation type.
[b] Except where noted, all of the beads were *Olivella*, which were typed using Bennyhoff and Hughes (1987).

Eighteen beads are Class E lipped (Bennyhoff and Hughes 1986:127-129). Of that number, 10 are E1a round thin lipped, three are E1b oval thin lipped, and five are E2b thick lipped. Class E beads date late in time, after ca. AD 1500.

Three G1 tiny saucer beads (see Bennyhoff and Hughes 1987:132) were recovered. This bead has no firm temporal significance. Three beads identified as H1a ground disks all have very small perforation diameters probably made with metal needles. Class H beads occur primarily in southern California and date to the Mission Period, between about AD 1770 and 1834. Five K1 cupped beads (see Bennyhoff and Hughes 1987:137) found at the site probably date to the Emergent Period, after ca. AD 1200.

Finally, one specimen (Cat. No. 092) was an *Olivella* Grooved Rectangle (OGR) bead (Class N2; Bennyhoff and Hughes 1987:141-142) (Figure 7). This bead type dates to the Middle Archaic and is a marker artifact for the Western Nexus interaction sphere between southern California and the northwestern Great Basin (Sutton and Koerper 2009). Other examples of this bead type have been found in various southern San Joaquin Valley sites and provide evidence of a Middle Archaic occupation in this region (Rosenthal et al. 2007:155; also see Kennett et al. 2007:546).

Haliotis Beads

Two *Haliotis rufescens* disk beads were recovered (Table 6), including one epidermis disk. Beads of *H. rufescens* have a wide distribution throughout California. Harrington (1942:16) reported that the Yokuts would string red *Haliotis* epidermis beads with white *Olivella* beads, as well as other shell bead types, for color contrast. *Haliotis* disk beads date generally between 5,000 BC and AD 400, and during part of the historical period (ca. AD 1650 to 1782).

Graesch (2001) examined *H. rufescens* disk beads from Santa Cruz Island and found that perforation diameter measurements are equal to or less than 1.1 mm, and relatively straight bore holes were drilled using metal needles. One of the *Haliotis* beads from Big Cut matched that criterion and so probably postdates AD 1650.

Clamshell Beads

One disk bead made from mussel (cf. *Mytilus californianus*) shell was recovered on the surface (Table 6) and ap-

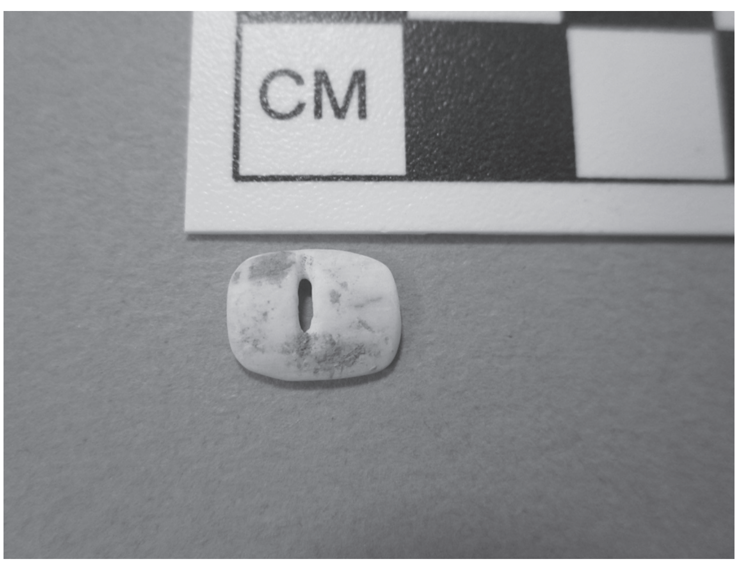

Figure 7. *Olivella* Grooved Rectangle bead (Cat. No. 092) from the Big Cut site (CA-KER-4395).

pears to have some dark-colored residue adhering to its surface. Such beads most commonly date after ca. AD 900 and continued to be used into historic times (Gibson 1992:34). In addition, a clamshell tube bead was noted on the surface but was not collected (see Table 6).

Glass Beads

Two glass beads were collected from the surface. One (Cat. No. 010) is a small, globular, cobalt blue bead measuring 3.5 x 2.3 x 1.3 mm. The second (Cat. No. 011) is a small cylindrical, diagonally cut, aquamarine/turquoise bead measuring 3.3 x 3.4 x 1.2 mm. Glass beads are typically regarded as contact period trade items. Sutton (2000a:30) suggested that native groups may have eventually "substituted glass beads for shell beads within their economic system" due to decreasing access to shell beads and increasing access to glass beads as a result of contact with Euroamericans.

Faunal Remains

The faunal collection from the Big Cut site consists of *Anodonta* shell, freshwater snail shell, and the remains of fishes, snakes, turtles, birds, and mammals. Some of the remains were recovered from the soils that were cut back to expose the profiles, but most were collected in the bulk soil samples from the profiles (see Tables 1 and 2). No faunal remains were collected from the surface.

Analytical Methods for the Faunal Remains

The faunal elements were counted and weighed prior to taxonomic assessment. Diagnostic elements were separated and identified to species wherever possible using the characteristic features described by Olsen (1968) for reptiles, Gilbert et al. (1985) for birds, and Olsen (1996) for mammals. The remaining materials were identified to the closest appropriate taxonomic level. The invertebrate remains were separated as *Anodonta* and freshwater snail. The vertebrate remains were first separated as fish and nonfish, and the fish remains were examined and identified by one of us (KWG). All nonfish specimens were initially identified by CSUB students and subsequently confirmed by Sutton and/or Gardner. Gobalet confirmed the presence of *Microtus,* snake, and small mammalian carnivore elements among the fish materials.

Only a small fraction of the faunal remains could be identified beyond a general size or taxonomic category. Materials not identified to at least the generic level were assigned to the next appropriate taxonomic level. Due to extreme fragmentation of most of the mammalian remains, identification was largely restricted to a simple differentiation between large, medium-small, and small mammal. Another common sorting technique in many archaeofaunal studies is to separate burned and unburned bone under the assumption that burned bone is more likely to be culturally deposited. As most of the bones in the collection were too small and fragmentary to be tabulated accurately, this evaluation was not applicable, but the majority of them appeared to be burned.

The basic counting unit used in quantifying the faunal assemblage from the Big Cut site was the number of identified specimens (NISP), by which each bone or bone fragment is assigned to some taxonomic level. As a result of the severe fragmentation of many of the faunal elements at the site, the NISP was quite high. This degree of fragmentation is related to many factors, including site formation processes (e.g., Schiffer 1987), differential breakage (e.g., Grayson 1991), and processing technique (e.g., Yohe 1996). Such factors can introduce significant bias into the analysis of faunal assemblages from archaeological contexts.

Invertebrate Remains

The invertebrate remains from the Big Cut site consisted primarily of bivalves with small quantities of gastropods, all of which are highly fragmented.

Bivalves

Only one species of freshwater shell, *Anodonta californiensis* (also known as California floater), was identified, consisting of 166.8 g of shell from the profile soil samples (see Tables 1 and 2), the vast majority of which was derived from Profile 1. As noted above, all of the shell was highly fragmented, and no hinges or even nearly complete specimens were found. The cultural and/or taphonomic processes involved in this fragmentation are not clear, although much of the shell was burned, suggesting a cultural derivation. *A. californiensis* typically inhabits lakes and slow-moving streams with mud or sand substrates, although they have also been found in rivers and creeks with gravel substrates.

There is considerable archaeological and ethnographic evidence of the use of *Anodonta* by the prehistoric Yokuts (e.g., Gifford and Schenck 1926; Wedel 1941; Wallace 1978a, 1978b). Wedel (1941:10) observed abundant *Anodonta* remains in his trench profiles at Buena Vista Lake (CA-KER-39 and CA-KER-60) (also see Hartzell 1992; Williams 2002), and he suggested that the deposit was similar in nature to shell mound sites on San Francisco Bay and along the Santa Barbara coast (Wedel 1941:26).

In his study of a radiocarbon reservoir correction factor on shell to refine the chronology for the Elk Hills area in the Buena Vista Lake Basin, Culleton (2006:1335) reported that the procurement of freshwater mussels (*Anodonta* and *Gonidea*) apparently intensified after about 700 years ago, at the termination of the Medieval Climatic Anomaly (also see Gardner 2007) and during the subsequent Little Ice Age. This indicated to Culleton (2006:1331) that escalating occupation of the Elk Hills at that time seemed to be correlated with increasing precipitation and that "slough resource exploitation may have been driven by regional population pressure rather than drought-related declines in aquatic productivity."

Gastropods

Two gastropods, both freshwater snails, were identified at the site. *Physa gyrina* is represented by two very small, intact shells, one from each of the soil profiles. *P. gyrina* occurs in almost any permanent or intermittent freshwater habitat type, including ponds, lakes, creeks, and rivers (Anderson 1996; Dillon 2000). Neither of these shells was burned or otherwise culturally modified. Their extremely small size makes it unlikely that these snails were used as food by the Yokuts, and their paucity at the site reinforces this argument.

The other freshwater snail was identified only as a member of the family Planorbidae. Fragments of this snail were found consistently throughout the cultural deposit, although in very small quantities; a total of 6.6 g were recovered, in relatively equal amounts between the two soil profiles. There was no evidence of cultural modification of these fragments (e.g., burning), and there were too few fragments to suggest that this species was utilized by the inhabitants of the site.

Vertebrate Remains

The vertebrate remains from Big Cut consisted of fishes, snakes, turtle, birds, and mammals. Only a few of these specimens were recovered from the cutback soils; the remaining specimens were found in the soil samples.

Actinopterygii: Ray-finned Fishes

Fish remains comprised the vast majority of the faunal specimens, all of which were found in the soil samples. Seven species of fishes were identified (Tables 7 and 8): Sacramento perch (*Archoplites interruptus*); tule perch (*Hysterocarpus traski)*; Sacramento sucker (*Catostomus occidentalis)*; Sacramento blackfish (*Orthodon microlepidotus*); Sacramento pikeminnow (*Ptychocheilus grandis*); and the tentatively identified

Table 7. Distribution of Fish Remains by Strata[a] for Profile 1 at CA-KER-4395.

Taxon	A	B	C(U)	C(L)	D	CS	Totals
Archoplites interruptus	1	7	12	5	–	9	34
Hysterocarpus traski	–	19	7	11	–	–	37
Orthodon microlepidotus	–	1	2	2	–	–	5
Catostomus occidentalis	–	11	2	2	–	2	17
Lavinia exilicauda	–	2	–	–	–	–	2
Ptychocheilus grandis	–	–	1	–	–	–	1
Gila crassicauda	–	–	1	–	–	–	1
Cyprinidae	–	–	35	18	6	10	69
Cypriniformes	1	14	2	9	–	–	26
Actinopterygii	many	many	many	many	18	3	untab.

[a] Number of identified species. Key: C(U) = Stratum C upper; C(L) = Stratum C lower; CS = cutback soil.

Table 8. Distribution of Fish Remains by Strata[a] for Profile 2 at CA-KER-4395.

Taxon	A	B	C(U)	C(L)	D	CS	Totals
Archoplites interruptus	–	1	3	5	3	1	13
Hysterocarpus traski	–	–	–	–	–	–	–
Orthodon microlepidotus	–	–	–	–	–	–	–
Catostomus occidentalis	–	–	–	–	–	–	–
Lavinia exilicauda	–	–	–	–	–	–	–
Ptychocheilus grandis	–	–	–	–	–	–	–
Gila crassicauda	–	–	–	–	–	–	–
Cyprinidae	–	1	–	1	3	–	5
Cypriniformes	–	2	–	–	–	–	2
Actinopterygii	–	1	–	24	many	–	untab.

[a] Number of identified species. Key: C(U) = Stratum C upper; C(L) = Stratum C lower; CS = cutback soil.

hitch (*Lavinia exilicauda)* and thicktail chub (*Gila crassicauda*). In addition, an uncounted but large number of actinopterygian, cypriniform, and cyprinid specimens are in the collection.

The most abundant fish species identified was Sacramento perch (n = 57; 44.9 percent of the identified species). Sacramento perch, which can reach a total length (TL) of 61 cm, inhabits sloughs, sluggish rivers, and lakes of central and southern California (McGinnis 1984:80; Moyle 2004). One of the main characteristics of Sacramento perch habitat is the presence of beds of rooted and emergent aquatic vegetation for use as spawning grounds and nurseries. At one time, the immense tule stands common around Buena Vista Lake most likely supported a large population of Sacramento perch. The perch elements recovered included 30 vertebrae, 20 otoliths, 2 preopercles, 2 atlases, 1 basioccipital, 1 quadrate, and 1 vomer.

The next most frequently occurring fish species was tule perch (n = 39; 30.7 percent of the identified species). This species is a small member of the viviparous surfperch family (Embiotocidae) and was once common in the Central Valley (Moyle 2004). Tule perch reach a TL of about 16 cm. The 39 identified tule perch elements were all vertebrae.

A total of 18 elements of Sacramento sucker (ca. 50 cm TL) were recovered (14.2 percent of the identified species). Sacramento suckers are common in the rivers and lakes of the Sacramento-San Joaquin drainage (McGinnis 1984:162). Adults prefer deeper water, while the young tend to inhabit more shallow waters (Moyle 2004). The Sacramento sucker elements included 16 vertebrae and 2 otoliths.

Eight elements of Sacramento blackfish (ca. 60 cm TL) were found (6.3 percent of the identified species). This native fish typically inhabits backwater areas, is tolerant of low-oxygen waters, and is common in the San Joaquin Valley river/lake system (Moyle 2004). The recovered elements included 5 teeth, 2 pharyngeals, and a basioccipital.

Three elements (2.4 percent of the identified species) were identified as hitch (ca. 15 to 35 cm TL) (McGinnis 1984:144). Hitch are found in the San Joaquin Valley river/lake system and prefer slow-moving, deeper water (Moyle 2004). The hitch elements consisted of 2 pharyngeals and 1 tooth.

Only a single element of Sacramento pikeminnow was found, a vertebra. This member of the minnow family is the largest native California cyprinid, growing to over a meter (McGinnis 1984:151). Its distribution is within the Sacramento-San Joaquin river system, tributaries of Monterey Bay, and the Russian River. A characteristic trait of this fish is its large spawning aggregations (McGinnis 1984:151).

A single pharyngeal of a probable thicktail chub (0.8 percent of the identified species) was identified. This now-extinct fish preferred slow, backwater areas of sloughs and lakes of the Central Valley, particularly around tule stands (Moyle 2004). It reached a total length of about 25 cm.

Comparative data on fish utilization are available from a few sites in the southern San Joaquin Valley (Gobalet et al. 2004:820, Table 4). CA-KER-4595 (Parr 1998) is situated on the south side of the Kern River as it emerges from the mouth of Kern Canyon about 24 km east of Bakersfield (Figure 1). At this apparently Middle-Upper Archaic site, 238 fish elements were recovered, comprising 24 percent of the faunal specimens (Hudson et al. 1998; Gobalet et al. 2004). Four fish species were identified at this site: Sacramento sucker (n = 95); Sacramento pikeminnow (n = 10); hitch (n = 4); and hardhead (*Mylopharodon conocephalus*) (n = 1). Most of the remaining specimens were identified as minnows or ray-finned fishes, although an additional 83 elements were described as "minnow or Sacramento sucker" (Hudson et al. 1998). As such, Sacramento suckers were clearly the dominant species at KER-4595.

The Elliot Ranch site (CA-KER-1437) (Macko and Weil 1984) is located on the Kern River at Bakersfield (Figure 1) and was interpreted as a small camp occupied between about 600 BC to AD 1 (an Upper Archaic occupation). A fairly large number of fish remains were recovered, most of which were identified as suckers (probably Sacramento sucker), minnows, and Sacramento perch (Macko and Weil 1984:63). However, the majority of faunal remains at the site consisted of mammals, although a small quantity of shell of freshwater mollusks and crustaceans were also recovered (Macko and Weil 1984:65).

The Goose Lake site (CA-KER-766) (Sutton 1992) lies on the northern shore of Goose Lake, near the confluence of the Kern River and Buena Vista Slough (Figure 1). At this Upper Archaic site, fish comprised about 55 percent of the faunal specimens that were recovered (Jackson et al. 1992). Six of the seven species that were identified at Big Cut were also identified at Goose Lake, the one exception being Sacramento pikeminnow. Sacramento perch was the most abundant species at Goose Lake, comprising nearly 24 percent of the fish remains. While tule perch represented only about 3 percent of the fish remains from this site, it was the second most abundant species. It should be noted, however, that of the 1,118 fish specimens from Goose Lake, more than half (n = 594) could only be identified to the minnow family, Cyprinidae (Jackson et al. 1992:57).

Eight sites along the eastern flank of the Elk Hills (Figure 1) were excavated in 2003 (Culleton et al. 2005), spanning time from the early to late Holocene, and faunal remains were recovered from each of the sites (including CA-KER-3079, -3168, and -5404 that may contain Early and Middle Archaic components, see above). However, only a rudimentary analysis of these remains was conducted on five of the sites with "indeterminate fish" being noted at each (see Culleton et al. 2005:Tables 6.14, 8.15, 10.8, 11.9, and 12.7).

Along the southwest shoreline of Buena Vista Lake (Figure 1), Hartzell (1992) analyzed the fish remains from several Upper Archaic/Emergent sites: KER-39 (see Wedel 1941); KER-116 (see Fredrickson and Grossman 1977); and CA-KER-180 (the latter of which is within the Tule Elk Reserve). At KER-39, fish accounted for 99 percent of the faunal remains (see Hartzell 1992:180, Table 6.5), with most of the specimens identified to taxon being Sacramento blackfish, Sacramento perch, hitch, thicktail chub, and tule perch (Hartzell 1992:Table 6.6). At the nearby KER-116 site, mammals (NISP = 1,485) were somewhat less abundant than fish (NISP = 1,746) (Hartzell 1992:Tables 6.24 and 6.25). The fish were once again dominated by Sacramento perch and Sacramento blackfish. Interestingly, Hartzell's (1992) excavations at KER-180 revealed that mammals represented the vast majority of the faunal remains, with fish accounting for only about 1.5 percent of the collection. Sacramento perch, hitch, and Sacramento blackfish were the most common, although only three elements of each were identified.

Barton et al. (2010) reported on recent excavations at the Bead Hill site (CA-KER-450), an Upper Archaic temporary habitation site on the northwestern shore of Buena Vista Lake (Figure 1). Only two fish species were identified in that study, Sacramento perch (n = 44) and Sacramento sucker (n = 9), with the remaining fish identified only as Actinopterygii or Cyprinidae.

Sacramento perch and tule perch were the dominant species at the Big Cut site, making up 44.9 percent and 30.7 percent of the fish remains, respectively. Hitch made up only 2.4 percent of the identified fish species, while Sacramento sucker made up 18 percent of the fish remains. For 33 archaeological sites in the drainage of the San Joaquin River as a whole, Gobalet et al. (2004:820) reported 69.8 percent of all the remains identified to species as Sacramento perch and 5.1 percent of the remains as tule perch. Sacramento blackfish comprised 6.8 percent of the remains and Sacramento sucker 8.0 percent. The fishes identified at Big Cut are those that would be expected for this region. Noticeably scarce from these studies are Chinook salmon (*Onchorhynchus tshawytscha*) and steelhead rainbow trout (*O. mykiss*), a perplexing issue addressed by Gobalet et al. (2004), Adams et al. (2007), and Gobalet (2012).

Squamata and Testudines

Two reptile clades were identified, snakes and turtles. Fourteen elements of unidentified snakes (Squamata) were recovered. Two unburned vertebrae came from the cutback soils from Profile 2. These were likely not related to human activity. Two additional snake vertebrae were found in the soil sample from Stratum C (upper) of Profile 1, and ten more snake vertebrae were found in the soil sample from Stratum C (lower) of Profile 2. All of these were also unburned, suggesting that they were also unrelated to the human activity at the site. There is virtually no ethnographic or archaeological evidence that snakes were considered a food resource by the Yokuts, although some snakes (particularly rattlesnakes) were sometimes used in ceremonies and rituals (e.g., Gayton 1948; Latta 1977).

A very small fragment of what appears to be part of a carapace from a pond turtle (cf. *Actinemys marmorata*) was found in the cutback soils of Profile 1. Turtles were known to have been roasted in their shells and eaten by the Yokuts in the Buena Vista Lake area (Gayton 1948:14).

Aves

The remains of two birds, grebe and duck, were found. The carpometacarpus from a probable pied-billed grebe (cf. *Podilymbus podiceps*) was found in Profile 1. Pied-billed grebes feed mainly on aquatic invertebrates, as well as on small fishes and amphibians (Robbins et al. 2001).

The coracoid of a probable bufflehead duck (cf. *Bucephala albeola*) was found in Profile 2. The bufflehead is the smallest diving duck in North America. In freshwater habitats, buffleheads eat insects, aquatic plants, and fish eggs (Robbins et al. 2001).

The fact that neither of these bird elements was burned and that waterfowl was nearly absent at the site suggests that they were not a major resource, although further excavations could demonstrate otherwise. Ducks, coots, and teals were recovered (although not in large numbers) at the Goose Lake site (KER-766), located about 60 km north of Big Cut (Jackson et al. 1992). Hartzell (1992) reported numerous species of birds, including coots, grebes, teals, ducks, rails, pelicans, geese, cormorants, and loons, at other sites in the Buena Vista Lake Basin (see above). There is considerable ethnographic evidence of Yokuts use of waterfowl and other birds (e.g., Latta 1977), and given that Big Cut is situated in a lacustrine environment where waterfowl would be expected, the virtual absence of bird remains could indicate that the site was not occupied during the winter when waterfowl would have been present in the area.

Mammalia

Most of the mammal remains were found in the soil samples, and most were too fragmentary to identify beyond large, medium-small, and small mammal, although nearly all of them were burned. There were 0.94 g of mammal bone in the soil samples taken from Profile 1 and 2.34 g of mammal bone in the soil samples from Profile 2 (Tables 1 and 2).

Of the bones that were recovered from the cutback soils, five were identified as lagomorphs (three from Profile 1 and two from Profile 2), and undoubtedly some of the unidentified small and medium-small fragments (six from Profile 1 and nine from Profile 2) were also from lagomorphs (see Table 9). Lagomorphs (particularly *Lepus californicus* and *Sylvilagus audubonii*) are known to have been important resources for the Yokuts and are frequently recovered from sites in the region. In addition, seven elements identified as cottontail rabbit (*S. audubonii*) were recovered from Profile 1, none of which was burned. These bones were articulated, with bits of fur still attached to the tarsals, and are considered natural.

One mandible fragment of a pocket gopher (*Thomomys* spp.) with an intact tooth was recovered from Profile 1. Gophers are common to the Buena Vista Lake area but are of unknown cultural relevance. One unburned tooth of a vole (cf. *Microtus californicus*) was identified from Stratum C in Profile 1. Finally,

Table 9. Distribution of Reptile, Bird, and Mammal Remains[a] from the Profile Cutback Soils at the Big Cut Site (CA-KER-4395).

Taxon	Element	Profile	Total NISP	Burned
Testidunes and Lepidosauria				
cf. *Actinemys marmorata*	carapace	1	1	yes
unidentified snake	vertebrae	1	3	no
		2	11	no
Aves				
cf. *Podilymbus podiceps*	carpometacarpus	1	1	no
cf. *Bucephala albeola*	coracoid	2	1	no
Mammalia[b]				
Sylvilagus audubonii[c]	tibia fragment	1	1	no
	metatarsals	1	4	no
	tarsals	1	2	no
unidentified lagomorph	mandible fragment	1	1	yes
	teeth	1	2	no
	humerus fragment	1	1	yes
	metatarsal fragment	2	1	yes
Microtis cf. *californicus*	tooth	1	1	no
Thomomys spp.	mandible fragment with tooth	1	1	yes
unidentified carnivore	teeth	1	3	no
unidentified small mammal	unidentified fragments	1	6	yes
unidentified medium-small mammal	unidentified fragments	2	9	most are
unidentified large mammal	long bone fragment	1	1	no

[a] Number of identified specimens (NISP).
[b] The total counts in this table exclude the many tiny specimens identified simply as mammal that were not tabulated.
[c] These remains likely represent a natural death.

three small tooth fragments from an unidentified carnivore were found in the cutback soils at Profile 1. None of these remains are considered cultural.

Discussion of the Faunal Remains

The faunal collection from the Big Cut site was primarily made up of aquatic resources. Most of the faunal remains were those of fishes and freshwater mollusks, the vast majority of which (ca. 90 percent) was recovered from Profile 1. This suggests the possibility of at least two activity areas at the site, one for the processing of fishes and mollusks (at Profile 1) and one for a different, but unknown, activity (at Profile 2).

The season of occupation of the site could not be definitively determined from the faunal remains, as most of the identified species are present in the area year-round. However, the general absence of waterfowl (assuming it is not due to sampling) could suggest that the site was not occupied in the winter when waterfowl would have been present. Moreover, there is little that can be inferred about animal procurement technology as no fishing gear was identified, and the terrestrial hunting tools (i.e., projectile points) that were recovered are not unusual for this area. Overall, the faunal assemblage from the Big Cut site appears to be typical, albeit small, of what would be expected at Buena Vista Lake and what is known of Yokuts animal procurement techniques.

Botanical Remains

An extremely small quantity of seed fragments was retrieved from the soil samples from Profiles 1 and 2 (total weight of 0.36 g) (Tables 1 and 2). Due to the small quantity of these seed fragments and in the absence of their taxonomic identification, their significance cannot be determined at this time.

Obsidian Studies

Six obsidian specimens were submitted for sourcing and hydration analyses (Table 10). Two of the specimens were projectile points, two were bifaces, and two were debitage. Five of the six specimens were sourced to the Coso Volcanic Field, and one (the Gypsum point) came from an unidentified source. The hydration rim measurements ranged between 4.82 µm and 8.34 µm. One of the debitage specimens, one of the bifaces, and the Elko point were in the 7.0 µm to 8.0 µm range, while the Gypsum point measured 5.34 µm.

Dating

In order to assess the age of the Big Cut site, artifact typologies for shell beads and projectile points, as well as obsidian hydration analysis, were used. These data sets are discussed below.

Shell Beads

The 12 *Olivella* bead types identified in the collection (Table 6) indicate that the site may have been initially occupied as early as 3,000 BC (Middle Archaic) and may have witnessed sporadic occupation to about AD 1800 (Emergent). It should be noted, however, that some of these beads, particularly the A1a (small spire-lopped), B2b (medium end-ground), and G1 (tiny saucer) types, have very wide date ranges between about 3,000 BC and AD 1800. More than half of the beads (n = 18) were E1a (round thin lipped), E1b (oval thin lipped), and E2b (deep lipped) types (dating no earlier than about AD 1500 [Upper Archaic]); five were K1 (callus cupped) types (dating no earlier than about AD 300 [Emergent]); three were H1a (ground disk) types (dating to the Mission Period); and one was a D3 (oval punched) type (dating between about AD 100 and 300). The N2 OGR bead dates to about 3,000 BC.

The bead data suggest that there was some occupation during the Middle Archaic but that most of the occupation post-dates approximately AD 300. The glass beads and the Mission Period shell beads raise the possibility that the site was also occupied during historic times.

Projectile Points

As noted above, the Cottonwood Triangular projectile points date to the Emergent Period. The Elko Corner-notched and Gypsum points date to the Middle Archaic (or perhaps the early Upper Archaic).

Obsidian Data

As shown in Table 10, five of the six specimens submitted for analysis were sourced to the Coso Volcanic Field, while the sixth could not be identified. The obsidian hydration data suggest that the occupation, or at least the use of obsidian at the site, was relatively early, before the Emergent Period. The smallest rim measurement was 4.82 µm, typically considered to fall within the latter part of the Upper Archaic in the southern San Joaquin Valley, while the other rim measurements were considerably larger.

Table 10. Results of Obsidian Studies from the Big Cut Site (CA-KER-4395).

Cat. No.	Pacific Legacy Sample No.	Provenience	Artifact	Rim (in µm)	Source
006	PL-98-474-8	surface	Humboldt point	4.82	Coso
007	PL-98-474-9	surface	flake	8.34	Coso
008	PL-98-474-10	surface	flake	6.14	Coso
086	PL-98-474-11	surface	stemmed point base	7.76	Coso
094	PL-98-474-12	surface	Elko point	7.33	Coso
095	PL-98-474-13	surface	Gypsum point	5.34	unidentified

Other sites in the area exhibit a similar pattern (Sutton and Des Lauriers 2002) in that Coso obsidian is the preferred material and few rim measurements are less than 4.0 µm. An understanding of this pattern is elusive.

Dating Summary

In sum, each of the data sets for dating the Big Cut site indicates the likelihood of at least two components, a Middle Archaic occupation dating perhaps as early as 3,000 BC and an Emergent occupation dating after AD 1000. The glass beads suggest that site occupation might have continued to some degree after historic contact. Thus, it is proposed that initial site occupation occurred about 3,000 BC and ended sometime during the early Upper Archaic, and the second significant occupation began during the Emergent Period and ended about AD 1800. Sporadic and less intense habitations may have taken place between the first and second occupations, and undoubtedly there was some activity at the site after AD 1800 as demonstrated by the bead data.

Conclusions

The brief research project at the Big Cut site was intended to first assess the level of damage to the site from modern development and vandalism and then to address general issues of function, seasonality, and chronology. Despite the bulldozer damage and some vandalism, the site appeared to have relatively good subsurface integrity, at least in 1995. Until formal excavations can be conducted, however, the integrity of the site deposit remains in question.

Due to the very limited nature of these investigations, determining the function of the site is difficult. It is tentatively suggested that it may have served as a temporary camp, perhaps on a seasonal basis. The faunal remains suggest that fish and mollusks were important resources, but they do not provide evidence of seasonality, as both of these food sources are present year-round. While projectile points are known to have been used to hunt terrestrial animals, the lack of technology related to fish procurement makes it difficult to determine how the fish were captured. The site appears to have two significant occupations, one during the Middle Archaic and one during the Emergent Period.

A much larger habitation site lies some 250 m to the west, just across an embayment of Buena Vista Lake where the Buena Vista Slough exits to the north (see Figure 8). This site, known as Bead Hill (KER-450) (Dieckman 1977; also see Bass and Andrews 1977; Jones et al. 1996; Sutton 2000b; Barton et al. 2010) contains an extensive midden and large quantities of material culture and faunal remains, although it has been extensively vandalized. A late (Emergent) occupation of Bead Hill is clear (it may be the ethnographic Yokuts village of *Tulamniu*), but the timing of its initial occupation is unknown. Thus, it seems possible that Big Cut could be a satellite site to Bead Hill, and this question should be considered during future research in the area.

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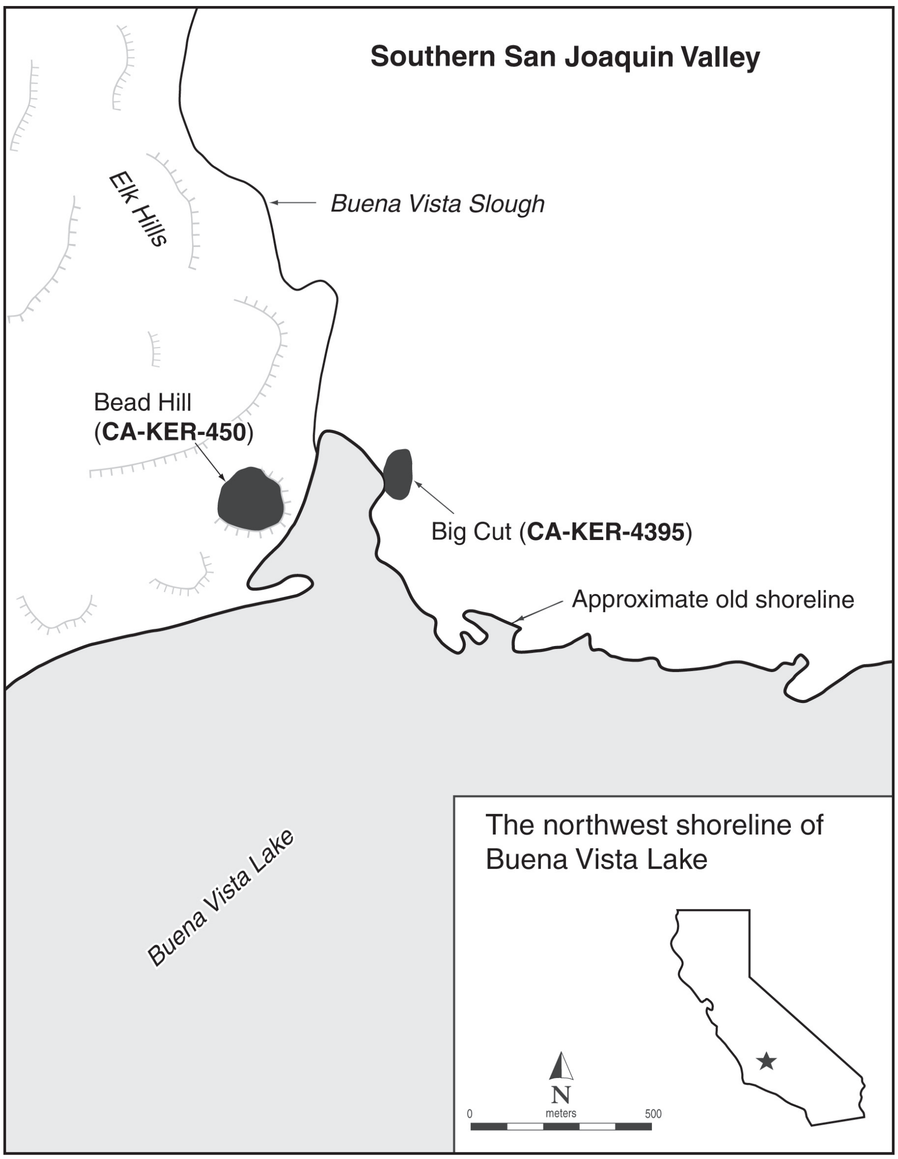

Figure 8. Location of the Big Cut (CA-KER-4395) and Bead Hill (CA-KER-450) sites on the ancient shoreline of Buena Vista Lake.

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