# BEDROCK MILLING ELEMENTS AS INDICATORS OF SUBSISTENCE AND SETTLEMENT PATTERNS IN NORTHERN SAN DIEGO COUNTY, CALIFORNIA

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## ABSTRACT

In a small region, patterned differences in the configuration and distribution of bedrock milling elements can reveal changes through time and differences in the food-processing activities in varied environments. Five kinds of bedrock milling elements are identified in the San Luis Rey River drainage area: mortars, metates, slicks, collars or mortar pockets, and anvil pits or cupules. Their distributions and associations indicate differences in settlement-subsistence patterns between the central and upper central parts of the basin; differentiation of focused acorn-processing activities versus generalized food-processing; and intensification of acorn-based subsistence in very late or protohistoric times. The bedrock milling data have the potential to contribute to future analyses of such issues as socio-cultural demographic pressures and intensification processes.

## INTRODUCTION

Scholarly interest in acorns as a subsistence staple in prehistoric California has a long history extending back at least to the turn of the present century. A recent paper by Basgall (1987:21–52) summarizes much of this history and comments on the use of acorns as important storable staples; on the significance of leaching as a factor in acorn use; and on several other aspects of acorn-based subsistence practices. In contrast to Basgall's report, which considers such concepts and data on a statewide basis, the present paper is concerned with specific and probably localized circumstances in one part of San Diego County. A significant aspect of acorn-processing activities relates to the equipment and procedures used, and the conventional wisdom holds that bedrock mortars were a critical element.

Recognition of patterned differences in the configuration and distribution of bedrock milling elements suggests possible differences in food processing activities as well as changes through time for a very limited geographic area. It is important to see this proposed patterning in relation to the size of the extant sample, and to recognize that the proposals herein are necessarily tentative. Data from other contexts over an expanded territory should be examined with the recognition of similar patterning in mind. As well, the definition of distributional patterning which may be attributed to different subsistence practices and/or culture change should be considered.

Based on preliminary but reasonably clear differences in the distribution of bedrock milling elements in the central and upper central San Luis Rey River drainage in northern San Diego County (Fig. 1), this paper proposes that there were: (1) differences in settlement-subsistence patterns between the lower central and upper central river basin; (2) probable differentiation of focused acorn-processing activities, as opposed to generalized vegetal/small-animal food processing; and (3) possible evidence for acorn-based subsistence intensification in very late prehistoric or early protohistoric times.

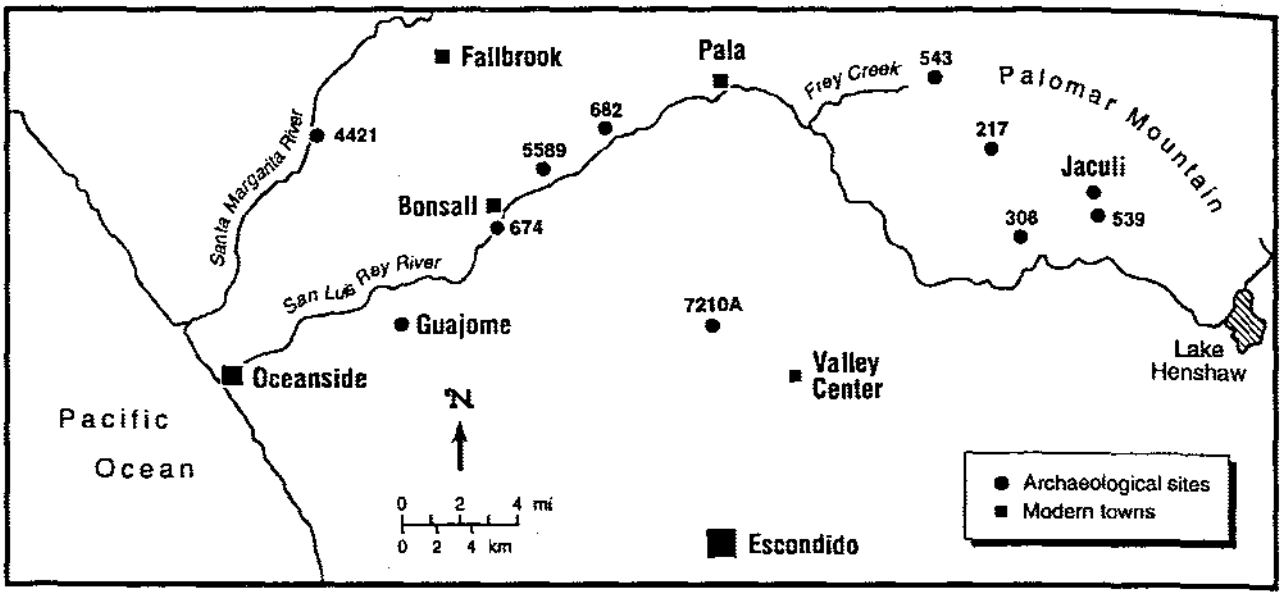


Fig. 1. The location of the transect sample sites in the San Luis Rey River area.

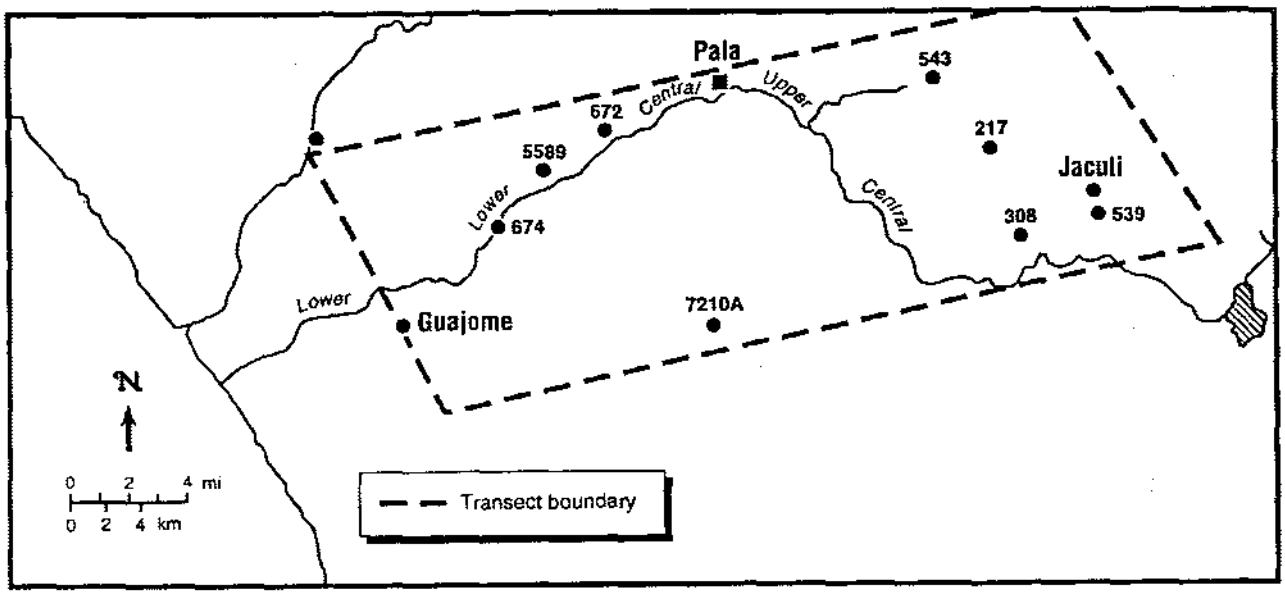


Fig. 2. The approximate boundaries of the transect study area.

It is accepted as a given that at the time of contact in southern California, as elsewhere in the state, the acorn was an important storable staple, and that leaching was a critical part of an efficient acorn-based subsistence.

Detailed descriptions of acorn processing in northern San Diego County have not been published, but a reasonable picture of acorn collecting and processing activities can be gleaned from the extant ethnographic literature and from discussions with surviving elders during the 1940s and 1950s. Based on these data it is clear that acorn processing activities are

manifest in the archaeological record primarily as well-developed milling stations characteristically dominated by bedrock mortars.

On the assumption that there is a meaningful correlation between acorn processing and bedrock mortars, it is proposed that the distribution of bedrock milling elements in this part of San Diego County is suggestive of a developmental continuum with an increasing focus on acorn processing through time. This patterning appears as increased mortar frequencies relative to other kinds of milling elements, and as an increasing percentage of larger and deeper mortars. As part of this patterning there is, in addition, some reason to suggest that by very late prehistoric times a significant part of the regional acorn processing may have been done as specialized activities focused primarily on favored species of oaks found in the higher elevations of the upland interior.

The present paper is mostly concerned with the differences and the interpretational potential implicit in the relative frequency of *kinds* of milling elements across a transect sample, and the relationships between the various kinds of elements, e.g., distribution of mortar pockets and milling element combinations.

The possible significance of differences in mortar sizes and a concern with milling element distributions suggestive of functional or systemic relationships (processing or milling techniques) have been set aside and will be considered in another paper presently in process.

It is important to stress up front that this paper is exploratory, and that the basis for any tentative conclusions (sample size and integrity) is as yet minimal. The intent here is not to test the issues, but to focus attention on them.

## STUDY AREA

The primary study area for this discussion is a transect which extends from the upper elevations of the westerly crest of Palomar Mountain, westward along the San Luis Rey River to the general vicinity of the Guajome Ranch a few miles below the modern town of Bonsall (Figs. 1 and 2). Site locations within the transect range from about 5,000 feet (1,524 m) above sea level at Silver Crest (SDI-217) to about 170 feet (52 m) in the vicinity of the modern town of Bonsall. This area was occupied in historic times by the ethnographically-defined Luiseño (Sparkman 1908:188–192; Kroeber 1925:648–649; White 1963:104– 110).

Based on ethnographic and ethnohistoric information, it is clear that acorns processed in bedrock mortars represented an important staple for the Luiseño, and by extrapolation their immediate San Luis Rey antecedents. For general descriptions and discussion of the characteristics of the San Luis Rey Complex, see Meighan (1954:215–229); True, Meighan, and Crew (1974;73–80); True and Waugh (1981:84–115); True and Waugh (1982:34–54); and True, Pankey, and Warren (1991:7–11).

The present study includes data from seven late prehistoric habitation sites located within the San Luis Rey river drainage, and one prehistoric site located in the lower Santa Margarita River drainage. Data from four San Luis Rey I camps located in the Frey Creek drainage and one San Luis Rey I camp on the adjacent Valley Center Plateau are included for comparative purposes.

*SDI-674*. This site is located on the westerly bank of the San Luis Rey River adjacent to the modern settlement of Bonsall. It is situated at the interface of riparian and interior sage scrub plant communities at an elevation of 170 feet (52 m) above sea level. Most of the site

was impacted by historic development early in the present century, and except for milling features, not much has survived. Portions of the site were excavated by Caltrans in 1983 and the bedrock features were mapped and described as part of this work (Rosen 1984:1–138). This location has been tentatively identified as the village of Kwalam (Kroeber 1925:Pl. 57 and 1907:147; Rosen 1984:7; Oxendine 1983:118; True and Waugh 1987:132–133).

*SDI-5589*. This site is located some 3 miles (4.8 km) upstream from Bonsall at the junction of Live Oak Creek and the San Luis Rey River. It is in an interior sage scrub plant community adjacent to riparian, wetland, and chaparral communities. The elevation is about 300 feet (91 m) above sea level. Portions of the site were excavated by the San Diego County Archaeological Society during the 1970s, and a preliminary report has been published (Fulmer 1985:59–76). The site has been described as a San Luis Rey II occupation site. While this was certainly an important location with at least two occupational components, it was at best a marginal "village" and the late San Luis Rey occupancy was probably of short or limited duration.

*SDI-682*. This site is a major San Luis Rey village located near the junction of Horse Ranch Creek and the San Luis Rey River. It is situated between riparian and interior sage scrub plant communities adjacent to small scale wetlands. The elevation is about 300 feet (91 m) above sea level. SDI-682 is almost certainly the village of Tomkav (Kroeber 1907:147; 1925:Pl. 57; Oxendine 1983:119). Portions of the site were excavated during the 1950s and early 1960s and the results of these investigations are reported in True, Pankey, and Warren (1991).

*SDI-308*. This site is located on the flank of Palomar Mountain at an elevation of 2,500 feet (762 m) above sea level. The vegetational context is sparse oak parkland adjacent to dense oak forests. Portions of the site were sampled by Meighan in the 1950s (UCLA), and the bedrock features were mapped in 1968 by True and Crew (UCD). This major occupational site has been identified as the village of Molpa (White 1963:125; True, Meighan, and Crew 1974:1–126).

*SDI-217*. This site is an important summer camp located at the Silver Crest picnic area in Palomar Mountain State Park, at an elevation of about 5,000 feet (1,524 m) above sea level. It is in a mixed coniferous-broadleaf forest setting. Waugh (MS 1986) excavated several units at this locale and provides detailed counts of the associated milling elements. The site is within the acorn-gathering territory of the Pauma village (Wav-a-mai), and the site location has been identified as the place known as Pa-ku-ka (Sparkman 1908:192; True, Meighan, and Crew 1974:127–128).

*SDI-539*. This site is an important summer camp or village located along the westerly scarp of Palomar Mountain at an elevation of about 4,500 feet (1,372 m) above sea level. The environmental context is mixed coniferous-broadleaf forest. No known formal excavations have been made at this site to date, but the bedrock milling features were described by Chace and Sutton (MS 1978:1–45). The location has been identified by Luiseño consultants as the place Shau-tush-ma (True, field notes, 1955–1958). Shau-tush-ma is identified by Sparkman as the summer acorn-collecting location for the people from Japicha (1908:192).

The sites described above were known firsthand and are considered to be the primary data base for this paper. As a result of a preliminary sorting of the bedrock mortar data, two other sites were added to broaden the sample. These new loci include the sites associated with the Rancho Guajome and a village location on the Santa Margarita drainage near the

base hospital of Camp Pendleton, neither of which had been formally examined by the writer.

*Guajome.* The ethnographically-identified village of Guajome is located in a lateral valley marginal to the San Luis Rey River and is adjacent to interior sage scrub and riparian plant communities. The elevation is about 100 feet (30 m) above sea level. Fink (1978:45–61) described several loci which in the aggregate almost certainly make up the village described by Kroeber as Wakhaumai (1907:147) and Wahaumai (1925:Pl. 57) and by Oxendine (1983:116–117) as Wahomai, Wahaumai, or Wagaumay.

*SDI-4421.* This site is a large camp or village located near the base hospital at Camp Pendleton. Although it is in a different watershed than the sites described above, it is in an environmental and elevational context similar to the sites described for the village at Guajome. Welch (MS 1975:102) describes 45 bedrock mortars, 13 basins, and 6 slicks for this site, and notes that they are situated in what he calls grinding centers. Each such feature included slicks, metates, and shallow mortars clustered around a deep central mortar.

As a kind of control, data from several San Luis Rey I sites were added to the sample. This included four sites from the Frey Creek drainage and one from the adjacent Valley center plateau. These sites are non-pottery bearing habitation areas believed to represent evidence of the antecedents of San Luis Rey II occupations found in the same general vicinity.

*Frey Creek Sites.* Details on the Frey Creek camps are presented in Meighan (1954:215–227); True and Waugh (1981:84–114); and Waugh (MS 1986:168–223).

*SDI-7210A.* This site, identified locally as the Atwood site, was described by Chace (MS 1979:24) as a large habitation area with an extensive midden. Lithic flakes, charcoal, and faunal remains were recorded, but pottery apparently was absent. The site produced a variety of artifacts and 66 recorded bedrock milling elements.

## THE MILLING ELEMENTS

Five kinds of bedrock milling elements have been identified in conjunction with the sites described above. These include mortars, metates, slicks, collars or mortar pockets, and anvil pits or cupules (Fig. 3).

*Mortars* tend to be round, although in some kinds of rock the deeper specimens take on an oval configuration after long use. Mortar diameters range from about 10 to some 30 cm, and depths range from 2 to 3 cm for incipient forms to over 30 cm for well developed specimens. Cross-sectional configurations tend to be rounded or U-shaped rather than conical.

*Bedrock metates,* as defined here, are round-to-oval depressions with *finite margins* and depths that range from .5 to as much as 4 cm. These forms should not be confused with the deep narrow oval depressions found in the mountain regions of the Diegueño territory (True, field notes, 1961–1962).

*Slicks* may have rounded or oval outlines but more often have no clearly defined shape or margin. Their surfaces range from glassy smooth to knobby irregular, and typically have no measurable depth. Surface configurations may be flat, sometimes slightly concave, and not uncommonly convex. Slick sizes vary greatly, and because margins are difficult to define, measurements are usually not very precise. This is especially true where several adjacent working surfaces have merged into large, often irregularly-shaped polished or rubbed areas.

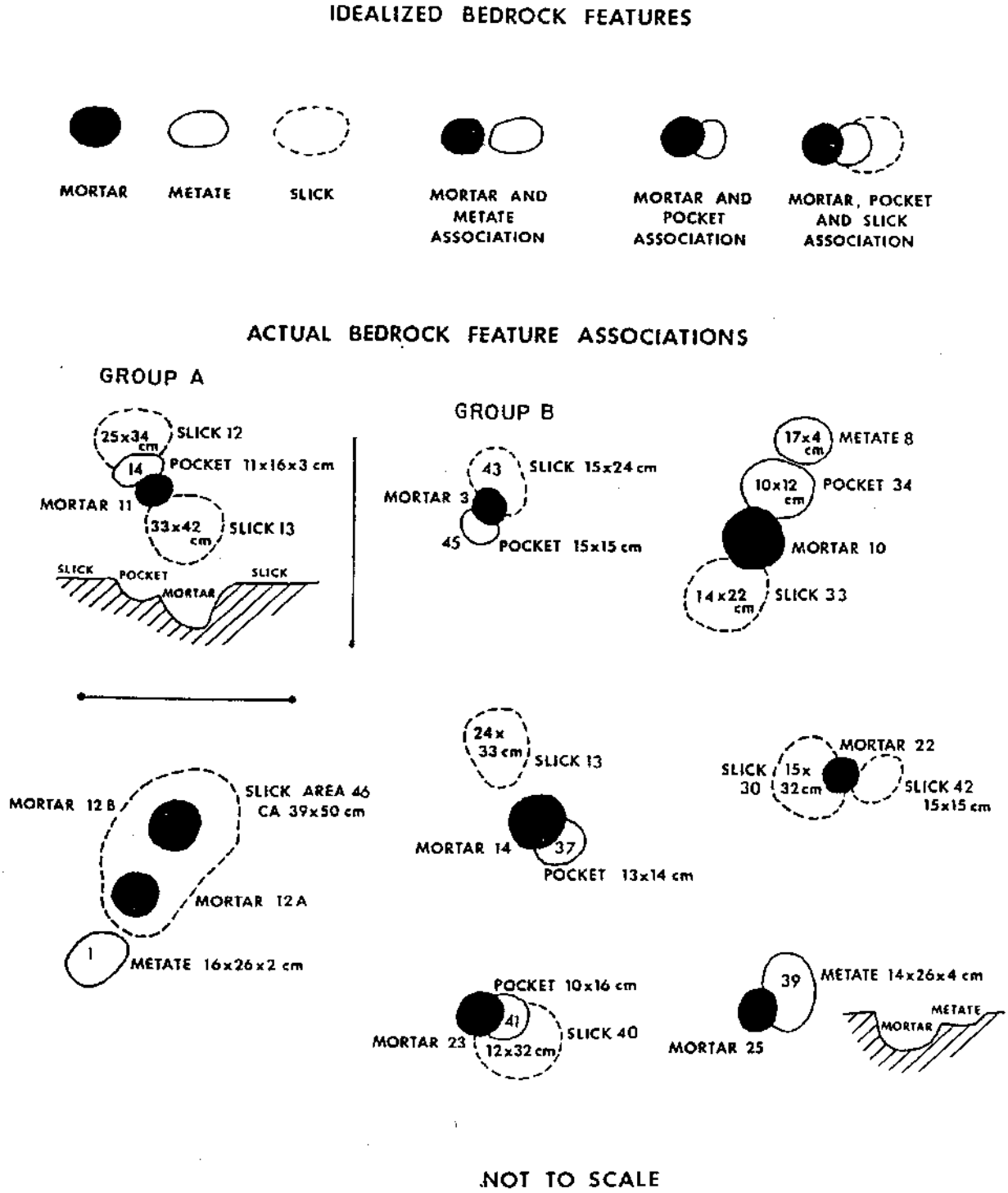


Fig. 3. Idealized forms of the milling elements and the actual bedrock milling element associations at SDi-682.

*Mortar Collar.* For the purposes of this paper a collar or mortar pocket is defined as a milling or holding depression situated adjacent to the margin of a mortar. The outline form tends to be crescent shaped (Fig. 3).

*Cupules* are found locally in at least two basic situations with several possible variants. They may be situated on vertical or near-vertical surfaces under circumstances which suggest some kind of ceremonial function (Minor 1975:1–22; Hedges MS 1980:1–22), or they may be on more-or-less horizontal surfaces associated with bedrock mortars in such a way that some functional relationship is suggested. A relationship with acorn processing has been suggested by several writers including Bettinger (1974:80) and True (MS 1966:142–143; 1970:17). It is probably obvious that not all cupules on more-or-less horizontal surfaces functioned as hulling pits, but some probably did, and where a close cupule-to-mortar association exists, this appears to be the most promising explanation.

## DATA ANALYSIS

Wherever possible, data on the relative frequency of bedrock milling elements (mortars, metates, and slicks) will be considered separately, but because metates and slicks were combined for reporting purposes in the original Molpa report (True, Meighan, and Crew 1974:33) and cannot easily be separated at the present time, the slick and metate data will be presented as a combined category. This may confuse the issue for some kinds of future comparisons, but it is not a significant factor in the present analysis. Based on the data from the sites described above, several different bedrock milling element relationships can be identified. These include:

1. frequency differences in *kinds* of milling elements over space and through time (mortars, metates, and slicks);

2. differences in spatial relationships between milling elements from site to site (locational correlations between mortars, collars, metates, and slicks);

3. differences in mortar sizes both within and between sites; and

4. correlations between mortar sizes, site chronologies, materials being processed, and specific site locational contexts.

These possibilities (and probably others) need to be examined in relation to other kinds of processing (acorns versus other vegetal and/or animal products), circumstances of food processing (methods), and settlement-subsistence patterns proposed for the study area.

### Relative Frequency of Different Milling Elements

When relative frequency data were plotted from the primary sample (San Luis Rey II sites minus Guajome and SDI-4421), it seemed obvious that mortars were significantly more frequent at the higher elevation sites and that there was an apparent gradient from highland to lowland riverine contexts (Table 1). When the two additional sites from lowland contexts were added, however, the pattern shifted somewhat (Table 2 and Fig. 4), and a different interpretation was indicated. Initially, it was assumed that the observed patterning reflected generally contemporary differential resource processing of one kind or another, but the pos-

sibility that time was a factor also had to be considered. With this in mind, data from non-pottery San Luis Rey I sites were added to the sample (Table 3).

Table 1. Mortar and Metate/Slick Distributions: Primary Transect Sample

| Sites | Mortars | Metates | Slicks | Metate/Slicks |
|---|---|---|---|---|
| SDi-539 | 46 (90.2%) | 3 ( 5.8%) | 2 ( 3.9%) | 5 ( 9.7%) |
| SDi-217 | 204 (88.7%) | 26 (11.3%) | ----- | 26 (11.3%) |
| SDi-308 | 288 (72.5%) | ----- | ----- | 109 (27.5%) |
| SDi-682 | 114 (58.4%) | 50 (25.6%) | 31 (15.8%) | 81 (41.4%) |
| SDi-5589 | 11 (39.3%) | 6 (21.4%) | 11 (39.3%) | 17 (60.7%) |
| SDi-674 | 36 (35.3%) | 39 (38.2%) | 27 (26.4%) | 66 (64.6%) |

Table 2. Mortar and Metate/Slick Distributions: San Luis Rey II Sites

| Site | Mortars | Metates | Slicks | Metate/Slicks |
|---|---|---|---|---|
| SDi-539 | 46 (90.2%) | 3 ( 5.8%) | 2 ( 3.9%) | 5 ( 9.7%) |
| SDi-217 | 204 (88.7%) | 26 (11.3%) | none reported | 26 (11.3%) |
| SDi-308 | 288 (72.5%) | ----- | ----- | 109 (27.5%) |
| SDi-4421 | 45 (70.3%) | 13 (20.3%) | 6 ( 9.4%) | 19 (16.6%) |
| SDi-682 | 114 (58.4%) | 50 (25.6%) | 31 (15.8%) | 81 (41.4%) |
| Guajome | 67 (58.0%) | 28 (24.5%) | 19 (16.6%) | 41 (36.9%) |
| SDi-5589 | 11 (39.3%) | 6 (21.4%) | 11 (39.3%) | 17 (60.7%) |
| SDi-674 | 36 (35.3%) | 39 (38.2%) | 27 (26.4%) | 66 (64.6%) |

Table 3. Mortar and Metate/Slick Distributions: San Luis Rey I Sites

| Sites | Mortars | Metates | Slicks | Metate/Slicks |
|---|---|---|---|---|
| SDi-246 | 4 (33.3%) | 6 (50.0%) | 2 (16.6%) | 8 (66.6%) |
| SDi-501 | 4 (20.0%) | 8 (40.0%) | 8 (40.0%) | 16 (80.0%) |
| SDi-401 | 1 (16.6%) | ----- | 5 (83.3%) | 5 (83.3%) |
| SDi-731 | 23 (45.1%) | 7 (13.7%) | 21 (41.2%) | 28 (54.9%) |
| SDi-7210A | 8 (11.9%) | ----- | ----- | 59 (88.1%) |
| | 40 | 21 | 36 | 116 |
| | (25.6%) | ----- | ----- | (74.3%) |

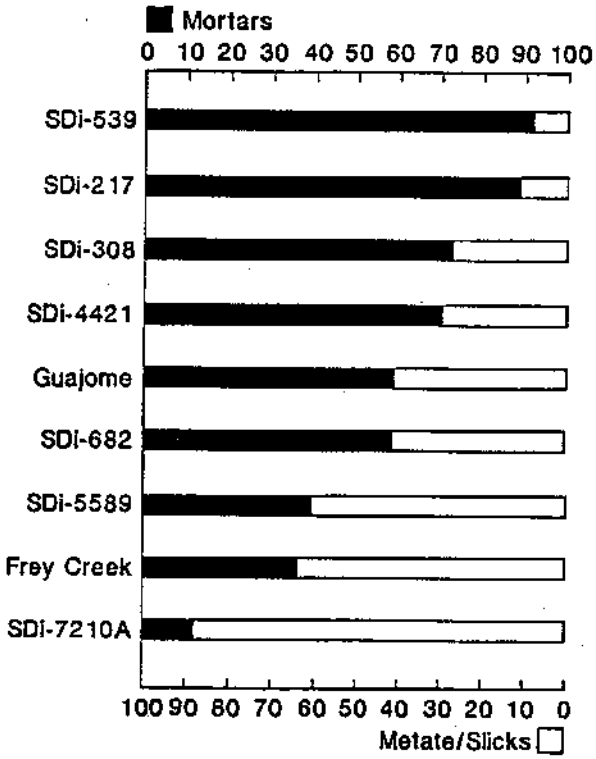


Fig. 4. Mortar to metate distribution: whole site data.

Comparison of the San Luis Rey I site data (Table 3) with the San Luis Rey II site data (Table 2) emphasizes the relatively low percentage of mortars associated with San Luis Rey I sites.

Using these relative frequencies as a basis for evaluating site to food-processing relationships, it is possible to propose some very general templates with potential interpretive significance. With mortar percentages that exceed 80%, sites SDI-539 and SDI-217 are easily separated from the others, both in terms of elevation (locational) and mortar frequencies. Sites SDI-308, -682, -4421, and Guajome can be grouped on the basis of generally similar mortar to metate/slick ratios, but in this case the pattern crosscuts several environmental contexts with significant differences in elevation, as well as presumed differential subsistence resource bases. Sites SDI-5589 and SDI-674 have attributes that cause them to be identified as probable San Luis Rey II villages, and both occupy generally similar environmental circumstances. Their mortar to metate/slick ratios, however, suggest differences in resource focus, processing methods, or time. When compared to the other sites in the San Luis Rey II sample, the distribution of mortar to metate/slick ratios more closely approximates those ratios than were noted for the San Luis Rey I sample.

While the three general distributions proposed above seemed to be meaningful, it is important to note that some of the major sites in the sample include several separable occupational or functional loci; these might represent contemporary differential processing activities, or possible changes through time within each site. To examine such possibilities in relation to the whole site, mortar to metate/slick frequencies were plotted for several recognizable loci at sites SDI-682 and SDI-308 (Table 4 and Fig. 5).

Table 4. Mortar Distribution by Site and Site Loci, Sites SDi-308 and -682

| Site | Locus | Mortars | Metate/Slicks | Total |
|---|---|---|---|---|
| SDi-308 | | | | |
| | A | 19 (57.6%) | 14 (42.4%) | 33 |
| | B,C,E | 115 (82.1%) | 25 (17.8%) | 140 |
| | F,G | 36 (81.8%) | 8 (18.2%) | 44 |
| | H,J | 102 (69.8%) | 44 (30.1%) | 146 |
| | D | 16 (47.0%) | 18 (52.9%) | 34 |
| Total | | 288 | 109 | 397 |
| SDi-682 | | | | |
| | 6AB | 39 (81.2%) | 9 (18.7%) | 48 |
| | 2 | 13 (59.1%) | 9 (40.9%) | 22 |
| | 6DE | 7 (46.6%) | 8 (53.3%) | 15 |
| | 3,4 | 32 (48.5%) | 34 (51.2%) | 66 |
| | 7 | 23 (37.1%) | 39 (62.9%) | 62 |
| Total | | 114 | 99 | 213 |

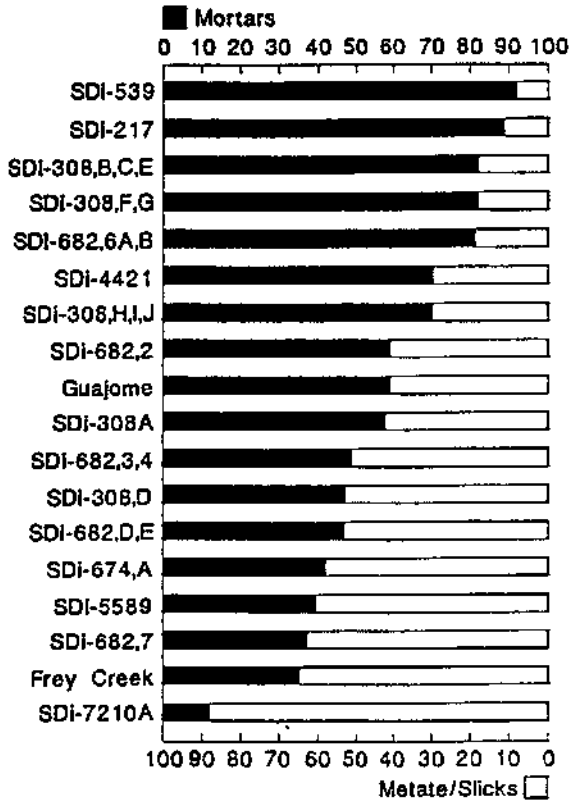


Fig. 5. Mortar to metate distribution: by site and site loci.

Even though the significance of these distributions is not yet fully appreciated, it seems safe to suggest that mortar to metate/slick percentages over 80% represent evidence of intensive acorn processing. Based on other evidence, it is also possible to suggest that such intensive activities took place in very late prehistoric and early proto-historic times. On the other end of the scale, if one accepts the traditional wisdom in California relating to such matters, mortar to metate/slick frequencies significantly less than 50% suggest generalized processing with a considerable emphasis on hard seeds and small animal processing. Comparisons with the non-pottery San Luis Rey I sites support the possibility that loci on that end of the distributional pattern are representative of the earlier end of the late prehistoric occupation. Other factors, of course, need to be considered prior to any definitive conclusions.

To examine these relationships further, mortar to metate/slick frequencies need to be compared with other categories of data such as the presence or absence of mortar pockets or collars, mortar to metate/slick combinations, and mortar associations with hulling cupules.

Presence or Absence of Mortar Pockets, Combinations, and Superpositions

Mortar pockets are usually obvious and are easily recognized. They are not, however, always reported as entities apart from the mortars and may be included in the same count, or conversely they may be recorded as separate mortar elements. A similar condition prevails with mortar, metate, and slick *combinations*, and it is not always possible to tell from published accounts how the listed elements were distributed on a site or outcropping. The situation is further complicated because it is not possible to say with certainty whether elements in close proximity were necessarily part of a processing complex, or simply represent fortuitous superpositions with little or no cultural or subsistence significance.

Although they are obvious as elements, functional cupules have not been reported systematically in published reports, and it is difficult to know for sure whether described elements were (are) functional or ceremonial. Both kinds are known from sites within the study area. This level of reporting may complicate future comparative analyses, but it is not a serious problem at the present time.

Recognizing the obvious data limitations, the distribution of mortar pockets (collars), combinations, and cupules from the San Luis Rey transect sample is presented in Tables 5–11. As can be seen, there are significant gaps in the record; this is mostly because the original data collection was focused on different kinds of problems and because the milling element information available in the published literature is mostly the by-product of nonsystematic observation.

Table 5. Mortar Distributions for Transect Sites and Loci Percentages

| Sites/Loci | Mortars | Metate/Slicks |
|---|---|---|
| SDi-539 | 90.2% | 9.7% |
| SDi-217 | 88.7% | 11.3% |
| SDi-308 (F&G) | 82.2% | 17.7% |
| SDi-308(B,C,E) | 82.1% | 17.8% |
| SDi-682(6AB) | 81.2% | 18.7% |
| SDi-4421 | 70.3% | 29.9% |
| SDi-308(H,J) | 70.0% | 29.9% |
| SDi-682(2) | 59.1% | 40.9% |
| Guajome | 58.7% | 41.2% |
| SDi-308(A) | 57.75% | 42.4% |
| SDi-674(D) | 50.0% | 50.0% |
| SDi-682(3,4) | 48.5% | 51.1% |
| SDi-308(D) | 47.0% | 52.9% |
| SDi-682(6D,E) | 46.6% | 53.3% |
| SDi-674 | 41.9% | 58.1% |
| SDi-5589 | 39.3% | 60.7% |
| SDi-682(7) | 37.1% | 62.9% |
| Frey Creek | 35.9% | 64.0% |
| SDi-674(iso) | 14.3% | 85.7% |
| SDi-7210A | 11.9% | 88.0% |

Table 6. Distribution of Mortars, Metate/Slicks, Cupules, Pockets, and Combination

| Site | Mortars | Metates | Cupules | Pockets | Combination |
|---|---|---|---|---|---|
| SDi-539 | 46 (90.2%) | 5 ( 9.7%) | probable | none | none |
| SDi-217 | 204 (88.7%) | 26 (11.3%) | common | none | none |
| SDi-308G,F | 36 (81.8%) | 8 (18.2%) | no data | 12 | 1 |
| SDi-308B,C,E | 115 (82.1%) | 25 (17.8%) | no data | 12 | 20 |
| SDi-6826AB | 39 (81.2%) | 9 (18.7%) | present | ? | none |
| SDi-4421 | 45 (70.3%) | 19 (29.7%) | no data | 17 | 10 |
| SDi-308H,I,J | 103 (70.0%) | 44 (29.7%) | no data | 1 | 10 |
| SDi-682(2) | 13 (59.1%) | 9 (40.9%) | none | none | 2 |
| Guajome | 67 (58.8%) | 47 (41.2%) | no data | no data | no data |
| SDi-308A | 19 (57.6%) | 14 (42.4%) | none | none | 2 |
| SDi-682(3,4) | 32 (48.5%) | 34 (51.1%) | none noted | 3 | none |
| SDi-308D | 16 (47.0%) | 18 (52.9%) | none noted | 2 | 4 |
| SDi-682(6DE) | 7 (46.6%) | 8 (53.3%) | none noted | ? | ? |
| SDi-674A | 31 (41.9%) | 43 (58.1%) | none noted | 2 | 7 |
| SDi-5589 | 11 (39.3%) | 17 (60.7%) | none noted | 1 | 5 |
| SDi-682(7) | 23 (37.1%) | 39 (62.9%) | none noted | 7 | 7 |
| SDi-7210A | 8 (11.9%) | 59 (88.0%) | none | none | 1(?) |

Table 7. Relative Frequency of Pockets and Combinations in Whole-Site Contexts

| Sites | Mortars | Metate/Slicks | Pockets | Combinations |
|---|---|---|---|---|
| SDi-539 | 46 | 5 | 0 | 0 |
| SDi-217 | 204 | 26 | 0 | 0 |
| SDi-308 | 287 | 109 | 287/16 ( 5.6%) | 287/37 (12.9%) |
| SDi-682 | 114 | 81 | 114/10 ( 8.7%) | 114/9 ( 7.9%) |
| SDi-5589 | 11 | 17 | 11/1 ( 9.1%) | 11/5 (45.5%) |
| SDi-674 | 36 | 66 | 36/3 ( 8.3%) | 36/10 (27.7%) |
| Guajome | 67 | 47 | no data | no data |
| SDi-4421 | 45 | 19 | 45/17 (37.7%) | 45/10 (22.2%) |
| Frey Creek | 32 | 57 | none | 32/11 (34.4%) |
| SDi-7210A | 8 | 59 | none | 8/1 (12.5%) |

Percentage of pockets and combinations to mortars, e.g., Site 308 has 287 mortars and 16 reported pockets (5.6%). In contrast, site 484 has 45 mortars and 17 pockets (37.7%); 308 has 37 reported combinations (12.9%); and the Frey Creek sites have 32 mortars and 11 combinations (34.4%).

Table 8. Relative Frequency of Pockets to Mortars, Ranked by Percentage: Whole Site Data

| Site | | Ratio Pocket | | Mortars |
|---|---|---|---|---|
| SDi-4421 | 45/17 (37.7%) | 1 | to | 2.6 |
| SDi-5589 | 11/1 ( 9.1%) | 1 | to | 11.0 |
| SDi-682 | 114/10 ( 8.7%) | 1 | to | 11.4 |
| SDi-674 | 36/3 ( 8.3%) | 1 | to | 12.0 |
| SDi-308 | 287/16 ( 5.6%) | 1 | to | 17.9 |
| Guajome | no data | | no data | |
| SDi-217 | none | | none | |
| SDi-539 | none | | none | |
| SDi-7210A | none | | none | |
| Frey Creek | none | | none | |

Table 9. Relative Frequency of Combinations to Mortars Ranked by Percentage: Whole Site Data

| Site | | Ratios Combinations | | Mortars |
|---|---|---|---|---|
| SDi-5589 | 11/5 (45.5%) | 1 | to | 2.2 |
| Frey Creek | 32/11 (34.4%) | 1 | to | 2.9 |
| SDi-674 | 36/10 (27.7%) | 1 | to | 3.6 |
| SDi-4421 | 45/10 (22.2%) | 1 | to | 4.5 |
| SDi-308 | 287/37 (12.9%) | 1 | to | 7.8 |
| SDi-7210A | 8/1 (12.5%) | 1 | to | 8.0 |
| SDi-682 | 114/9 ( 7.9%) | 1 | to | 12.6 |
| Guajome | no data | | no data | |
| SDi-217 | none | | none | |
| SDi-539 | none | | none | |

Table 10. Relative Frequency of Pockets to Mortars by Site and Site Loci: Ranked by Percentage

| Sites | Mortars | | Ratios Pockets | | Mortars |
|---|---|---|---|---|---|
| SDi-4421 | 45 | 45/17 (37.7%) | 1 | to | 2.6 |
| SDi-308(F,G) | 37 | 37/12 (32.4%) | 1 | to | 3.0 |
| SDi-682(7) | 23 | 23/7 (30.4%) | 1 | to | 3.2 |
| SDi-674(A) | 13 | 13/2 (15.4%) | 1 | to | 6.5 |
| SDi-308(D) | 16 | 16/2 (12.5%) | 1 | to | 8.0 |
| SDi-308(B,C,E) | 115 | 115/12 (10.4%) | 1 | to | 9.6 |
| SDi-682(3,4) | 32 | 32/3 ( 9.4%) | 1 | to | 10.7 |
| SDi-5589 | 11 | 11/1 ( 9.1%) | 1 | to | 11.0 |
| SDi-308(H,J) | 103 | 103/1 ( 1.0%) | 1 | to | 103.0 |
| SDi-682(2) | 13 | 13/? (?) | ----- | to | ----- |
| Guajome | 67 | 67/? (?) | ----- | to | ----- |
| SDi-308(A) | 19 | 19/? (?) | ----- | to | ----- |
| SDi-682(D,E) | 7 | 7/? (?) | ----- | to | ----- |
| SDi-7210A | 8 | 8/0 | ----- | to | ----- |
| SDi-682(6AB) | 39 | 39/0 | ----- | to | ----- |
| SDi-217 | 204 | 204/0 | ----- | to | ----- |
| SDi-539 | 46 | 46/0 | ----- | to | ----- |
| Frey Creek | 32 | 32/0 | ----- | to | ----- |

Table 11. Relative Frequency of Combinations to Mortars by Site and Site Loci: Ranked by Percentage

| Site | Mortars | | Ratios Cominations | | Mortars |
|---|---|---|---|---|---|
| SDi-5589 | 11 | 11/5 (45.5%) | 1 | to | 2.2 |
| Frey Creek | 32 | 32/11 (34.4%) | 1 | to | 2.9 |
| SDi-682(7) | 23 | 23/7 (30.4%) | 1 | to | 3.3 |
| SDi-674(A) | 31 | 31/7 (22.6%) | 1 | to | 4.4 |
| SDi-4421 | 45 | 45/10 (22.2%) | 1 | to | 4.5 |
| SDi-308(B,C,E) | 115 | 115/20 (17.4%) | 1 | to | 5.8 |
| SDi-682(2) | 13 | 13/2 (15.4%) | 1 | to | 6.5 |
| SDi-308(D) | 16 | 16/2 (12.5%) | 1 | to | 8.0 |
| SDi-7210A | 8 | 8/1 (12.5%) | 1 | to | 8.0 |
| SDi-308(A) | 19 | 19/2 (10.5%) | 1 | to | 9.5 |
| SDi-308(H,J) | 103 | 103/10 ( 9.7%) | 1 | to | 10.3 |
| SDi-308(F,G) | 37 | 37/1 ( 2.7%) | 1 | to | 37.0 |
| SDi-682(6AB) | 39 | 39/0 ----- | ----- | to | ----- |
| Guajome | 67 | 67/? ----- | ----- | to | ----- |
| SDi-682(D,E) | 7 | 7/? ----- | ----- | to | ----- |
| SDi-682(3,4) | 32 | 32/? ----- | ----- | to | ----- |
| SDi-217 | 204 | 204/0 ----- | ----- | to | ----- |
| SDi-539 | 46 | 46/0 ----- | ----- | to | ----- |

Based then on the extant published data, it is proposed that when a more complete sample is available there will be a positive correlation between acorn-processing camps and functional cupules, with few or rare associated mortar pockets and/or milling element combinations. A second category or grouping would have mortars, few or no functional cupules, associated mortar pockets plus some superpositions or combinations. This second aggregate of elements is tentatively assigned to the designation "generalized processing village." In the present sample the distribution of pockets and combinations tends to overlap, but with a larger sample and a modicum of temporal control, additional sorting may be possible. If this turns out to be the case, it is proposed that a mortar/metate/slick superposition pattern would be antecedent to a mortar/mortar pocket/combination pattern. That is to say, metate-slick combinations seem to be less common at general processing village loci than at the so far identified San Luis Rey I camps. Some combinations and superpositions have been identified at San Luis Rey I camps, but pockets seem *not to be* part of that pattern. In short, small mortars and metate-slick combinations tend to be characteristic of San Luis Rey I camps and of other probably related processing stations. The full significance of these proposed distributions is not yet obvious, but it seems fairly clear that both time and resource foci are involved.

## GENERAL DISCUSSION

As can be seen in Tables 1–11 there are obvious differences in the distribution of different kinds of bedrock milling elements across the study transect. These differences may represent responses to environmental circumstances (kinds of resources available); responses to cultural preferences or technical factors (processing modes); and/or to different usages developed through time. Closely related to the distribution of *kinds* of milling elements, there appear to be meaningful differences in the distribution of milling element associations (combinations and superpositions). The term "combination" here refers to the apparent functional associations of more than one kind of milling element. Examples include mortars with associated pockets, mortars directly associated with metates or slicks, and mortars superimposed over metates and/or slicks (Fig. 3). All aspects of this kind of patterning are not always obvious, and some apparent associations should be considered with caution. The possibilities, however, clearly warrant attention.

On the assumption that the observed patterning in each category is a reflection of some socio-cultural or cultural-economic reality, it seems prudent to examine the basis for the interpretation so far proposed. As noted above, in the initial examination of the transect data it seemed reasonable to suggest that elevation (environment) was a significant factor in the distribution of mortars versus metates and slicks. The addition of two supplemental lowland sites, however, changed the nature of the distribution and suggested that factors other than environment were operative. Furthermore, reevaluation of the data for both whole sites and identifiable infra-site loci suggested four general distributional categories which appeared to be only partially environmentally dependent:

1. Heavy concentrations of mostly large deep mortars with few or no associated metates or slicks. Mortar pockets are absent or rare (ambiguous), and anvil-like cupules are commonly if not usually associated. This aggregate of traits has been identified as an acorn processing station.

2. Sites characterized by numerous mortars of various sizes, often with associated pockets or collars, and typically associated with metates and/or slicks in various combina-

tions or superimposed configurations. This aggregate is associated with sites identified here as generalized processing/habitation villages. A broadly-based subsistence orientation is proposed, but one with a strong and important emphasis on acorn products.

3. Sites which include small to medium bedrock mortars, metates, and slicks (both as separate elements and as combinations). Mortars here are often shallow, sometimes suggestive of bases for basket hoppers. Metates and slicks represent the most common elements. This pattern is typically found in small site contexts, and generalized processing is suggested. Acorns may have been relatively unimportant.

4. Sites or processing stations dominated by bedrock metates and slicks. Mortars and cupules are absent or extremely uncommon, and combinations are absent or at best very rare. It is assumed for purposes of discussion that acorn processing here was of minimal concern and hard seed, fiber, or small-animal processing was the primary focus.

To put these site categories into a useful perspective, it is necessary to examine: (1) the settlement pattern as defined to date; (2) some additional aspects of the environmental setting; and (3) to the degree possible, the basis for some temporal differentiation within the late prehistoric San Luis Rey occupancy.

## Settlement Pattern

Based on ethnographic and archaeological data developed over some 80 years of general interest by anthropologists, and some 40 years of observation and inquiry by the writer, the late prehistoric settlement-subsistence pattern for the interior upland region of the central San Luis Rey River basin is reasonably well known. For the defined interior upland region the picture that has emerged to date is one which has permanent sedentary villages established in lowland valley or lower mountain flank locations with permanent counterpart seasonal camps on the adjacent mountaintop. On the basis of ethnographic data, each lineage or aggregated multiple-lineage group had a defined collecting territory that was systematically defended against trespass (Sparkman 1908:190; White 1963:113–125; Max Peters, personal communication, 1958).

The archaeological data so far in hand are consistent with this pattern, and counterpart mountaintop camps have been identified for almost all of the valley villages situated around the western margins of Palomar Mountain (True, Meighan, and Crew 1974:103–145). Depending on the topography, the approximate distances between the valley villages and the mountaintop camps vary, as do the distances between valley villages and between the several better-documented mountaintop camps. However, all are relatively close and in no instance are more than one half-day's walk apart. Depending on access, oak grove distributions, and topography, the summer camp locations may be relatively close together, but clearly within their designated territories.

Questions have been raised by other researchers as to the timing or duration of the seasonal camp occupancy (which was clearly variable), but the important point is not how much of the year was spent at the seasonal camps but that they were permanent and that each had a fixed relationship with a counterpart valley village.

In contrast to the details available for the interior upland region, the settlement system for the lower portions of the river valley is generally poorly known and was probably significantly different from the system described above. Based on the evidence in hand (archaeological site locations), the lower riverine pattern would have been recognizably dif-

ferent both in terms of site locations and probable subsistence procurement practices. Unfortunately, there are no viable ethnographic data which bear on this, and proposals must be based on the available archaeology and on very general ethnographic extrapolations from the interior upland regions. For the lower central valley regions, there is no basis for proposing an extended seasonal round, and the high elevation-low elevation pattern proposed for the interior makes no sense for two obvious reasons: (1) topographic configurations within the lowland valley regions do not include sufficient elevational differences to be meaningful in terms of vegetal-based subsistence potential; (2) all of the high elevation land within the Agua Tibia-Palomar Mountain range (which is the only upland area even remotely accessible) was claimed and defended by the villages situated around the base of the mountain, and it is unlikely that access would have been provided to downstream villages on any meaningful scale.

Settlements within the lower and lower central portions of the study area include major villages at Tomkav and the Mission site, as well as several smaller villages at Bonsall, Live Oak Creek, etc. All are located adjacent to springs and on primary San Luis Rey River tributaries near their junction with the river. The existence of some minor collecting and processing stations apart from each primary village is a reasonable postulate, but for the late end of the time scale, at least, it is proposed that most resources were carried back to the home village for storage, processing, and consumption. Whatever the ultimate configuration, this kind of single permanent village pattern is clearly different from the bipolar pattern proposed for the interior upland. While any assessment of the subsistence base for the lowland valley sites is necessarily speculative, it seems reasonable to suggest that differences between the two patterns were more a matter of focus than substance. It is suggested that the lower valley sites made greater (but still limited) use of marine resources than did the interior upland settlements, and it should be noted that two of the three favored oak species were concentrated in the upland mountain locales mostly out of reach of the lowland valley riverine villages.

For both the upper central and lower central regions, it is proposed that each village unit controlled a finite territory with the use of resources similar to those proposed for the Luiseño in general. Use of resources in this context refers to general rather than specific situations, and it should be stressed that traditional subsistence details recovered from ethnographic sources three or more generations after the collapse of the native system are not likely to reflect prehistoric conditions with any degree of accuracy. On the other hand, it is likely that the same *general* resource base has been available over the past several centuries, and it seems reasonable to suggest that the prehistoric subsistence base, whatever the details, was tied to the same kinds of resources present in the early decades of the 19th century.

## Environmental Considerations

To a substantial degree, environmental conditions within the study transect reflect differences in elevation which in one way or another relate to amounts and circumstances of precipitation, temperature, soil conditions, exposure, and sundry other micro-environmental situations, most of which are of minimal concern at the present time.

Although other plant and animal resources were important contributors to the local subsistence, the primary concern here is with kind and distribution of oak resources. Recognizing that the descriptions are over simplified, general distributions of plant communities within the study area are included as minimal background information. The following categories are proposed: (1) mixed coniferous-broadleaf forest (confined to elevations above

3,800 feet (1,160 m) and significant perhaps, only in contexts above 4,000 feet (1,220 m); (2) chaparral-oak woodland that extends over a considerable range in elevation with the exact plant community composition depending on available water, soils, and exposure (gallery forest communities would be included here with some riparian vegetation in the better watered locales); (3) riparian-oak-sycamore grassland communities that are located along the margins of the larger drainages; and (4) a riparian gallery forest-inland sage scrub community that dominates large areas of the lower elevations of the transect 100 to 1,000 feet (30 to 300 m) above sea level.

Beauchamp (1986:7–8) describes the oak woodlands found in this region in terms of sparse and dense phases which reflect both species differentiation and relative density of individual stands. Distribution of the two oak patterns (dense versus sparse) is not mutually exclusive with regard to the communities proposed for the archaeological transect, and there is some overlapping in categories and species. It is possible, however, to categorize most localities within the transect in terms of the Beauchamp criteria.

Sites SDI-217 and -539 are located within the mixed coniferous forest (montane coniferous forest) and are in contexts described by Beauchamp as "massive trees with relatively dense shaded understory" (1986:7).

Precipitation in such contexts ranges from 35 to 45 inches a year and ponderosa pine, white fir, sugar pine and cedar are associated with black oak (*Quercus kelloggii*), canyon live oak (*Quercus chrysolepis*), and coastal live oak (*Quercus agrifolia*).

Site SDI-308 (and the associated village of Cuca) is located in an oak grassland area adjacent to a large stand of live oak (dense) on one side and chaparral-oak woodland (sparse) on the other. The sparse oak woodland is widespread but situated over difficult terrain, and the dense live oak forest was clearly the most important asset.

The Frey Creek sites (SDI-246, -266, -501, and -731) are located on an alluvial fan adjacent to a minor gallery forest (live oak dense) with sparse oak woodlands nearby. Both mixed and chamise chaparral are adjacent. Inland sage scrub plants are presently associated, but this may be the result of disturbance in more recent historic times.

Tomkav (SDI-682) is located adjacent to a riparian woodland with scattered stands of live oak along the margins of the river. Chaparral abuts the site proper (predominantly chamise) but with mixed chaparral communities nearby.

Sites SDI-5589 and -674 are located adjacent to riparian woodland and are directly associated with inland sage scrub communities. Oaks (*Quercus agrifolia*) are present along the margins of the river and as elements in gallery forest communities within nearby tributary drainages.

For the sites at Guajome and SDI-4421, the environmental situation is similar, with scattered stands of coastal live oak (typically in small scale gallery forest contexts). Adjacent hills tend to be bare at the present time or are covered with inland sage scrub. Mixed chaparral communities have survived on localized steep hillsides.

## Temporal Considerations

There is little or no question as to the general placement of the San Luis Rey complex material in northern San Diego County, but empirical data with specific temporal signifi-

cance are rare. Those that are available often have minimal application in the definition of detailed late prehistoric culture sequences.

Waugh (MS 1986:115) reports two radiocarbon determinations from SDI-217 taken from depths ranging from 80 to 120 cm. One (Beta 7191) is dated to 930 ± 60 radiocarbon years; the other (Beta 10066) is dated to 1300 ± 70 radiocarbon years. True and Waugh (1983:253–255) report on six radiocarbon samples from sites in the Frey Creek complex that range from 300 ± 90 to 760 ± 100 radiocarbon years.

For site SDI-217 the numbers suggest that cultural activities were taking place on site as early as A.D. 1000. For the Frey Creek suite the numbers suggest a late transition from San Luis Rey I to San Luis Rey II. While useful in a very general sense, these numbers have very little meaning in the context of the present report because there is no way to relate the radiocarbon determinations from SDI-217 to any specific activities related to the bedrock milling features. Furthermore, in addition to these inherent interpretational limitations, it should be noted and stressed that radiocarbon determinations in the late time range are likely to be notoriously erratic because of secular variation.

Although attempts have been made locally to utilize obsidian hydration readings for dating purposes (Chace 1980:8–11; Hughes and True 1985:328–330), the presently available obsidian sample is limited, and no reliable hydration rate has been established for this part of California. In sum, other than to argue that most of the bedrock milling sites are associated with a San Luis Rey II occupancy and that much of the focused acorn milling activity was late prehistoric in time, there is little to be said relative to specific temporal considerations. It is suggested that many of the changes reflected in bedrock mortar data represent a period of time that does not exceed 400 to 500 years, and that the focus on systematic acorn processing was concentrated in the period just prior to mission contact. Even if additional radiocarbon determinations were available from more specific and useful contexts, it is likely that the duration of many of the proposed activities would have been too short to be measured meaningfully in the radiocarbon record.

With these several qualifications in mind, a temporal ranking of terminal occupancies of the major sites in the study transect is proposed, based on ethnographic and ethereal archaeological assessments. This proposal says nothing about duration or under what circumstances any given site was (might have been) occupied. This very tentative ranking is presented below starting with the occupancies believed to have been most recent.

Based on quite reliable ethnographic and historic data it is possible to propose that sites SDI-217 and SDI-539 were still being used on a very limited scale as late as the mid-19th century. Acorns were collected from these areas on a small scale during the first two decades of the 20th century, although it is not clear whether or not they were processed at the collection sites (Max Peters, personal communication, 1958). It is certainly meaningful that we have specific references to the use and the affiliation of these two sites, which suggests that some native subsistence practices had survived in the valley counterpart villages (Pauma and Japicha) well into post-mission times. An exact date is of minimal consequence, and the concern here is only with a general time. It is, however, clearly meaningful that so many details relative to site SDI-217 have survived.

For site SDI-308, the ethnohistoric data suggest an occupancy that lasted until sometime in the early decades of the 19th century. The year 1820 has been suggested as a terminal date based on glass bead types recovered from the site surface (True, Meighan, and Crew 1974:93). This approximate time is supported by both the level and kinds of historic and

ethnographic knowledge available locally. The site name is known as is its affiliation with the adjacent village of Cuca. Other details are vague or unknown. Based on artifacts and historic accounts, the site was clearly occupied into historic times but has been abandoned long enough so that no presently living person can directly relate to any of its occupants. This general level of dating can also be inferred from the presence of traditional projectile points made of European material (blue and white china or porcelain). On the other hand historic artifacts in general were relatively rare, and trash indicative of a more recent historic occupancy is conspicuous by its absence.

It is suggested that site SDI-682 be placed next in the sequence. For this major site we have a name (Tomkav) and some very vague folkloric references. No affiliation can be proposed and no survivors have been identified. References by White (1963:123) suggesting a Pauma connection with Tomkav is almost certainly the result of a misunderstanding of his question by chief Pachito, and the role described for Tomkav (as a source of lithic raw material) makes little sense. No historic artifacts were recovered during the excavations at this site. It should be noted that more than one locus has been identified within the larger area known as Tomkav, and there is reason to suggest some differences in the time of their use. Locus 6AB was probably the most recently used area, and locus 7 probably represents the initial San Luis Rey occupancy with a full range of San Luis Rey I and San Luis Rey II activities represented by the other loci between.

Site SDI-674 is generally similar to SDI-682 in that it seems to have a name (Kwalam), but no other meaningful ethnographic or historic references are known. A large amount of historic trash was recovered from SDI-674 as a result of the Caltrans investigations (Rosen MS 1984:105–106), but this material is clearly related to the 20th-century automobile repair facility that straddled the site for several decades. Historic artifacts that can be directly related to the site occupancy have not been reported.

Tentatively the site complex at Guajome seems to fit into the same time category as sites SDI-682 and SDI-674. The interpretation there is complicated by the development of the historic rancho overlying and overlapping with the native occupation area. The resulting native affiliations carried over well into historic times, and it is difficult to know which remains and accounts relate to the primary Indian settlement and which relate to the ranch. It is likely, in fact, that the mission activities decimated and scattered the native population from this locale, and that the ranch development that followed pretty well obliterated any meaningful native identity. It is proposed then that all three villages (SDI-682, -674, and Guajome) ceased to exist as functioning native settlements as early as A.D. 1800.

Based on data in hand, site SDI-5589 would have been abandoned (or nearly so) prior to A.D. 1800. We have no name that can be attributed to that locale, no ethnographic detail, and apparently no associated historic artifacts.

The Frey Creek complex sites (SDI-246, -266, -501, and -731) have no direct ethnographic referents that are not modern and related to a different set of activities (place names). No historic artifacts have been recovered from these sites, and pottery is conspicuously absent from the collections. These loci have been categorized as San Luis Rey I sites and had occupancies that probably terminated during the 17th century and/or the very early 18th century.

### Native Preferences

Sparkman (1908:193–194) notes that for the Luiseño the acorn of the black oak (*Quercus kelloggii*) was by far the most palatable and the common live oak (*Quercus agrifolia*) was the second choice. The third choice, the canyon live oak (*Quercus chrysolepis*), was described as palatable but hard to grind. Acorns from other oak species were used only when nuts from the favored species could not be obtained.

Recognizing that the actual amount of acorns available to any particular settlement or group depended in part on the size and configuration of the collecting territory (which in some cases is unknown), it appears in general that oaks become increasingly common as one moves inland from the coast (up hill). Further, it seems to be the case that the heaviest concentrations of the most favored species are found in the interior upland regions. For the study transect, black oak, for example, is found only on the higher elevations of Agua Tibia-Palomar Mountain; canyon live oak is found on the mountaintop and some adjacent canyons at elevations above 3,000 feet (900 m). *Quercus agrifolia* has an overlapping distribution that crosscuts all elevations from the mountaintop to near sea level. The heavier stands of live oak, however, are found in the intermediate elevation interior regions.

For the study transect, at least, not only are most of the preferred species found in the interior upland regions, but it could be proposed that trees in the higher elevation would receive more precipitation on a year in, year out basis and therefore may have been more consistent and reliable producers. Such potential productivity would have to be considered in relation to natural cyclical tendencies of several of the oak species, but it is a point deemed worth mention.

## CONCLUDING COMMENTS

It is reasonably clear that there are differences in bedrock milling element forms and distributions within the study transect. While it is impossible to know for sure what the basis for such distributional patterning is (was), several reasonable possibilities come to mind. It is possible, for example, that some of the observed patterning relates to contemporary processing of more than one oak species. Another possibility is simply that there were local differences in the intensity in more or less contemporary contexts that had little or no relationship to either economics or socio-cultural preferences. It is considered most likely, however, that the observed patterned differences reflect changes in milling procedures or processes through time and, for now, a developmental model seems to make the most sense.

Using data from site SDI-217 as a template, it is tempting to propose a trend toward specialized acorn processing in very late prehistoric times and to attribute this to some kind of demographically-driven subsistence intensification. The likelihood that some kind or level of intensification was part of the latest prehistoric-early historic developments locally has been proposed by Waugh (MS 1986:310–321), and such possibilities in general seem reasonable as long as the dimensions and scope of the proposed processes are consistent with data representative of local levels of development and specialization. Serious consideration, however, of the idea that a move from a generalized processing base to a specialized acorn-processing base was in some way a response to some kind of prehistoric demographic bulge requires a careful assessment of the available data and all possible alternative scenarios.

As noted above in passing, one of the more obvious alternative possibilities suggests that the observed patterning was related to differential processing of acorns from different oak species. Since it is clear that species preferences did exist (some of which might favor different kinds or levels of processing), such a possibility must be considered, and it should be assumed that not all acorns were subjected to exactly the same kind of treatment. On the other hand, while this possibility should not be ignored, it seems fairly obvious that it is not the principal basis for the patterning so far identified.

Recognizing that the geographic distribution of two of the three most favored oak species was limited to the higher elevations of the interior regions and that these acorns would not have been easily available to the lowland riverine villages, it is probably significant that the milling element patterning attributed to both specialized acorn processing and generalized vegetal *processing* crosscuts the elevational-environmental boundaries described for the study transect. That is to say, besides some evidence for specialized acorn-processing stations in lowland village contexts (locus 6AB at site SDI-682, for example), two categories of major sites are found in the mountaintop contexts, both of which have village-like characteristics. Sparkman (1908:192), for example, designates some sites on Palomar Mountain as acorn camps, and others are described as "old villages on Palomar." Both categories of sites look the same in a casual examination, and for many years it was not clear why he had made the distinction. Independent of Sparkman, Max Peters and Romulo Sobenish (Luiseño elders) identified sites SDI-217 and SDI-539 as acorn camps and described other near by sites as village locations (personal communications, 1957–1959). Recognition of the differences in bedrock milling element distributions for these two site categories has clarified this aspect of the ethnographic record, which until recently did not make sense.

To document and substantiate the basis for such a separation, it is necessary to compare specific data from those sites identified as villages and those identified as acorn-processing camps. Unfortunately, detailed milling element counts and measurements for the mountaintop village sites are not immediately available, but enough information is in hand to provide a reasonable preliminary assessment which will suffice until such detailed counts can be obtained. Thus, while not included in the transect sample originally, the mountaintop village of Jaculi serves as the principal basis for a preliminary comparison. Jaculi has been described as a mountaintop site belonging to the winter village of Japicha (R. Sobenish, personal communication, 1958). The bedrock elements at Jaculi are described as follows: "Bedrock grinding equipment deserves mention because of the variety of forms found on this site. These include bedrock mortars superimposed over dish-shaped bedrock metates, combinations or pairs of mortars, and oval basined metates as well as combinations or pairs of mortars with one large and one small (pockets)" (True, field notes, 1953). This distribution of elements clearly falls into the category described above as a generalized processing site, and it is obviously different from the elements and distributions at SDI-217 and SDI-539.

To reinforce the comparison, data from another mountaintop village site are introduced. This locale (SDI-543 ) was identified by Max Peters, an elder from the village of Pauma, as a mountaintop site belonging to Pauma. At the time (1958) no attempt was made to collect artifacts or record features, but in a more recent investigation Fulmer (MS 1978:119) describes the bedrock elements as follows:

> a complex of mortars, basins and slicks . . . is located along drainage channels east and west of the site and along the rim of the parkland to the south. Mortars are the most frequently occurring features, in singles or in multiple combinations, and with a complex topography of

> surrounding slicks or troughs. The diameter of the mortars varies from 13 to 19 cms and they range from 2 to 12 cms in depth. In general, for the complex surfaces when slicks and or troughs surround mortars, the mortar tends to be deeper and well developed. Over 50 mortars were recorded and more may occur around the site perimeter.

Without measurements and counts, quantitative assessments are impossible, but based on Fulmer's description, the milling element assemblage at SDI-543 appears to be similar to that at Jaculi. Both are *clearly different* from the pattern described for SDI-217 and SDI-539, both of which have been directly identified as acorn processing stations. All four of the mountain-top sites noted here are in similar environmental contexts, and Jaculi, SDI-217, and SDI-539 are relatively close together in almost identical environmental settings.

Thus, while there are still many loose ends and several complex settlement-subsistence issues that have not been addressed, it seems that there is little basis for proposing that acorn species differences or environmental conditions, per se, account for the milling element distributions noted in the transect sample. This leads to the suggestion that the pattern differences are in some way tied to other subsistence-related circumstances, with demographic pressure being a significant possibility. One could argue that increasing subsistence needs might well have resulted in a more focused and intense exploitation of the extant acorn resources and the kind of processing facility represented by site SDI-217. On the other hand, it could be as easily argued that subsistence pressure under such circumstances might result in an opposite response with an increasing focus on the recovery and processing of the widest range of edible resources. This in turn leads to the question of whether the specialized acorn-processing facilities and technology developed in addition to, or as a replacement for, a generalized processing base. That is to say, was the production of more food the goal, or was the goal simply the more efficient production of a favored food in relation to some as yet unidentified socio-cultural circumstances.

A discussion of the local socio-cultural demographic, settlement-subsistence details in relation to possible intensification processes is clearly beyond the scope of the present paper. The principal goal here is the preliminary documentation of the bedrock milling data and the tentative suggestion that they may provide the basis for more substantive assessments of settlement-subsistence activities as part of future analyses and interpretations. It is probably worth noting that, however feeble, the bedrock milling element distribution data provided above in conjunction with the noted ethnographic gleanings may well represent the only empirical evidence so far available for the idea that acorn specialization was in some way related to an intensification process. Such an idea is worth mention, even in passing, and it is probably important to be able to consider such possibilities on a level that goes beyond a logical statement that just notes that life in late prehistoric times was more complicated than life in early prehistoric times.

Regardless of the possible implications of these data with respect to such esoteric issues as demographic configurations and intensification processes, they clearly indicate the potential for some kind of delineation of identifiable bedrock milling feature patterns. Such patterning may relate to temporal considerations, processing variations, and or subsistence differences, all matters to be addressed in future regional research.

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