Reconceptualizing the Encinitas Tradition of Southern California

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Abstract

What has been commonly known as the Millingstone Horizon in southern California represents a cultural phenomenon that occurred between ca. 9,400 and 1,000 years ago, beginning and ending at different times in different areas. Manifestations of this phenomenon have been recognized since the 1920s, and in the 1940s and 1950s the Topanga and La Jolla complexes were defined and included as geographic and temporal expressions of the Millingstone Horizon. Interior manifestations of the Millingstone Horizon were generally described using coastal terms or assigned either to the Sayles or Pauma complexes. In 1968 the Encinitas Tradition was proposed as a replacement for the Millingstone Horizon in order to better understand it as a cultural tradition. More recently, the Millingstone archetype in southern California has been divided into the broad temporal categories of Early, Middle, and Late periods, or simply subsumed under the even broader temporal category of Middle Holocene.

We provide a brief history of the Millingstone concept, reaffirm the merit of the Encinitas Tradition, and recommend a return to the use of taxonomic terms, herein called pattern and phase, to describe the internal variation of the Encinitas Tradition. For the northern inland expressions of the Encinitas Tradition, we propose a new pattern, Greven Knoll. The previously described Sayles Complex is recast as the last phase of the Greven Knoll Pattern (Greven Knoll III). We believe that an understanding of the regional variants of Encinitas will foster a better understanding of the geographic and temporal manifestations of the Millingstone phenomenon in southern California, as well as the changes through space and time that ultimately resulted in the replacement of Millingstone adaptive strategies by strikingly new ones. Further, we propose that the Encinitas Tradition was a Hokan linguistic entity, eventually becoming proto-Yuman.

Introduction

Early in the Holocene, a phenomenon distinguished by an abundance of milling implements (especially manos and metates), a paucity of projectile points, and a near absence of vertebrate faunal remains appeared across much of California. Radiocarbon dates from these components in southern California generally indicated a time span between about 8,500 and 1,000 BP, although most have been dated between about 7,000 and 3,000 BP, particularly along the coast. Various regional expressions of this cultural phenomenon, called the Topanga and La Jolla complexes, were identified and later integrated into what became known as the Millingstone Horizon in southern California (Wallace 1955; also see Wallace 1954).

Warren (1968) defined the “Millingstone Horizon” in southern California as a cultural tradition, which he named the Encinitas Tradition. Warren (1968:2) chose Encinitas as the new name for the tradition so that the names of its existing expressions, such as Topanga and La Jolla, would not be confused with the tradition name.

The Encinitas Tradition concept was generally adopted by most researchers (but see Basgall and True 1985:3.16-3.55; Fitzgerald 1993:3-11). Many abandoned the idea of regional expressions in favor of a generalized Encinitas Tradition (with the exception of the La Jolla Complex, which remains in use). Others continued to use the outmoded term “Millingstone Horizon” and in some cases divided it into Early, Middle, and Late based on general chronologies or clusters of radiocarbon dates. Still others chose to use the term "Middle Holocene" to characterize "Millingstone" materials. Lacking any real cultural context, such temporal entities are not particularly useful for understanding prehistory, but they continue to be employed as broad outlines of culture history in southern California.

As a result of the elimination of the regional taxonomic terminology and the compression of its various expressions into a homogeneous Encinitas Tradition, distinctions between regions and components have become obscured, differences between geographic regions have generally been ignored, and similarities have been accentuated. However, the identification of cultural, spatial, and temporal variation is central to the identification of archaeological entities throughout space and time and is critical for moving toward an understanding of adaptation and change.

It is clear that there are technological differences between the various expressions of the Encinitas Tradition (Corum 1977; Basgall and True 1985:3.54; Hale 2001) and that major cultural changes took place in some areas (e.g., in the Los Angeles area as a result of the Takic intrusion [Sutton 2009]) and not in others. For example, many cogged stones and "early" style discoidals (as defined by Underbrink and Koerper [2006:117])[1] have been discovered at sites in the Los Angeles Basin, but they do not occur either in San Diego County or in the Santa Barbara Channel area (e.g., Eberhart 1961; Herring 1968; Warren 1968; Koerper and Mason 1998). Fundamentally, then, we know that the Millingstone in one area is not the same as the Millingstone in another. Therefore, we argue that the Encinitas Tradition remains valid and is an important tool for understanding the Millingstone phenomenon in southern California, and we propose a return to the use of taxonomic units—pattern and phase—that describe the variations in the Encinitas Tradition across southern California.

An important issue in this regard is the variable use of different terms to designate time and archaeological entities (part of the reason that Warren [1968] defined the Encinitas Tradition). In this article, the term "period" is used to specify a span of time, such as the Early Holocene. Initially, regional expressions of the "Millingstone" were defined as "complexes" (e.g., the Topanga Complex) to convey the general association between groups of artifacts. The term "complex" is replaced by "pattern" (following Warren et al. 2008:17) to denote units of cultural similarity in traits that include technology, settlement pattern, mortuary practice, and the like. The next taxonomic level, "phase," is used to designate subdivisions within a pattern as identified by specific changes in cultural assemblages. For example, the previously designated Topanga Complex is herein renamed the Topanga Pattern of the Encinitas Tradition. Within Topanga, three specific archaeological manifestations (Phases I, II, and III) had previously been defined and are retained herein. These terms offer a great deal of information. For example, if a component is referred to as reflecting Topanga I, one should instantly recognize something about its technology, geography, ecology, and chronology. In our opinion, that degree of specificity in the terminology provides a heuristic framework that promotes clarity and can lead to a better understanding of the archaeological record.

Separate coastal and interior manifestations of the Encinitas Tradition are clearly evident in artifact assemblages and adaptations, and we believe it is important to recognize that variation. Thus, we propose a new pattern within the Encinitas Tradition for the northern inland region, which we name Greven Knoll, and we redefine the Sayles Complex as the latest manifestation of the Greven Knoll Pattern (Greven Knoll III). In this way, we offer a model that conveys our position that the inland variants of the Encinitas Tradition, while somewhat similar in adaptation to those on the coast, are separate archaeological entities from their coastal variants.

We believe that each of the patterns discussed in this article can be broadly viewed as archaeological cultures, constructs that serve as models of extinct cultural organizations that include all facets of human behavior as reflected in the archaeological record. Thus, we model patterns as the equivalent of "cultures" and their phases as more specific expressions of the cultures through time. Each of the patterns would generally be related to one another through the tradition (akin to a European tradition with a French pattern having feudal, imperial, and democratic phases). This approach, we believe, will help foster a greater understanding of "the anthropological ramifications of these various manifestations" (Basgall and True 1985:3.52, emphasis in original).

We are aware that our proposal reflects an old-fashioned, culture-historical approach. However, one cannot develop or test behavioral, evolutionary, or ecological models without having some control over traits through space and time, and we believe that basic description and classification remain the foundations to any understanding of the past. Indeed, many of our colleagues appear to embrace a general view that the Encinitas Tradition represents some sort of unchanged culture and adaptation spanning many millennia throughout southern California, a view that has evolved at least in part into the tendency of some scholars to forego the taxonomic subdivisions within the Encinitas Tradition that have served to define its geographic, cultural, and temporal differences. On the contrary, we believe that the patterns and phases of the Encinitas Tradition exhibit considerable variation (e.g., technology, economy, mortuary patterns) through space and time, albeit with a common theme. This variation is rooted in cultural contact and exchange and in cultural-environmental interaction.

A number of other issues inhibit our understanding of the Encinitas Tradition (Goldberg and Arnold 1988:47; McGuire and Hildebrandt 1994:42; Hale 2001:19-33), including a research focus on large sites, a lack of chronological control, differing field methods and analytical techniques, difficulty in defining phases with limited traits, and a reliance on ethnographic analogy (such as the assumption that manos and metates automatically indicate small seed processing). Although these issues are largely beyond the scope of this article, they remain important, and we believe that better spatial and temporal control can help clarify these concerns.

A Background for the Encinitas Tradition

Beginning in the 1920s, the presence of sites in the Santa Barbara area containing an abundance of millingstones[2] (predominantly manos and metates) was recognized, a cultural entity that David Banks Rogers (1929) referred to as the "Oak Grove People." Oak Grove components contained many manos and metates, relatively few other artifacts, and a paucity of faunal remains. Oak Grove components were often overlain by components with darker soil that contained more faunal remains, mortars and pestles, and notched or stemmed points. These later components were representative of what D. B. Rogers (1929) called the "Hunting People," now known as the Campbell Tradition.

Farther south along the coast of San Diego County, Malcolm Rogers (1929:455) identified components containing materials that were similar to Oak Grove assemblages, which he initially termed "Shell-Midden" but later renamed the La Jolla Complex (M. Rogers 1939, 1945). La Jolla was divided into La Jolla I and II (M. Rogers 1945; Harding 1951). Later work by Moriarty (1966) resulted in the addition of a third phase, La Jolla III. The assemblages of the La Jolla Complex were similar to Topanga and Oak Grove farther north, although evidence of shellfish exploitation was more pronounced in La Jolla components.

Subsequently, in the first general synthesis of southern California prehistory, Wallace (1955:2; also see Wallace 1978) proposed four "broad temporal divisions" based on the cultural content of sites. Wallace called these divisions "Horizons" (a usage employed prior to the publication of the Willey and Phillips [1958] definition of horizon), specifically Horizons I (Early Man), II (Milling Stone), III (Intermediate), and IV (Late Prehistoric). Wallace (1955:219) proposed that "Horizon II" materials, designated "Milling Stone Assemblages," were best represented by the "Oak Grove culture of the Santa Barbara region," but that similar assemblages had been documented at the Little Sycamore site (CA-VEN-1) in Ventura County (see Wallace 1954; Wallace et al. 1956; Gamble and King 1997:Table 5.1; Dallas 2004), Topanga Canyon and Malaga Cove in Los Angeles County, and some La Jolla sites in coastal San Diego County. Research at a number of sites in Los Angeles and Ventura counties (e.g., Heizer and Lemert 1947; Treganza 1950; Treganza and Malamud 1950; Treganza and Bierman 1958; Johnson 1966; also see Meighan 1959, 1965) resulted in the definition and refinement of three phases of the Millingstone in that region: Topanga I (ca. 8,500 to 5,000 BP), Topanga II (ca. 5,000 to 3,000 BP), and Topanga III (ca. 3,000 to 2,000 BP).

The "Millingstone Horizon" in southern California, as it came to be known, was characterized by an abundance of metates, manos, scraper planes, choppers, and core tools, some mortars and pestles, and a paucity of projectile points and faunal remains. Inherent in the definition of the Millingstone Horizon was an adaptation that was heavily dependent on seed processing (e.g., many millingstones) with a minor emphasis on hunting (e.g., a paucity of projectile points and faunal remains). The Millingstone Horizon was seen as the California equivalent of the Desert Culture of the Great Basin (e.g., Meighan 1963; Moriarty 1967), in which seed processing dominated the economy.

Inland variants of the Millingstone Horizon were also recognized—the Pauma Complex (True 1958, 1980) in San Diego County and the Sayles Complex (Kowta 1969) in San Bernardino and Riverside counties. Inland San Diego County sites were generally considered to be part of the early or middle Millingstone, while inland sites in San Bernardino and Riverside counties have typically been considered to be part of the late Millingstone.

Although Wallace used cultural traits to define the Millingstone Horizon, he proposed it as a temporal period. A few years later, Willey and Phillips (1958:33) offered a new definition of horizon, referring to it as "a primarily spatial continuity represented by cultural traits and assemblages whose nature and mode of occurrence permit the assumption of a broad and rapid spread." Wallace (1955) used horizon differently than Willey and Phillips, and these two definitions tend to be conflated in the literature (through no fault of Wallace), causing considerable confusion (e.g., Warren 1984; Koerper and Drover 1984). The Willey and Phillips (1958) definition is the one now commonly employed.

Warren (1968) defined the Encinitas Tradition to enable a discussion of cultural issues rather than just the temporal issues addressed by the concept of the Millingstone Horizon. The concept of tradition, as defined by Warren (1968:1), is "a generic unit comprising historically related phases" that can be "distinguished from one another on the basis of differences in cultural patterns reflected in differences in artifact types and assemblages and differences in cultural features within site units." Warren's definition of tradition is similar to that originally offered by Willey and Phillips (1958:37), who described it as "a (primarily) temporal continuity represented by persistent configurations in single technologies or other systems of related forms."

While noting that "ideally, a tradition is defined in an environmental vacuum with ecology playing no part in the definition," Warren (1968:1) recognized that there was a relationship between a given cultural tradition and its ecological adaptation. In general, the Encinitas

Tradition was viewed as reflecting a well-developed collecting economy with much less emphasis on hunting (Warren 1968:6). The Encinitas Tradition appears to have included a very general and flexible subsistence strategy (e.g., Hale 2001:165) undertaken by small, mobile groups with a heavy reliance on plant resources.

Other Millingstone Traditions?

A number of other Millingstone entities have been identified in California, including manifestations in northern California (True et al. 1979; True and Baumhoff 1985; Fitzgerald 1993; Fitzgerald and Jones 1999), the Central Valley (e.g., McGuire 1993), and along the central coast (Fitzgerald 2000; Jones et al. 2002, 2008; Jones 2008). Jones (2008) recently defined a "Millingstone Culture Area" that encompassed all of these regional expressions, including the Encinitas Tradition. It seems likely that other millingstone traditions will be identified in California in the future, as there are documented regional variations in artifact morphology and mortuary patterns (e.g., Fitzgerald and Jones 1999:71). However, the Encinitas Tradition, as currently understood, is confined to southern California, but it may include northern Baja California, a proposition that remains to be demonstrated.

To date, the only other "Millingstone" entity formally identified is Oak Grove in the Santa Barbara region, which is clearly "Millingstone" in character. Oak Grove was originally included in the Millingstone Horizon (Wallace 1955) and later within the Encinitas Tradition (Warren 1968). In more recent treatments of California prehistory (Moratto 1984; King 1990; Glassow et al. 2007), Oak Grove is generally subsumed within the Early Period in the Santa Barbara area rather than as part of the Encinitas Tradition of southern California.

It was thought that Oak Grove began sometime about 7,500 BP and was replaced about 5,000 BP by the Campbell Tradition, which was seen as representing the ancestors of the Chumash. The Campbell Tradition was clearly a new archaeological entity that succeeded the Oak Grove archaeological entity, as seen by the appearance of mortars and pestles, a substantial increase in the number of projectile points, the appearance of new types of points, and an increase in both marine and terrestrial faunal remains. Thus, Campbell represented a distinctive subsistence shift from seed collecting to more hunting and presumably acorn processing. The people of Oak Grove, Campbell, and Encinitas were seen as speaking languages of the Hokan stock (e.g., Moratto 1984:551).

The origin of the Campbell Tradition is uncertain. It is possible that Campbell reflects the arrival of a new population, perhaps from the interior (D. B. Rogers 1929:355-357; Wallace 1978) or from the coast to the north (Harrison 1964:368). It is also possible that the Campbell cultural assemblage diffused into the region and was adopted by the existing Oak Grove population (Moratto 1984:164). Although such distinct changes in the archaeological record as are seen between Oak Grove and Campbell are suggestive of cultural change, and even population replacement, the adoption of mortar and pestle technology was widespread across California at about 5,000 BP and is a phase marker (e.g., Topanga II) for the Encinitas Tradition to the south. Thus, the real difference between Campbell and later expressions of the Encinitas Tradition (e.g., Topanga II) is an increase in hunting as reflected by the appearance of larger numbers (and new types) of projectile points and the increase in faunal (both marine and terrestrial) remains. It seems possible that these new assemblages simply reflect economic adaptations of the existing Oak Grove people.

If the Campbell Tradition represents a new population at about 5,000 BP and Campbell is ancestral to the Chumash, then the Chumash would have been "in place" in the Santa Barbara area for about 5,000 years. If Campbell is a modification of Oak Grove through diffusion and/or changes in adaptation, then the ancestors of the Chumash may have been in place since the Early Holocene (e.g., Connolly et al. 1995:316). At the time the thinking was that, whatever the case, the languages involved would have still been Hokan.

However, Chumash is no longer considered to be Hokan and has been reclassified as a separate language family, Chumashan (e.g., Klar 2002), thought to be a linguistic isolate in place for a considerable amount of time (Golla 2007:80), suggesting at least linguistic continuity since the Early Holocene. These linguistic data on Chumashan continuity are supported by some artifactual (e.g., Connolly et al. 1995), osteological (e.g., Kerr 2004; also see Sutton 2009:45), and DNA data (e.g., Johnson and Lorenz 2006:56) that suggest a long-lived "Chumash" presence in the Santa Barbara region. Thus, if it is true that Chumashan linguistics and "Chumash" biology have been present in the Santa Barbara region since the Early Holocene, then it seems reasonable to believe that Oak Grove was linguistically Chumashan and Campbell represents some sort of in situ development from Oak Grove, ultimately leading to the historic Chumash.

The reclassification of Chumash out of the Hokan stock does not alter the belief that the people of the Encinitas Tradition spoke Hokan languages (e.g., Moratto 1984:546). If this is true, and if Oak Grove peoples spoke a Chumashan language, and if a major defining factor in a cultural tradition is its linguistic affiliation, then Oak Grove should belong to a different cultural tradition than Encinitas. Such a cultural tradition has not yet been formally proposed, but we suggest that it may be the southernmost extension of a Central Coast Millingstone tradition, one that perhaps dates to the Late Pleistocene (e.g., Jones et al. 2002). If Oak Grove was part of a different cultural tradition than Encinitas, its deviation from an Encinitas-like expression at about 5,000 BP seems easier to understand. Oak Grove would have existed in a different cultural environment, a different natural environment, with separate neighbors and influences, and so would have had a different trajectory than Encinitas entities. A different adaptation to changes in a different environment would be expected. This is obviously a very speculative hypothesis that must await further research.

Perhaps an even more speculative idea is as follows. Let us assume that Oak Grove was Hokan and part of the Encinitas Tradition and that at the same time, people speaking Chumashan languages and having "Chumash" biology occupied both the southern and northern Channel Islands, but not the mainland. These Island "Chumash" may have been in place since the Late Pleistocene or Early Holocene, and they might represent the first colonists along the coast (e.g., Johnson and Lorenz 2006:56). Sometime about 5,000 BP, these "Chumash" people moved onto the mainland in the Santa Barbara area, displaced the Oak Grove people, and adopted a new lifestyle seen archaeologically as the Campbell Tradition. The Campbell Tradition, then, would reflect the arrival of the "Chumash" onto the mainland from the islands. The new mainland "Chumash" would then have expanded their territory, mostly north and east into the interior (e.g., the Inland Chumash), after about 5,000 BP. Sometime about 3,200 BP, Takic groups displaced the "Chumash" on the southern, but not the northern, Channel Islands (see Sutton 2009), leaving the northern Channel Islands and the Santa Barbara area in Chumash hands.

If this general model were correct, then ancient "Chumash" DNA and osteological traits should be found in skeletal samples from the northern Channel Islands from about 12,000 to 10,000 BP to the present, on the southern Channel Islands from about 10,000 BP to about 3,200 BP, and on the mainland Chumash region only after about 5,000 BP. The linguistic data should indicate that Chumashan is "oldest" on the Islands, that the mainland Chumashan languages split from the Island languages, and that the northernmost mainland Chumashan language split from its southern mainland neighbor. The archaeological data should demonstrate substantial links between the islands and the mainland only after about 5,000 BP. An investigation of this exploratory model is well beyond the scope of this article.

Rejuvenating the Encinitas Tradition

As defined by Warren (1968:12), the Encinitas Tradition extended from the Santa Barbara region to the Mexican border and dated roughly between 7,500 and 2,000 BP. The characteristic traits of the Encinitas Tradition are abundant metates and manos, crudely fashioned core and flake tools, bone tools, shell ornaments, and a paucity of projectile points. The subsistence pattern of the Encinitas Tradition was apparently focused on collecting (e.g., plants, shellfish, and other resources, depending on circumstances) with hunting being of less importance, a pattern "well adapted to the various plant communities and the littoral zone, with a rocky foreshore and long, narrow estuaries at the mouths of the streams" (Warren 1968:12). The character of faunal remains varies by location but includes shellfish, terrestrial animals, sea mammals, and fish.

Warren (1968:1) mostly dealt with the coastal expressions of the Encinitas Tradition but recognized that a single tradition could have adapted to "several environments through time and/or space." Following this idea, inland expressions of the Encinitas Tradition have been identified. The inland patterns of the Encinitas Tradition are herein identified as Pauma and Greven Knoll and are discussed in detail below.

There are several characteristics that set these inland patterns apart from their coastal counterparts. An obvious difference is an economic one in that inland Encinitas expressions lack the remains of marine resources (e.g., sea mammals, shellfish, and fish), concomitant with a greater emphasis on terrestrial resources. Settlement was focused on inland streams, springs, creeks, lakes, valley floors, and some montane settings. Inland Encinitas expressions exhibit greater influence from desert groups, demonstrated not only by geographic proximity to the Mojave Desert but also by the presence of Pinto and Elko projectile points at many sites. Flexed burials were the preferred mortuary practice, along with occasional cremations. Inland Encinitas Tradition adaptations appear to have been at least partly a response to the warmer and drier conditions of the Altithermal (e.g., Kowta 1969).

Artifact assemblages of the inland Encinitas patterns are similar in some respects to those of the coastal Encinitas patterns, particularly in the abundance of manos and metates. There are some noteworthy differences. In inland expressions, cogged stones and discoidals are rare; the significance of this near absence is unclear but may simply be due to distance. In addition, mortar and pestle (or bedrock mortar) technology was not part of inland Encinitas technology, and manos and metates remained the principal technology after 5,000 BP. Acorns were not exploited inland until very late, and they never gained the importance in the interior that they seem to have had along the coast. Yucca was apparently an important part of the Greven Knoll III adaptation, although there is some disagreement on that point (see below). After about 3,500 years ago, there were profound changes likely brought about by an influx of Takic groups (see below).

Each of the patterns and phases of the Encinitas Tradition (except Oak Grove) is considered below (see Table 1). The sites and components discussed to describe each pattern are not intended to constitute a comprehensive list; rather, we chose a few thought to be typical (or in some cases atypical) of the various phases within each pattern. It is important to note that the geographic boundaries between the various patterns are currently unclear. Further, the changes apparent in the archaeological record that have led to the naming of various patterns within the Encinitas Tradition were the result of a variety of factors, possibly including but not limited to population replacement.

Table I. Marker Traits of Patterns and Phases within the Encinitas Tradition of Southern California.

Pattern	Phase	Dates (BP)	Material Culture Traits	Other Traits
Topanga	Coastal Los Angeles and Orange Counties			
	Topanga III	3,500 to 2,000	abundant manos and metates, continuing increase in mortars and pestles, wider variety of small projectile points, stone-lined earthen ovens	hunting and gathering important, flexed inhumations (some under rock cairns), cremations rare, possible subsistence focus on yucca and/or agave
	Topanga II	5,000 to 3,500	still abundant but fewer manos and metates, adoption of mortars and pestles, smaller points, cogged stones, late discoidals, fewer scraper planes and core tools, some stone balls and charmstones	shellfish important, addition of acorns, reburial of long bones only and addition of flexed inhumations (some beneath metate cairns), cremations rare
	Topanga I	8,500 to 5,000	abundant manos and metates, many core tools and scraper planes/scrapers, charmstones, cogged stones, early discoidals, few but large points, faunal remains rare	shellfish and hunting important, secondary burials under metate cairns (some with long bones only), a few extended inhumations, no cremations
La Jolla	Coastal San Diego County			
	La Jolla III	4,000 to 1,300	cores, scraper planes/scrapers, cobble tools, bone tools	flexed inhumations, cremations relatively rare, change in geographic locale of sites to lower elevations
	La Jolla II	5,000 to 4,000	continuing use of manos and metates along with the adoption of mortars and pestles, increase in number and type of points, late discoidals, scraper planes	shellfish and fish important, increased use of terrestrial mammals, flexed inhumations (some beneath metates), "true" cemeteries, trade began with Channel Islands
	La Jolla I	8,500 to 5,000	abundant manos and metates (initial appearance), scrapers, Pinto-like points, discoidals, cobble tools, tarring pebbles	shellfish and plants more important than hunting and fishing (but marine mammals exploited), mostly loosely flexed inhumations but some extended and secondary burials, no cremation
Greven Knoll	Inland San Bernardino/Riverside/Orange/Los Angeles Counties			
	Greven Knoll III (Sayles)	3,000 to 1,000	abundant manos and metates, Elko points, scraper planes, choppers, hammerstones, late discoidals, few mortars and pestles, general absence of shell artifacts	no shellfish, yucca and seeds as staples, hunting important but bones processed, flexed inhumations under cairns, cremations rare
	Greven Knoll II	4,000 to 3,000	abundant manos and metates, Elko points, core tools, late discoidals, few mortars and pestles, general absence of shell artifacts	no shellfish, hunting and gathering important, flexed inhumations, cremations rare
	Greven Knoll I	9,400 to 4,000	abundant manos and metates, Pinto points, charmstones, cogged stones and discoidals rare, no mortars or pestles, general absence of shell artifacts	no shellfish, hunting important, flexed inhumations, cremations rare
Pauma	Inland San Diego County			
	Pauma II	3,000 to 1,000	abundant manos and metates, discoidals, scraper planes, few points	possible Takic intrusion in the north, eventual replacement of Northern Pauma by San Luis Rey
	Pauma I	7,500 to 3,000	abundant manos and metates, discoidals, scraper planes, few points	possible coastal ties or seasonal use of interior areas by La Jolla groups, a few marine resources

The Topanga Pattern of the Encinitas Tradition

In coastal Los Angeles and Orange counties, the Encinitas Tradition is represented by the Topanga Pattern, which is divided into three phases, often referred to as Topanga I, II, and III (Table 1). Topanga groups are thought to have been relatively small and highly mobile, with a general economy focused on shellfish and seeds. Topanga is generally marked by large numbers of manos and metates, a scarcity of projectile points, an abundance of shellfish, and few vertebrate faunal remains. Inhumation was apparently the sole method of disposition of the dead, as no cremations have been reported from Topanga contexts (Moratto 1984; also see Allen 1994; Mason and Peterson 1994; Gamble and Russell 2002; Glassow et al. 2007).

Topanga was first defined as a result of excavations in the Santa Monica Mountains, including the Tank site, or CA-LAN-1 (Heizer and Lemert 1947; Treganza and Malamud 1950; Treganza and Bierman 1958; Kowta 1986) (Figure 1) and the nearby CA-LAN-2 site (Treganza and Bierman 1958) (Figure 1), both located about four miles from the coast in Topanga Canyon east of Malibu. Topanga components on the Los Angeles and Orange county coasts are situated in mountain settings, bays, wetlands, near-coastal valleys, marine terraces, and coastal plains (see Figure 2).

The Topanga Pattern, Phase I

Phase I (or Topanga I) of the Topanga Pattern is characterized by the presence of numerous manos and metates, abundant core tools (scraper planes, choppers, and hammerstones), a few mortars and pestles, relatively few large, leaf-shaped projectile points, cogged stones, and early discoidals. Secondary inhumation under cairns was a common mortuary practice (Johnson 1966:19), but extended inhumations (facing south) were also present. Most Topanga I components have been found along the coast, although a few are known in the Santa Monica Mountains and San Fernando Valley. Topanga I components have been dated between about 8,500 and 5,000 BP.

The Tank site (LAN-1) was excavated in the late 1940s (Heizer and Lemert 1947; Treganza and Malamud 1950; Treganza and Bierman 1958). Two cultural strata were identified at this site, Topanga I and Topanga II, but both are poorly dated. The collection from the site, estimated at about 10 percent of the site contents (Treganza and Bierman 1958:73), included some 329 metates, 2,556 manos, 2,008 scrapers, 1,478 hammerstones, and 4,994 core tools, as well as small numbers of cogged stones, discoidals, crescents, and other tools, although the stratigraphic positions of the artifacts were not made clear. Many features were also uncovered, including caches of milling tools and cairn burials. Some 19 human burials were found at the site, including primary and secondary inhumations. Subsistence remains were quite limited (Treganza and Bierman 1958:68). Heizer and Lemert (1947:238; also see Treganza and Malamud 1950:151; Gamble and King 1997) suggested that the Tank site was an early village (partly based on the presence of numerous inhumations), but Hale (2001:77-78) suggested that it represented a less sedentary population. The site also contained a Topanga II component, and obsidian hydration data (Meighan and Scalise 1988:244) may indicate the presence of a relatively recent (Topanga III?) third component.

Several other Topanga I components are known along the coast in the Malibu area. Excavations at the Sweetwater Mesa site, or CA-LAN-267 (Figure 1) east of Malibu Canyon, revealed many hundreds of millingstones (virtually all manos and metates) and core tools, as well as a cogged stone (King 1967). Marine shell from the Topanga I components was radiocarbon dated to 6310 ± 100, 6870 ± 100, and 6960 ± 100 RCYBP (King 1967:55; also see Gamble and King 1997:64). The Shobhan Paul site, or CA-LAN-958 (Figure 1), was situated on a knoll west of Point Dume "on the south-facing slope of an ancient

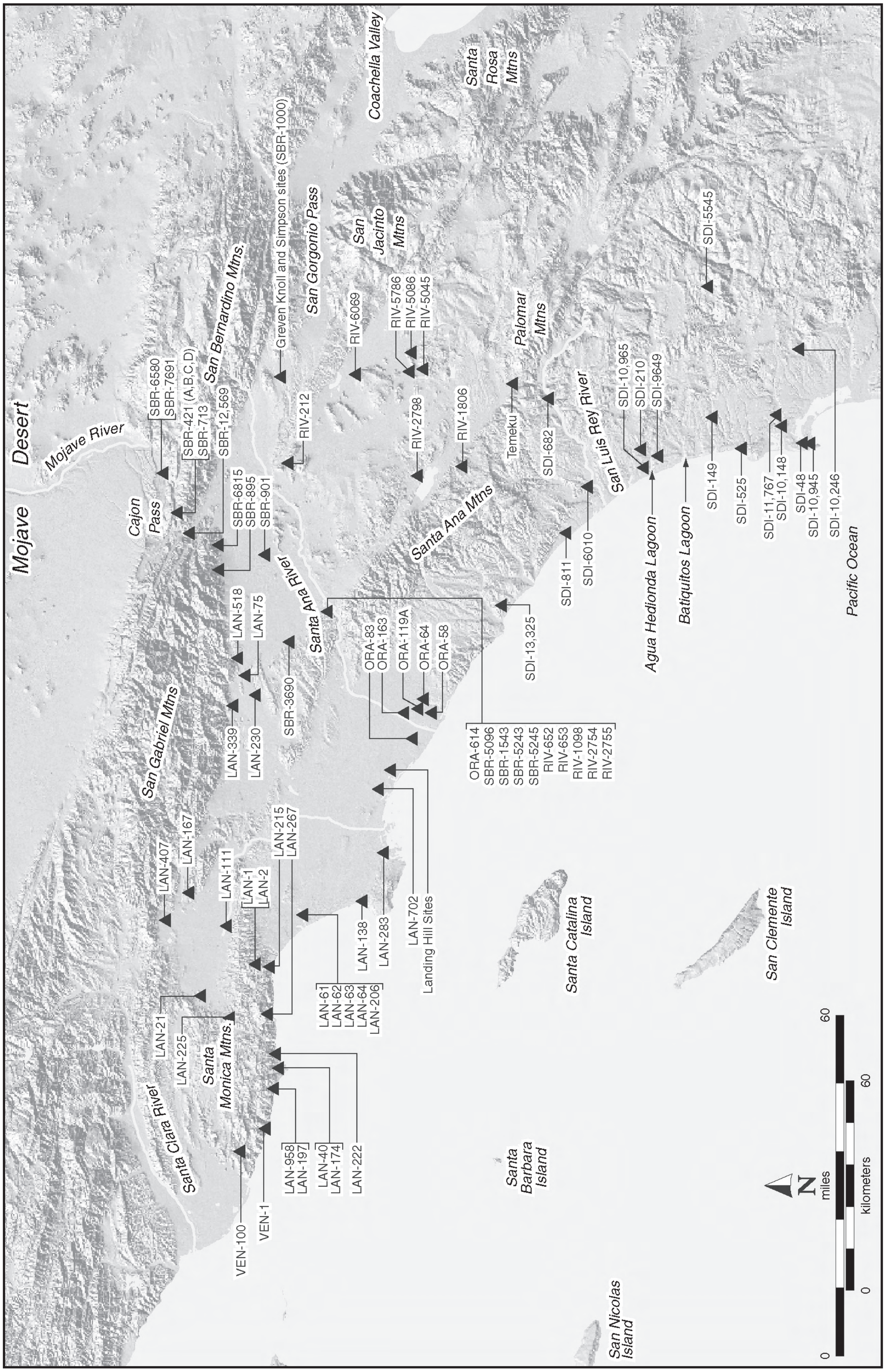

Figure 1. Location of sites and localities discussed in the text.

marine-cut terrace of the Santa Monica Mountains" (Salls 1995:1). The artifacts recovered included many manos and metates, large side-notched and lanceolate points, and some obsidian specimens, as well as other artifact types. Based on the artifact collection, Porcasi (1995:60) proposed that the site represented an early Millingstone (i.e., Topanga I) occupation. More recently, radiocarbon assays on marine shell placed the date of the Shobhan Paul site between 8,200 and 5,100 BP (Porcasi and Porcasi 2002:24). Excavations at the Parker Mesa site, or CA-LAN-215 (Figure 1), at the mouth of Topanga Canyon resulted in the recovery of manos, metates, scrapers, discoidals, and a variety of other artifacts that placed the site within Topanga I (King 1962). No inhumations were reported from any of these sites.

A few other Topanga I components are known in the Santa Monica Mountains area, although they are not thought to have been occupied much earlier than ca. 7,500 BP (King et al. 1968:99). Among these is the Century Ranch site, or CA-LAN-225 (Figure 1), which contained manos, metates, mortars, pestles, core tools, cogged stones, and discoidals (King et al. 1968; Leonard 1971). Burials under cairns of metates were also present.

In the San Fernando Valley just east of the Santa Monica Mountains, the Encino site (CA-LAN-111) (Figure 1) apparently contained a Topanga I component (Rozaire 1960). Materials recovered included manos, metates, scraper planes/scrapers, core tools, a plummet-shaped charmstone, a lozenge-shaped object (see Sutton and Koerper 2009), three discoidals, a cogged stone, a few points, but no faunal remains (Rozaire 1960:318). In addition, a single inhumation thought to represent a reburial was discovered at the site (Rozaire 1960:320). The discovery of the early "Millingstone"

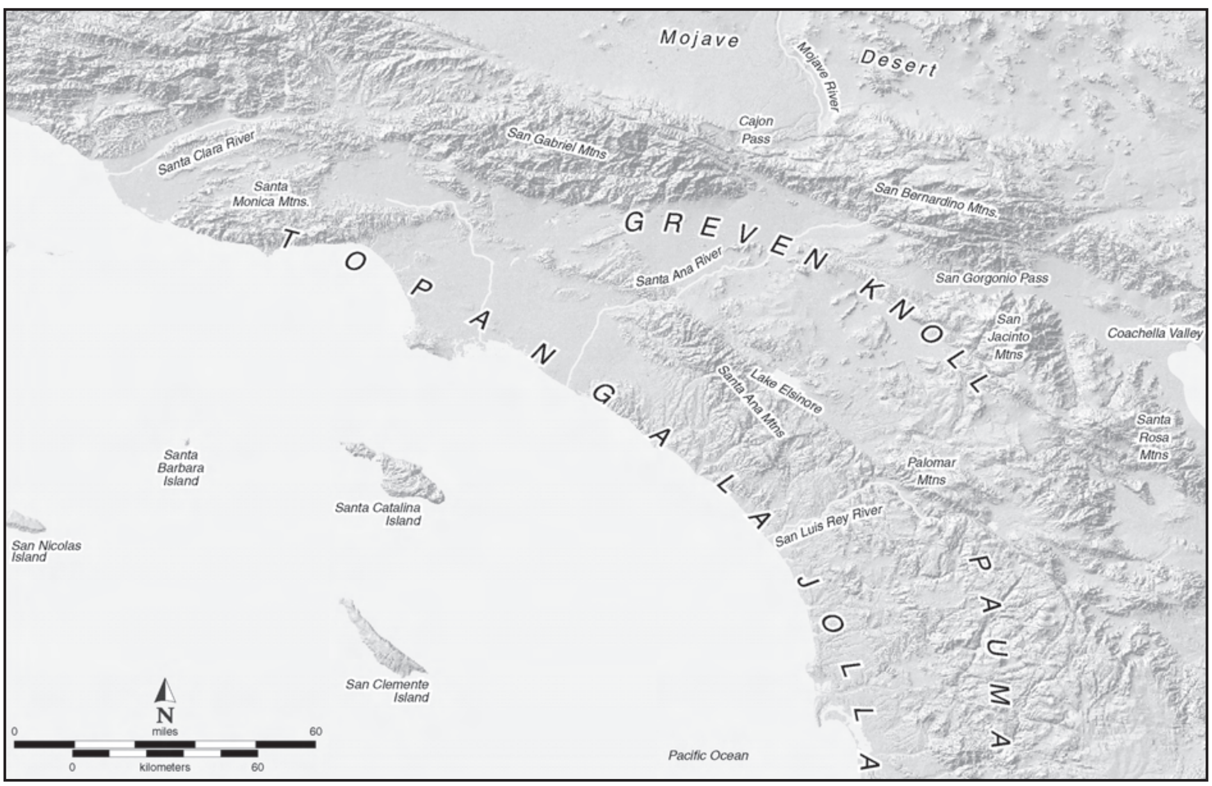

Figure 2. Generalized extent of the Encinitas Tradition and named patterns in southern California.

component at the Encino site led Kowta (1969:Figure 5) to use the term "Encino" to refer to this manifestation, but that term was never adopted.

Along the coast, farther to the south, there is also some evidence of a Topanga I occupation in the Ballona wetlands near Marina del Rey. Early archaeological surveys in this area identified a series of 15 sites in the upper Ballona with artifact collections that included cogged stones, a few large projectile points, and large numbers of ground stone artifacts (Farmer 1936; Rozaire and Belous 1950; Lambert 1983). Sufficient work has been done in this area to begin a reconstruction of Topanga settlement and subsistence systems (see Altschul et al. 2007).

Excavations at three sites located on top of the bluffs overlooking the Ballona wetlands have produced artifacts of apparent Topanga I affiliation. At the Bluff site (CA-LAN-64) (Figure 1), discoidals and cogged stones were recovered, but all were found in the upper, post-3,000 BP component at the site (Douglass et al. 2005). An earlier component was present, however, as evinced by shell features radiocarbon dated between 8,200 and 7,000 BP. The discoidals and cogged stones are believed to have originated from this earlier component, perhaps moved via bioturbation.

At the adjacent Del Rey site, or CA-LAN-63 (Figure 1), an apparent Topanga I component was discovered that produced two cogged stones, discoidals, and stemmed points (Van Horn 1987; Altschul et al. 2005). This site also had a substantial late component, however, suggesting the possibility that the cogged stones and discoidals originally came from the nearby LAN-64 site and that no Topanga I component actually existed at LAN-63.

The nearby Berger Street site (CA-LAN-206) (Figure 1) had three components (Van Horn and White 1997; Van Horn et al. 2003). The lowest, Component C, contained relatively few artifacts, including manos, metates, one "early" discoidal, five cogged stones (see Van Horn 1983:Figure 2b; Van Horn et al. 2003:Plate III, top; also see Eberhart 1961:369), but no mortars or pestles. Both shellfish and marine fish remains were abundant in Component C. A radiocarbon assay of 6750 ± 80 RCYBP was obtained on shell. Faunal utilization appears to have changed later in time in Component B (Topanga II?) where shellfish drop out and terrestrial animals become important (Van Horn et al. 2003:Tables 4 through 10, Figure 3; also see Altschul et al. 2007:Figure 3; Van Galder et al. 2007). The upper component (A) at the site again appeared to be different in that it had little bone but contained obsidian, fire-affected rock, a projectile point, and debitage (Van Horn et al. 2003:22).

While it appears that there was at least an ephemeral Topanga I occupation of the bluffs, there is very little to suggest any major Topanga I occupation of the lower Ballona wetlands (Ciolek-Torrello and Douglas 2002). Considerable research has revealed no Topanga I components on the lagoon edge, as well-developed marshes were apparently absent. The picture that emerges is one of brief forays to the lagoon from campsites on the bluff tops overlooking the bay. In small mobile groups, Topanga I residents of the Ballona exploited near shore and lagoonal fish and shellfish. Suitable conditions for permanent settlements might have existed in the nearby Baldwin Hills (Altschul et al. 2005).

Still farther south, the deeply stratified Malaga Cove site (CA-LAN-138) (Figure 1) is located on the northern end of the Palos Verdes Peninsula on a high point overlooking Santa Monica Bay a few miles south of the Ballona (Walker 1937, 1951; Wallace 1984, 1985, 1986). The Malaga Cove site was excavated in the 1930s and 1950s and contained four levels (components?). The lowest was Level 1, perhaps reflecting a San Dieguito component, and it produced a variety of materials, including shellfish remains, lithics, large points, microliths, worked shells, bone tools, and hammerstones, but no millingstones. Also within Level 1 were the remains of a variety of sea mammals, shellfish, and birds, including those of a flightless bird (diving goose [*Chendytes lawi*]) not then extinct as had been previously thought (Walker 1951; also see Moratto 1984:132; True 1987). Level 2 contained manos, metates, discoidals (Farmer 1953:178), knives, scrapers, and hammerstones (Walker 1937:213), and it was identified as a Millingstone (e.g., Topanga I?) component.

Six radiocarbon dates are available from Malaga Cove: two (7130 ± 0 [an unusual sigma] and 6510 ± 200 RCYBP) (Breschini et al. 1990:13) are fairly early while the others are post-2,000 BP. Johnson (1966:21) noted that the 6,510 date was obtained "from shell equatable with the next level below (level 1)," but Flint and Deevey (1960:201) reported that the sample came from "the next-to-lowermost soil horizon that contains evidence of human occupation, that being Level 2" (also see King 1967:63). Two inhumations were reported from Level 2 of Malaga Cove, both of which were loosely flexed (Wallace 1985:141), a possible Topanga II trait.

A number of Topanga I components have been identified in coastal Orange County (Koerper et al. 2002: Figure 5.2). The best known of these is (ORA-83) (Figure 1), or the "Cogged Stone Site" (Herring 1961, 1968), so named for the hundreds of cogged stones discovered there. The site is located on Bolsa Chica Mesa in Huntington Beach and is radiocarbon dated to at least 9,000 BP (Couch et al. 2009:148). Excavations by Herring (1968) produced more than 200 cogged stones. Later excavations conducted by Muñoz (1975) produced metates, manos, cogged stones, a discoidal, and a perforated "spindle-shaped" charmstone, as well as numerous scrapers and a small quantity of manufacturing tools (e.g., cores, hammerstones, blades). More recently, several caches of cogged stones have been discovered at the site, as well as one that contained both cogged stones and discoidals (Couch et al. 2009), along with 39 early discoidals, more than 50 plummet-like charmstones of various shapes, 281 manos, and a small number of metates, pestles, and projectile points. The large number of cogged stones (> 500, some collected by amateurs) found at Bolsa Chica suggests that the site was a major center for the manufacture of cogged stones. The primary function of the site remains unclear, but the Topanga I component certainly involved a sacred space of some kind.

Continuing south, on a bluff above Newport Bay in Orange County, a number of components were identified at the Irvine site, or CA-ORA-64 (Drover et al. 1983) (Figure 1), including a possible San Dieguito component, a Topanga I component, and several later components. Drover et al. (1983:Table 1) reported 22 uncorrected radiocarbon dates on marine shell, ranging between 8445 ± 280 and 4900 ± 80 RCYBP. More recently, Erlandson et al. (2005:Table 1; also see Macko 1998:Table 2) reported 14 calibrated radiocarbon dates on *Olivella* shell beads that ranged between 9,420 and 7,780 BP (also see Macko et al. 2005:93). Clearly, the Irvine site is one of the oldest shell middens on the west coast.

The Topanga I component at ORA-64 was identified by the presence of numerous manos and metates, charmstones, two cogged stones, several hundred late discoidals (Macko 1998:Table 22), ceramic effigies (Drover 1971, 1975), and a few points (Drover et al. 1983:53; Macko 1998:102-103). Mortuary patterns included cairn burials (Drover et al. 1983) and inhumations (as many as 600, many of which were flexed). One flexed inhumation was dated to 6,435 RCYBP, and a crescent was also discovered in association with the inhumation (Drover and Spain 1972:43; also see Drover et al. 1983:18-19), making it the earliest flexed burial known in the Los Angeles/Orange County area. The Topanga I component of the Irvine site also included obsidian from several sources, including one in northeastern California, demonstrating extensive trade during the Early Holocene (Erlandson et al.

2005; Fitzgerald et al. 2005; Macko et al. 2005; Sutton and Koerper 2009). The faunal remains from the site led Drover et al. (1983:47) to argue that there was “a breadth of animal use which has not generally been considered a feature of the Milling Stone Horizon.”

In sum, a number of sites with Topanga I components have been discovered adjacent to or within a few miles of the Los Angeles and Orange county coastlines, with very few being located inland (but see Cottrell 1978a). The number of sites exceeds that of the preceding San Dieguito Tradition (usage following Warren 1968:1), perhaps indicating a growth in population or possibly a reduction in the size of group territories. The adoption of mano and metate technology indicates a shift in or expansion of diet from that of the San Dieguito, perhaps due to population increases, environmental parameters, or both. Most Topanga I sites have been interpreted as temporary camps used by highly mobile groups. It is possible that the various Topanga I sites represent the settlement pattern of a single population with an extensive seasonal round (Moratto 1984:130). Such a pattern would not be unlike that suggested for the preceding San Dieguito Tradition.

The Topanga Pattern, Phase II

About 5,000 years ago, Topanga mortuary patterns changed, as flexed inhumations became common (although there are a few known from Topanga I) while reburials, some beneath inverted metates, continued (e.g., Treganza and Bierman 1958; Johnson 1966). Technological changes also occurred, and the adoption of mortar and pestle is a major technological marker of this phase. Artifact assemblages of Topanga II sites include manos, metates, scrapers, core tools, discoidals, charmstones, cogged stones, and a larger number of projectile points than in Topanga I assemblages. Koerper et al. (2006:121) noted that most cogged stones in Orange County have been recovered from sites along the Santa Ana River drainage, especially at Bolsa Chica. They suggested that these artifacts may have been scavenged from Topanga I sites, particularly from Bolsa Chica, and were distributed over a wider area during the later Topanga II phase (Koerper et al. 2006:121).

Topanga II was first identified at the Tank site (LAN-1) as the stratum above the Topanga I component (Treganza and Malamud 1950; Treganza and Bierman 1958). Topanga II is differentiated from Topanga I by a reduction in the percentage of manos/metates and scraper planes, the addition of mortars/pestles and flexed inhumations with no specific orientation, a reduction in the size of projectile points, fewer core tools, the presence of stone features (some associated with human remains), the appearance of shaped and incised stones, and “late” discoidals (as defined by Underbrink and Koerper [2006:117][1]) (Johnson 1966:19; Moratto 1984:127). Shellfish, and presumably acorns, became more important during this time. Johnson (1966:16) proposed that the exploitation of yucca was an significant element of Topanga II economies (but see below).

Along the Los Angeles coast, a number of sites can be assigned to the Topanga II phase. Zuma Creek (CA-LAN-174) is a Topanga II site located on a mesa northwest of Point Dume along northern Santa Monica Bay (Peck 1955). At this site, manos, metates, possible basket hopper mortars, scrapers, projectile points, core tools, cogged stones, discoidals, stone balls, and possible charmstones, among other artifacts, were recovered. By far the most common artifacts (excluding debitage) were manos (n = 109), with projectile points making up only a small fraction of the collection (n = 10). Flexed inhumations, extended inhumations, and reburials under cairns were also present at the site (Littlewood 1960; King 1967). A radiocarbon date of 4950 ± 200 RCYBP (King 1967:62) was obtained from the site. The Zuma Mesa site, or CA-LAN-40 (Ruby 1961) (Figure 1), is similar to the nearby Zuma Creek site, although a larger number of scrapers were identified at Zuma Mesa. The Zuma Mesa site was tentatively dated by comparing it to other dated sites with similar assemblages (Ruby 1961:202).

The artifacts recovered from Paradise Cove (CA-LAN-222) (Figure 1), a site located on the northeast side of Point Dume at the edge of the Santa Monica Mountains, included manos, metates, scrapers, and core tools, as well as a few leaf-shaped, stemmed, and side-notched projectile points (King 1967:61; Gamble and King 1997:64). There were also inhumations at the site, most of which were extended (more typical of Topanga I) although some were flexed. In the excavation area, the site was "literally paved with millingstones," under which were the inhumations (King 1967:61). One of the extended inhumations was radiocarbon dated to 4300 ± 80 RCYBP (King 1967:61).

There were also inhumations capped with millingstones at the coastal La Jolla Valley site, or CA-VEN-100 (West 1979) (Figure 1) located in the western Santa Monica Mountains. This site yielded manos, metates, mortars, and pestles, as well as preserved house floors. It was radiocarbon dated to 3830 ± 225 RCYBP (Gamble and King 1997:65). Other sites along the Los Angeles County coast with Topanga II components include the San Pedro Harbor site, or CA-LAN-283 (Butler 1974) (Figure 1) and CA-LAN-702 (Cottrell 1978b) (Figure 1) near Seal Beach, neither of which contained identified human remains.

In the Marina del Rey area, evidence of a small Topanga II occupation in the Ballona is present at several sites on top of the bluffs, including CA-LAN-61, -63, -64, and -206 (Van Horn and Murray 1985; Van Horn 1987; Van Horn et al. 2003; Altschul et al. 2005; also see Douglass et al. 2005) (Figure 1), continuing the Topanga I settlement pattern. However, a small Topanga II component was found at CA-LAN-62, located in the lowlands just below the bluff sites (Altschul et al. 2005), suggesting some change in settlement pattern. Although Topanga II groups apparently did live along the margins of the wetlands, those occupations seem to have been ephemeral (Ciolek-Torrello and Douglas 2002).

Component B at the Berger Street site (LAN-206) (Figure 1) may be Topanga II, as it is stratigraphically superior to an apparent Topanga I component (Van Horn and White 1997; Van Horn et al. 2003). Component B yielded abundant milling equipment (more than in the earlier Component A [Van Horn et al. 2003:22]), but no mortars or pestles. Marine fish were important; shellfish remains decreased, and terrestrial animals became important (Van Horn et al. 2003: Tables 4 through 10, Figure 3; also see Van Galder et al. 2007).

In the western end of the San Fernando Valley, the Chatsworth site, or CA-LAN-21 (Walker 1939, 1951) (Figure 1), may have contained a Topanga II component, although it was not well dated. Two large groups of cairns (A and B) were interpreted as mourning features. Group A generally consisted of cairns of tools broken up into hundreds of pieces (Walker 1951:96). Artifacts in Group A included manos, metates, hopper mortars, "medium-sized" bowls, large round bowls, small pestles, two discoidals, hammerstones, small arrow points, worked bone, plus beads, comals, and incised slabs of steatite (Walker 1951:99). In addition, some cremated human bone was found associated with Group A. Group B generally consisted of large unmodified sandstone slabs covering inhumations, possibly secondary. Artifacts in Groups B included manos, hopper mortars, "medium-sized" sandstone bowls, large "flowerpot" bowls, large pestles, hammerstones, three stemmed points, and ornaments of stone and bone. Walker (1951:100) believed that the two clusters dated to two different time periods. The cairn burials and stemmed points of Cluster B suggest a Topanga II connection. Subsequent investigations suggested that at least some portion of the site (Group A?) postdated 2,000 BP (Tartaglia 1980:xv, 318).

In the eastern end of the San Fernando Valley, the Big Tujunga Wash site, (CA-LAN-167) (Walker 1951) (Figure 1), might also contain a Topanga II component. The northern end of the site contained some 15 inhumations discovered associated with rock cairns and many broken artifacts (manos, bowls, pestles, and mortars) (Walker 1951:112). All the projectiles found in that area were "atlatl" points (Walker 1951:116). Walker (1951:116) believed that this northern end was earlier than the rest of the site, which contained cremations, arrow points, and steatite artifacts, all indicative of later occupations (Walker 1951; also see Ruby 1966; Wlodarski 1991; Becker 1999; Wheeler 2004:88).

The nearby Porter Ranch site (CA-LAN-407) (Figure 1) also appears to have had a Topanga II component, as the artifact assemblage included numerous metates, many of them ritually "killed" by knocking out the bottom of the depression; a few manos; one mortar; two stone balls; and two "atlatl" points (Walker 1951:22-25). No human remains were reported from LAN-407.

Topanga II components are also known in coastal Orange County, and they are sometimes considered to be part of "an expansion of settlement to take advantage of new habitats [kelp beds and estuaries] and resources [shellfish and fish] that became available as sea levels stabilized between about six and five thousand years ago" (Mason et al. 1997:58; also see Masters and Aiello 2007). The Banning-Norris site (CA-ORA-58) (Figure 1) is a large, stratified site along the lower Santa Ana River that was initially excavated in the 1930s by Winterbourne (1968a) and later by Dixon (1968, 1970). The lower component of the site dated to about 3,700 BP (Dixon 1970:63), and an upper late component was also present. The site yielded manos; metates; shell beads and ornaments; cogged stones, including one cache of three (Dixon 1968); late discoidals; plummet-shaped charmstones; stone balls (four associated with inhumations and three in a cache); a variety of other unusual artifacts; at least two cremations; and 37 inhumations (Anonymous 1938; Koerper et al. 1996; Macko et al. 2005).

At Landing Hill in Seal Beach (Cleland et al. 2007) (Figure 1), four of the five sites that were excavated produced numerous manos and metates, fewer mortars and pestles, hammerstones, cores, bifaces, and charmstones. Numerous inhumations (mostly tightly flexed, a few loosely flexed or extended) and a few cremations were also documented. The varied faunal remains from these sites were regarded as reflecting "generalized use of estuary, near shore, and local terrestrial habitats" (Cleland et al. 2007:329). Numerous radiocarbon assays indicated major occupations between about 5,500 and 3,000 BP (Cleland et al. 2007:329). Other sites in the area have produced similar radiocarbon dates (e.g., Whitney-Desautels 1997; York and Underwood 2002). Additional sites in coastal Orange County with potential Topanga II components include CA-ORA-119A (see Figure 1) in the Newport Bay area (Koerper 1979, 1981; Koerper and Drover 1983) and the Griset site (ORA-163) (Figure 1) in Costa Mesa (Winterbourne 1968b; Koerper et al. 1996).

Of considerable interest in southern California prehistory is the existence of a Middle Holocene interaction sphere, now called the Western Nexus (Sutton and Koerper 2009). Originally proposed by Howard and Raab (1993; also see Raab et al. 1994; Vellanoweth 1995, 2001; Jenkins and Erlandson 1996; Raab and Howard 2002; Kennett et al. 2007), the Western Nexus is viewed as an interaction sphere that linked southern California with the northwestern Great Basin between about 5,100 and 4,500 BP. Artifacts linking these regions include *Olivella* grooved rectangle (OGR) beads, large bifaces, stone balls, and lozenge stones (see Sutton and Koerper 2009). Western Nexus artifacts have been found in a number of Topanga II components, such as at ORA-64 (Macko 1998; Macko et al. 2005), and the distribution of these artifacts through space and time in southern California suggests a Topanga II involvement. Interestingly, however, OGR beads have been found on a number of the southern Channel Islands, which have no other apparent linkage to mainland Topanga II groups. The implications of these discoveries are unclear.

Phase II of the Topanga Pattern ended about 3,500 BP when it was replaced by a new population that migrated into the Los Angeles Basin, the Takic (Sutton 2009). The details of this intrusion and replacement are not fully understood, and the implications of that event have not been fully explored. It seems that some Topanga groups were not replaced but survived in the Santa Monica Mountains until about 2,000 BP.

The Topanga Pattern, Phase III

Topanga III is suggested herein to represent a "relic" Topanga II population isolated in the Santa Monica Mountains by the movement of Takic peoples from the north into coastal Los Angeles and Orange counties about 3,500 BP (see Sutton 2009). These "surviving" Topanga II groups became Topanga III by being isolated from other (e.g., Greven Knoll III) Encinitas groups by the Takic expansion, and they persisted until about 2,000 BP (Johnson 1966:20), at which time they were finally replaced by the Gabrielino or Chumash (e.g., Sutton 2009). Interestingly, Leonard (1971:123) argued that the Millingstone Horizon (Topanga III) in the Santa Monica Mountains lasted until ca. 500 years ago.

Topanga III traits include a continuing abundance of manos, metates, and core tools, an increase in the number of mortars and pestles, a greater number and wider variety of projectile point types, flexed inhumations (some beneath rock cairns), and the introduction of stone-lined earthen ovens (Johnson 1966:19). As Johnson (1966:19) pointed out, however, there was little change in the morphologies of the core tools and grinding implements between Topanga I and Topanga III, with the exception of pestles that exhibited more "embellishment by Phase III times." Johnson (1966:4) suggested that the ovens were used to bake yucca or agave. Similar features containing carbonized yucca as well as other botanical resources have also been found in the central Transverse Ranges, with most occurring between about 2,300 and 800 BP (Milburn et al. 2008:6, 20).

Johnson (1966) identified a Topanga III component at CA-LAN-2 that produced rock-lined ovens and seven flexed inhumations (also see discussion of this site in Hale [2001:79-90]). LAN-2 also yielded abundant metates, manos, scraper planes, and hammerstones, as well as a few choppers, small and large points, pestles, a crescent, and a few mortars. Radiocarbon dates for LAN-2 ranged between 2,700 and 2,440 BP (Johnson 1966:15). Based on these dates, Johnson (1966:20) proposed that Topanga III began about 3,000 years ago. He also thought that LAN-2 "represents the end of the Milling Stone Horizon in the vicinity of Los Angeles" or was even "transitional between the Milling Stone and Intermediate Horizons" (Johnson 1966:21).

The Trancas Canyon Cemetery site, or CA-LAN-197 (Thomas and Beaton 1968; Martz 1984) (Figure 1), is located on the coast west of Malibu Beach at the mouth of Trancas Canyon. The cemetery consisted of more than 100 extended inhumations, most of which were oriented generally south with no obvious social differentiation by sex or age (Thomas and Beaton 1968:171, Table 1). No cremations were reported at the site. The artifact collection included manos, metates, mortars, pestles, large projectile points, a spire-lopped *Olivella* bead, and bone tools, most of which were associated with the burials (Gamble and Russell 2002:119). A radiocarbon date of ca. 2,300 BP was obtained on a *Haliotis* shell associated with one of the burials (Thomas and Beaton 1968:167). The artifact assemblage is consistent with a Topanga III assignment, but the presence of extended burials suggests a change in mortuary practices.

Some scholars believe that there was a hiatus between 3,000 and 1,400 BP in the area around the Santa Monica Mountains, "followed by an influx of Shoshonean (Takic) groups into the coastal zone" (Ciolek-Torrello et al. 2006:32; also see Moratto 1984). On the other hand, such a proposed hiatus may be a function of sampling bias, since there have not been sufficient archaeological studies in southern California to support this argument (Grenda et al. 1998a; Ciolek-Torrello et al. 2006).

The La Jolla Pattern of the Encinitas Tradition

Along the San Diego coast, the Encinitas Tradition is represented by the La Jolla Pattern (see Figure 2), for which three phases (La Jolla I, II, and III) have been defined. Many researchers in San Diego County, however, prefer to collapse the time between San Dieguito and the introduction of small projectile points and pottery (roughly between 8,500 and 1,300 BP) into "a massive, chronologically undifferentiated cultural unit" (Warren et al. 2008:30), while some (e.g., Gallegos 2002) use the terms Early, Middle, and Late Holocene and/or Early Period and Late Period to encompass this span of time. Most recently, Warren (2008:36, Table 4) defined four chronological periods (I through IV) for western San Diego County and proposed several "cultural assemblages" for each, including San Dieguito and La Jolla.

We agree with Warren (2008:85) that the collapse of so many thousands of years into a single cultural entity defeats the purpose of determining change in cultural systems through time and obscures variability in the archaeological record of San Diego County. Therefore, we advocate a return to the use of the La Jolla pattern name as a more effective way to describe cultural assemblages and to detect change along the San Diego coast. One of the difficulties in doing so is that for the past few decades most San Diego researchers have not used these terms to describe sites they have investigated, and it is often problematic to determine under which phase such components would fall if we attempted to reassign them. Thus, the discussion of particular sites for these phases is necessarily brief, especially for La Jolla II and III.

Generally speaking, the La Jolla Pattern along coastal San Diego County is characterized by a major reliance on shellfish, fishing in rocky near shore areas and kelp beds, heavy exploitation of lagoons, seed gathering, and some terrestrial hunting. Animal bones tend to be rare at La Jolla sites, reinforcing the original idea that hunting was not very important in the Encinitas Tradition. Gallegos and Kyle (1991:iii) suggested that this paucity of bone might be due to poor preservation or perhaps to the "schlepp effect" (see Daly 1969:149) and that hunting may have been more important than is currently thought (also see Sutton 1993). La Jolla sites are typically located on terraces around lagoons or bays (e.g., Moratto 1984; Masters and Gallegos 1987; Gallegos 1992; Byrd and Raab 2007; Warren et al. 2008:78). Warren (1964; also see Warren 1967:234-236) suggested that La Jolla groups employed a central-based wandering pattern (e.g., Beardsley et al. 1956:138).

The La Jolla Pattern, Phase I

Beginning about 8,500 BP or perhaps 8,200 BP (Warren et al. 2008:37), the La Jolla Pattern emerged, representing the early Encinitas Tradition in coastal San Diego County. La Jolla I spanned about the same time as Topanga I to the north, although there were some differences in adaptation, cultural assemblages (e.g., the absence of cogged stones at La Jolla I sites), and mortuary practices (e.g., the presence of some extended inhumations in La Jolla I). Evidence of maritime adaptations along coastal San Diego County and the southern Channel Islands date to perhaps as early as 9,000 BP (but some older sites might be buried or inundated). These early sites are commonly situated alongside ancient coastal lagoons and on coastal terraces (Masters and Gallegos 1987; Warren et al. 2008:57). Warren et al. (2008:57) suggested that La Jolla (herein called La Jolla I) became “the primary cultural pattern” after about 7,200 BP.

La Jolla I artifact assemblages include basin metates, manos, flaked cobble tools, choppers, scrapers and scraper planes, Pinto-like points, and tarring pebbles for use in sealing basketry (Moriarty 1966:21; Koerper et al. 1991:44; Byrd and Raab 2007:218; Warren et al. 2008:24-25). Shellfish and plants appear to have been the most important resources, while hunting and fishing were less important (Byrd and Raab 2007:219; but see Noah 1998). Malcolm Rogers (1945:172) noted that “unsegregated interment without mortuary offerings” was the primary mortuary pattern, and loosely flexed inhumations were more common than extended or secondary inhumations (also see Moriarty 1966:21; Warren 1968:2; Koerper et al. 1991:44). Warren et al. (2008:24) clarified that there were occasional mortuary goods, including shell beads.

Warren et al. (1961:28) and Warren and Pavesic (1963:420) proposed that La Jolla I reflected a migration of inland groups from the desert sometime prior to 7,500 BP as the desert became drier during the Altithermal (also see Osborne 1958:48). The closing stages of La Jolla I came about as the estuaries silted in, a paleoenvironmental event that may have precipitated a population decrease along the coast, with inland adaptations taking hold in the river valleys (Warren et al. 1961:25). On the other hand, Byrd and Raab (2007:220) argued for continuity in coastal occupation throughout the Middle Holocene and into the Late Holocene.

The Scripps Estates I site, or CA-SDI-525 (Moriarty et al. 1959; Shumway et al. 1961) (Figure 1), was excavated by Malcolm Rogers in the 1930s and again by Moriarty and his colleagues in the 1950s and 1960s. Materials recovered from the site included abundant shellfish remains, many manos and metates, scraper planes, scrapers, choppers, hammerstones, a few shell beads, and a single projectile point, suggesting a La Jolla I affiliation. A cemetery with at least 46 inhumations (mostly flexed) was also present (Moriarty et al. 1959:194). Radiocarbon assays on shell provided dates of 5,500, 6,700, and 7,300 BP (Moriarty et al. 1959:198-199). A later analysis of the collection was conducted by Hale (2001:48-59), who concluded that the site contained a typical La Jolla assemblage and reflected intense but sporadic occupation. The presence of flexed inhumations may indicate some linkage to La Jolla II.

The Whelan Lake site (CA-SDI-6010) (Figure 1), a La Jolla I seasonal camp, was discovered about seven miles from the coast on the San Luis Rey River (Vanderpot et al. 1993). The site produced a relatively sparse collection of flaked stone (n = 23, excluding debitage) and ground stone (n = 15) that included a single Pinto-like projectile point, hammerstones, cores, choppers, biface tools, scrapers, metates, and manos. Also recovered from the site were Coso and Obsidian Butte obsidian, yucca macrofossils, marine shell, and the remains of marine mammals and fish (Vanderpot et al. 1993). Radiocarbon dates on shell produced results ranging between 7730 ± 100 and 6980 ± 100 RCYBP (Vanderpot et al. 1993:88). No human remains were discovered at the Whelan Lake site. The Harris site (CA-SDI-149) (Figure 1), frequently referred to as the type site for the San Dieguito Tradition, also contained a La Jolla I component (Warren and True 1961; Warren 1966, 1967; Moratto 1984:147).

Studies around Batiquitos Lagoon (e.g., Crabtree et al. 1963) (Figure 1) have demonstrated the presence of more than 170 sites representing San Dieguito (but see Warren et al. 2008:82-85), La Jolla, and Yuman occupations. Numerous dated sites (from 8,500 to 3,500 BP) and artifact comparisons led Gallegos (1987:24, 30) to suggest that San Dieguito developed into La Jolla I on the coast and into Pauma I inland (also see Moriarty 1967; Kaldenberg 1982). A number of sites at Camp Pendleton, some of which produced human burials, also contained La Jolla I components (e.g., Byrd 1996, 1997, 2000; York et al. 1999; Reddy 2000; also see Byrd and Raab 2007:Table 14.1).

The Ballast Point site (CA-SDI-48) (Figure 1) on Point Loma on San Diego Bay was occupied for more than 5,000 years, roughly between 6,600 and 1,300 BP, a time spanning most of the La Jolla Pattern (Gallegos and Kyle 1998). The site yielded data regarding chronology, diet, subsistence change, seasonality, and use of maritime resources. Shellfish was important, but fish and marine mammals were also major dietary constituents, which is unusual for La Jolla sites (Gallegos and Kyle 1998:191). Two radiocarbon dates (4940 ± 100 and 6000 ± 100 RCYBP) provided evidence of a La Jolla I component. The Ballast Point site "reflects what apparently was the most specialized adaptation to marine resources achieved by peoples of the La Jolla cultural pattern" (Warren et al. 2008:88). Given the dominance of maritime resources exploited at the Ballast Point site, Gallegos and Kyle (1998:201) thought that the site was related, at least in terms of economic activity, to the Campbell Tradition of the Santa Barbara area.

Several sites with La Jolla I components were excavated at Agua Hedionda Lagoon (Figure 1) in northern San Diego County, including CA-SDI-210 (Moriarty 1967), the Allan O. Kelly site (CA-SDI-9649) (Koerper et al. 1991), and Windsong Shores (CA-SDI-10,965) (Gallegos and Carrico 1984; Gallegos 1991). Radiocarbon assays dated SDI-210 between about 9,200 and 7,000 BP, Allan O. Kelly between 7,500 and 7,000 BP, and Windsong Shores between about 8,000 and 7,000 BP (see Gallegos 1991:22). No burials were reported from any of these sites.

The connection between the earlier San Dieguito and later La Jolla Pattern is unclear (see Warren et al. 2008:85-86). Some researchers (Bull 1983, 1987; Gallegos 1987:24, 30; Grenda 1997) have proposed that San Dieguito and La Jolla were functional variants of the same culture because the dating of some La Jolla sites appeared to overlap with some San Dieguito sites. Moriarty (1967), Warren (1967), Kaldenberg (1982), Chartkoff and Chartkoff (1984), Koerper et al. (1991), and Warren et al. (2008) suggested that San Dieguito transitioned into La Jolla (ca. 7,500 BP), with a change in economic focus from hunting to seed gathering and processing using millingstones and shellfish exploitation. Smith (1987:68-69) argued that San Dieguito came from the deserts first, that La Jolla was a Millingstone culture that came south from the Los Angeles area, and that the "transition" from San Dieguito to La Jolla noted by proponents of a single developmental model was actually the time when Millingstone La Jolla groups moved south and replaced the desert San Dieguito groups.

Gallegos (1987:30) suggested that San Dieguito, La Jolla, and Pauma (spanning some 5,000 years) represented "one people." Warren et al. (2008:85) argued, however, that assuming Gallegos (1987) meant that statement in a literal biological sense (i.e., that San Dieguito, La Jolla, and Pauma were genetically related populations), it is not possible to determine biological relatedness from cultural (artifactual) data, and that "the San Dieguito, La Jolla, and Pauma cultural patterns have not yet been identified as a single people or single cultural system."

The La Jolla Pattern, Phase II

About 5,000 BP a number of cultural changes occurred, marking the end of La Jolla I and the beginning of La Jolla II. The distinction between La Jolla I and II (see M. Rogers 1945:172) is based primarily on changes in mortuary patterns, an increase in flaked stone implements, and a pronounced increase in artifact formalization. Subsistence appears to have diversified, possibly due to population growth. Such diversification included adoption of the mortar and pestle (while still retaining mano and metate technology) and an increase in the remains of some commonly occurring terrestrial mammals.

Sites with La Jolla II components are typically found on coastal terraces overlooking lagoons and bays (Warren et al. 2008:71). Both coastal and inland resources were exploited, particularly plants and small animals. Since some inland sites date to this time (e.g., Christenson 1981) and have artifact inventories similar to those on the coast, Warren et al. (2008:71) argued that there is little difference between inland (Pauma) and coastal (La Jolla) sites and that “the two areas must be considered culturally similar and historically related” (also see True 1958, 1980; Warren et al. 1961).

Artifact inventories from La Jolla II sites include manos and metates, discoidals, stone balls, an increase in the number and type of projectile points, scraper planes, and the addition of mortars and pestles (Moratto 1984:147). In terms of mortuary patterns, “burials became more segregated and true cemeteries were formed,” and inhumations were “marked with one or more inverted metates” (M. Rogers 1945:172; also see Moriarty 1966:22). Flexed burials and mortuary offerings (such as shell and stone ornaments) were common occurrences (Moriarty 1966:22; Warren et al. 2008:25; also see Davis 1976).

La Jolla II populations have been viewed as being relatively large and semisedentary, with a subsistence focus on the “resource-rich bays and estuaries” of the San Diego coast (Byrd and Raab 2007:219). Intensity of occupation varied along the coastal lagoons, where *Chione* exploitation increased through time while *Argopecten* exploitation decreased, probably reflecting increasing siltation of the lagoons (Gallegos 1992: Figure 12.2). Shellfish was the dietary staple, although plants were also important resources; hunting and fishing were probably less important subsistence activities (Byrd and Reddy 2002:44; Byrd and Raab 2007:220).

The Ballast Point site (SDI-48; see above) was occupied through La Jolla II but exhibited little change from the La Jolla I pattern. Shellfish, fish, and marine mammals continued to be important (Gallegos and Kyle 1998:191). As noted above, the Ballast Point site seems to represent a specialized adaptation to marine resources by La Jolla groups (Warren et al. 2008:88).

The La Jolla Pattern, Phase III

Phase III of the La Jolla Pattern spanned the period between about 4,000 and 1,300 BP. Many of the La Jolla III traits are similar to those of La Jolla II, with the addition of some traits reflecting Yuman influences from the east (Moriarty 1966, 1968; Moratto 1984:147). Inhumation remained the predominant mortuary practice. Cooley (1998:1; also see Moriarty 1966:23) argued that “the incipient intrusion…of Late Period characteristics” began about 2,500 BP, suggesting a period of transition between the end of La Jolla and the emergence of the later traditions of the Yuman and Takic peoples. Several sites within the Camp Pendleton Marine Corps Base along the northern San Diego coast appear to have contained La Jolla III components (see Byrd and Reddy 2002:Table 4.2; also see Byrd and Raab 2007), but there are few known La Jolla III sites in San Diego County outside of Camp Pendleton.

The apparent paucity of La Jolla III components in coastal northern San Diego County might be explained by a decline in lagoon and estuary resources, forcing some (but not all) of the population into other areas. This model, known as the “Coastal Decline Model” (e.g., Warren et al. 1961; Warren and Pavesic 1963; Gallegos 1985, 1987; Masters and Gallegos 1997; Byrd 1998; Cooley 1998; Rosenthal et al. 2001; Warren 2008) posits that at about 3,500 BP, lagoons, estuaries, and bays in northern coastal San Diego County began to silt in due to declining rainfall, resulting in a drop in productivity of lagoon resources, especially shellfish. While some people could have remained, the decline in resources would have forced some of the population to move away from the lagoons and into other areas to exploit plants and small animals. These other areas could include inland areas east of the lagoons, or even coastal areas to the north (see Byrd 1998) or the south (see Cooley 1998:1). It seems that the lagoons became more productive again after about 1,500 BP and that population increased at the same time (Warren 2008).

At CA-SDI-13,325, situated near the mouth of San Mateo Creek within Camp Pendleton (Figure 1), a "small but diversified" assemblage was discovered (Rosenthal et al. 2001:185), including a few cores and choppers, manos and metates, bone tools, and shell beads, but no projectile points and no burials (Byrd et al. 1995; also see Rosenthal et al. 2001). Radiocarbon dates ranged between about 2,500 and 1,800 BP. A second Camp Pendleton site (CA-SDI-811) (Figure 1), located along the coast near the mouth of Las Flores Creek, contained a few flake and core tools, a few bone tools and beads, one mano, one mortar, no points, and no burials (Foster 1999; see also Rosenthal et al. 2001). This site was radiocarbon between about 2,800 and 1,500 BP.

In support of his argument for a transitional period between La Jolla and later materials, Cooley (1998) cited the investigation of a shell midden site (CA-SDI-11,767) (Figure 1) located on a terrace adjacent to the lower San Diego River, about six miles from the coast. The artifact collection from this site consisted of metates, manos, bone tools, shell and stone beads, cores, scraper planes, scrapers, chopping tools, hammerstones, bifaces, retouched flake scrapers, and utilized flakes. The site also contained a rock feature and a flexed burial. Based on radiocarbon dates, the site was determined to have been occupied between about 2,000 and 1,500 years ago (Cooley 1998:2). The discovery of an *Olivella dama* bead necklace thought to have been associated with the burial prompted Cooley (1998:2) to propose "early interaction between the people of the La Jolla Complex and the earliest Yumans." Cooley (1998:2) noted a similar pattern at other sites near SDI-11,767, such as the later component at Ballast Point (Gallegos and Kyle 1998) and at CA-SDI-10,945 (Pigniolo et al. 1991), in that the collections from these sites also produced substantial La Jolla materials with a thin veneer of Late Period material.

Kyle (1995) documented a late La Jolla site at CA-SDI-10,148 (Figure 1), located near Mission San Diego de Alcala adjacent to the San Diego River. Numerous manos, a few metates, two bifaces, hammerstones, and cobble tools were recovered from the site and most of the artifacts were interpreted as "tools and debitage resulting from manufacture and use of groundstone resharpening tools" (Kyle 1995:207). Several features were also identified, including five hearths and an intact "living floor" (Kyle 1995:212-213). Food processing was thought to be the main activity at the site. No burials were reported at SDI-10,148. Radiocarbon assays dated the site generally between 2,250 and 1,130 BP.

The Pauma Pattern of the Encinitas Tradition

In inland San Diego County, the Encinitas Tradition is represented by the Pauma Pattern (see Figure 2 and Table 1), named for the Pauma Valley in which it was first identified and defined (True 1958:255; also see Warren et al. 1961; True 1980; True and Beemer 1982). Pauma assemblages are quite different from San Dieguito assemblages (True 1980:37) but are similar to those of the La Jolla Pattern with the exception that shellfish remains occur only rarely at inland sites (True 1980:37; also see Warren et al. 2008:71). Pauma components are known from a variety of areas in San Diego County (e.g., San Luis Rey River, Valley Center, Escondido, San Marcos, Green Valley, and Santa Margarita River) and exhibit "generally similar aggregates of artifacts… in generally similar environmental contexts" (True and Beemer 1982:233). Indeed, an examination of the geographic distribution of the Pauma Pattern (depicted in a general way in Figure 2) shows a tendency for Pauma sites to be in montane settings.

Pauma components in northern interior San Diego County (Table 2) are characterized by a high frequency of shaped manos, a predominance of basin metates over slab metates, and the occurrence of cobble tools as well occasional scrapers, discoidals, and stone balls (True 1958, 1980; Warren et al. 1961; True and Beemer 1982; True and Pankey 1985; also see McCown 1955). Flaked stone artifacts (e.g., knives, points) are relatively uncommon, and bedrock mortars, pottery, and small triangular projectile points are "conspicuous by their absence" (True and Beemer 1982:233; also see True 1958, 1980; Warren et al. 1961; True and Pankey 1985). As noted above, archaeological assemblages of the Pauma and La Jolla patterns are similar, indicating "some as yet undefined but close relationship…between the two" (True 1980:370), possibly even that Pauma is an inland variant of La Jolla (Warren et al. 1961, 2008:71).

The Pauma Pattern, Phase I

Pauma I was initially identified based on surface surveys (True 1958). Originally, Pauma Pattern assemblages were considered to be "specialized tool-kits" of the later San Luis Rey Complex (True and Pankey 1985:241). Along the San Luis Rey River, excavations at the Pankey site, or CA-SDI-682 (True and Pankey 1985; True at al. 1991) (Figure 1), yielded a collection dominated by "millingstones." Human skeletal remains associated with an inverted basin metate at the site suggested a link to La Jollan practices on the coast (True and Pankey 1985:241). Radiocarbon dating placed the early occupation of the Pankey site at about 5,500 BP. This indicated to True and Pankey (1985:241) that Pauma I was a separate entity from San Luis Rey.

The radiocarbon dates from the Pankey site were obtained on marine shell, a rare but present constituent. This indicates that marine resources had been a minor part of the subsistence regime (True and Pankey 1985:242) but were much less important than at La Jolla sites. It also suggests economic ties with coastal groups or seasonal use of interior areas by La Jolla groups (True and Pankey 1985:242). True (1980:37; True and Pankey 1985:240-241) thought that Pauma might be a contemporaneous inland version of La Jolla. Moreover, while there are similarities between Pauma and some elements of the earlier San Dieguito Tradition, True (1980:35) argued that this likely represented "previous or overlapping occupancy of the same geographic space" or reuse of some San Dieguito artifacts by Pauma groups (also see Gallegos 1987:27).

A Pauma (I?) component may be present at the Temeku site near Temecula (McCown 1955) (Figure 1). A relatively large number of manos and metates, several discoidals (McCown 1955:Plate 24 e, f), and a very small number of points (see McCown 1955:Plate 26 g-i) were found in the lower levels of the site. No dating of the site was conducted.

Pauma I has been dated between about 7,500 and 3,000 BP, but this is only a very general, almost speculative, estimate. Relatively little obsidian has been recovered from Pauma I sites, and trade patterns of Pauma I are unknown.

The Pauma Pattern, Phase II

Phase II of the Pauma Pattern has yet to be well defined, and its existence is poorly supported by any changes in cultural traits. Perhaps all that sets Pauma I apart from Pauma II is a general assumption that there must have been some change after the Takic expansion about 3,500 BP (see Sutton 2009).

At the end of Pauma II, however, there was a clear and sudden break in the archaeological record at around 1,300 BP, with the appearance of the San Luis Rey Complex (see True et al. 1991) in northern San Diego County and the Cuyamaca Complex (True 1970; also see McDonald and Eighmey 2008) in southern San Diego County. This break is evidenced by "obvious dissimilarities in artifact types and site locations" (True 1958:257) and indicates a replacement of Pauma II by San Luis Rey/Cuyamaca groups and/or a population decline. Following this break, there was little

Table 2. Comparison of Artifact Category Percentages Between the Pauma Pattern and Greven Knoll Phases of the Encinitas Tradition of Southern California.

Artifact	Pauma Pattern[a] (ca. 8,500-1,000 BP)	Greven Knoll I (ca. 8,500-4,000 BP)	Greven Knoll II (ca. 4,000-3,000 BP)	Greven Knoll III (ca. 3,000-1,000 BP)
manos	46.1	17.5	30.5	19.7
metates	13.2	11.9	18.1	8.6
pestles	–	–	0.4	2.2
mortars/bowls	–	0.7	0.1	1.0
misc ground stone	–	16.2	4.5	2.7
bifaces/points	6.1	9.8	6.5	4.7
core/core tools	2.5	10.8	16.7	12.8
scrapers	12.1	4.5	2.0	7.9
scraper planes	2.7	–	4.1	15.3
edge-modified flakes	9.1	7.7	6.1	7.8
hammerstones	5.9	8.4	8.2	11.8
cogged stones	–	–	0.1	0.1
discoidals	0.7	0.4	0.2	0.3
stone balls	0.7	0.1	0.5	–
donut stones	0.7	–	0.1	0.1
slate pins	–	–	0.1	–
pipes	–	–	0.1	–
ornaments	–	0.5	0.1	1.5
bone artifacts	0.2	7.9	1.2	2.7
quartz crystals	–	1.3	0.2	0.2
other	–	2.2	0.2	1.2
Totals	100	100	100	100

a. The Pauma Pattern is not well defined in the literature, particularly the break between Pauma I and II; therefore, in this table we have merged them. The numbers are derived from: Pauma Pattern (True 1980:Table 2); Greven Knoll I and II (Table 3, this article); Greven Knoll III (Table 4, this article).

occupation by Pauma II groups in San Diego County, suggesting that they were "most active just prior to or during the initial stages of the period of long drought, with only sporadic or extremely limited activities extending, perhaps, well into the dry period" (True 1958:257). This might explain why there are so few Pauma II components known.

One example of a Pauma II component is at Las Montanas, or CA-SDI-10,246 (Yohe and Chace 1995) (Figure 1), about a mile northwest of Jamul in San Diego County. This site, located on a tributary of Sweetwater River, yielded numerous manos and metates, a single early discoidal, a single projectile point, and possible scraper planes. Radiocarbon dates and obsidian hydration analysis indicated that the site was most intensively occupied between about 3,000 and 2,000 BP (Yohe and Chace 1995:83). Eleven of the 12 obsidian samples were sourced to the Coso Volcanic Field, with one from Obsidian Butte. No burials were found at the Las Montanas site.

A Pauma II component may be present at the Kelly site (CA-SDI-5545) (Chace and Sutton 1990), located near El Cajon Mountain northeast of San Diego (Figure 1). The materials recovered at SDI-5545 included manos and metates (no mortars or pestles), hammerstones, cores, scrapers, and faunal remains, including some marine shell. No discoidals were discovered, and a number of bedrock milling slicks were present.

The Greven Knoll Pattern of the Encinitas Tradition

Early Millingstone expressions in interior southern California developed coevally with similar manifestations along the coast (e.g., Topanga I and La Jolla I). In San Diego County, these interior cultural developments were initially identified as the Pauma Complex (True 1958:255), herein designated the Pauma Pattern (see above). The Early Millingstone archaeological record in the northern portion of interior southern California was not formally named but was often referred to as "Inland Millingstone," "Encinitas," or even "Topanga." In his description and discussion of the Sayles Complex (now designated Greven Knoll III; see below), Kowta (1969: Figure 5) used the term "Greven Knoll" to refer to the inland pre-Sayles Millingstone materials, which he dated between 5,000 and 3,000 BP. Thus, Kowta (1969) designated the late Millingstone as the "Sayles Complex" and used "Greven Knoll" to refer to the early inland Millingstone (Kowta 1969, Figure 5), but he did not include any discussion of how "Greven Knoll" was defined.

We propose that all expressions of the inland Millingstone in southern California north of San Diego County be grouped together as the Greven Knoll Pattern (see Figure 2) of the Encinitas Tradition (following Kowta [1969:Figure 5]) (also see Table 1). We divide Greven Knoll into three phases (I, II, and III) based on changes in cultural traits. The Sayles Complex defined by Kowta (1969) is herein renamed Greven Knoll III and represents the latest manifestation of the northern inland Encinitas Tradition (see below and Table 1). One of the traits that sets Greven Knoll apart from Topanga is the general absence of shell beads in Greven Knoll components, suggesting that Greven Knoll had little contact with the coast.

As noted above, Pauma components tend to be in montane settings. Interestingly, Greven Knoll sites tend to be in valley settings (see Figure 2). The importance of these geographic associations is uncertain, but it surely must have affected some aspects of the settlement and subsistence patterns.

The Greven Knoll Pattern, Phase I

Phase I of Greven Knoll is characterized by a dominance of manos and metates (but no mortars or pestles), core tools, hammerstones, large dart points (including Pinto points), flexed inhumations, and occasional cremations (e.g., Grenda 1998). Scrapers and scraper planes are notably absent or rare (see Tables 2 and 3). Greven Knoll I groups seem to have been influenced by Pinto groups from the Mojave Desert (e.g., Kowta 1969:39), as evidenced by similarities in their material culture. Greven Knoll I may have appeared as early as 9,400 BP and lasted until about 4,000 BP.

The type site for the Greven Knoll Pattern in general, and Greven Knoll I in particular, is the Greven Knoll site, located in the City of Yucaipa in San Bernardino County along the southern edge of the San Bernardino Mountains (Figure 1). Excavations were conducted at the Greven Knoll site in 1947 by Gerald Smith and at the adjacent Simpson site in 1948 by Gil Becker (see Hicks 1958; Martz 1977; Grenda 1998). These two sites are now subsumed under the *Yukaipa't* site (CA-SBR-1000) (Grenda 1998) as Locus 1 and Locus 2, respectively, but for the sake of clarity with the older literature, we follow Kowta's (1969) use of Greven Knoll and Hicks's (1958) use of Simpson as the names of two different sites (as they possessed different components).

The Greven Knoll site contained a single component (herein assigned to Greven Knoll I) that included many manos and metates but no mortars or pestles (Kowta 1969:39). There were also numerous projectile points (including Pinto points) as well as a few discoidals and cogged stones. In addition, a flexed inhumation with a possible cremation above it was discovered. Kowta (1969:39) thought that the Greven Knoll site had been occupied between about 5,000 and 3,500 BP.

The adjacent Simpson site contained two components, one late and one buried "Millingstone" component (herein assigned to Greven Knoll II). The materials recovered from the Simpson site consisted of mortars, pestles, side-notched points, and stone and shell beads (Grenda 1998:26). Using these data, Kowta (1969:39) suggested that "the coastal Milling Stone complexes extended to and interdigitated with the desert Pinto Basin Complex in the vicinity of Cajon Pass."

Several other sites that can be assigned to Greven Knoll I are known in the inland valleys. Smith (1942) reported "numerous" manos, as well as metates (but no mortars and pestles), expedient hammerstones, choppers, scraper planes and scrapers, and large projectile points (including Pinto points) from a group of small sites discovered near Bloomington just west of San Bernardino. Neither the number of sites nor their names were provided by Smith (1942), and none was dated. The general description of artifacts (none was quantified) generally indicates a Greven Knoll I assignment (although scrapers are not typical of Greven Knoll I).

The nearby San Sevaine site, or CA-SBR-6815 (Grenda et al. 1998b) (Figure 1), located near Fontana, also had a Greven Knoll I component. The site yielded manos and metates, core tools, and several unclassified points. Grenda (1998b:98) thought that the site dated between 8,000 and 7,000 BP and proposed that it represented an early influx of people from the Mojave Desert that had no contact with the coast, perhaps constituting one of the initial entrants into the area.

Farther to the southwest in the Prado Basin of the Santa Ana River Canyon, the "Cogstone Point" site (CA-SBR-5096) (Figure 1) produced manos and metates, a Pinto point, an unknown number of cogged stones and discoidals, a stone ball (reported from the site but not confirmed), and no scraper planes. This assemblage is consistent with Greven Knoll I (Macko et al. 1983; Langenwalter and Brock 1985; de Barros 1992; also see Goldberg and Arnold 1988).

In the Lake Perris area, several sites with apparent Greven Knoll I components have recently been investigated. The Diamond Valley Pinto site, or CA-RIV-5045 (McDougall 2001a:829) (Figure 1), contained two components. The early component (at Locus B) produced a variety of ground and flaked stone artifacts, a crescent fragment, and 12 projectile points (including Silver Lake and Pinto types) (see Table 3), consistent

Table 3. Comparison of Certain Artifact Categories from Selected Greven Knoll I and II Components.[a]

Artifact Type	Greven Knoll I					Greven Knoll II						
	RIV-6069 (AU-2)	Diamond Valley (RIV-5045)	Elsinore (RIV-2798/H)	San Sevaine (SBR-6815/H)	Avg % of Collection	SBR-7691	Diamond Valley (RIV-5045)	Siphon (SBR-6580)	Wilson (LAN-518)	Sassone (LAN-339)	Hi Card Ranch (RIV-1806)	Avg % of Collection
manos	38/14.1	19/4.1	30/12.2[b]	92/39.5	17.5	7/22.6	3/1.4	113/32.5	60/35.7	550/58.6	96/31.5	30.5
metates	32/11.9	65/14.2	18/7.3	33/14.2	11.9	8/25.8	27/12.3	56/16.1	49/29.2	80/8.5	50/16.5	18.1
pestles	–	–	–	–	0	–	–	8/2.3	–	–	–	0.4
mortars/bowls	–	–	5/2.0	2/0.8	0.7	–	–	1/0.3	–	–	–	0.1
misc ground stone	74/27.4	54/11.9	44/18.0	18/7.7	16.2	3/9.7	21/9.5	14/4.0	3/1.8	7/0.7	4/1.2	4.5
bifaces/projectile pts	14/5.2	73/16.0	31/12.7	12/5.2	9.8	2/6.5	30/13.6	20/5.7	4/2.4	4/0.4	31/10.2	6.5
core/core tools	19/7.1	60/13.2	21/8.6	33/14.2	10.8	9/29.0	37/16.8	68/19.6	3/1.8	50/5.3	86/28.2	16.7
scrapers	14/5.2	54/11.9	2/0.8[c]	–	4.5	–	26/11.8	–	–	–	–	2.0
scraper planes	1/0.4	–	–	–	0	–	4/1.8	6/1.7	20/11.9	85/9.1	–	4.1
edge-modified flakes	18/6.7	60/13.2	14/5.7[d]	12/5.2	7.7	1/3.2	42/19.1	13/3.7	2/1.2	52/5.5	12/3.9	6.1
hammerstones	18/6.7	37/8.1	21/8.6	24/10.3	8.4	–	16/7.3	29/8.3	26/15.5	105/11.2	22/7.2	8.2
cogged stones	–	–	–	–	0	–	–	–	–	1/0.1	–	0.1
discoidals	3/1.1	–	–	1/0.4	0.4	–	–	–	1/0.6	1/0.1	1/0.3	0.2
stone balls	–	–	–	1/0.4	0.1	1/3.2	–	–	–	–	–	0.5
donut stones	–	–	–	–	0	–	–	–	–	1/0.1	2/0.6	0.1
slate pins	–	–	–	–	0	–	–	3/0.9	–	–	–	0.1
pipes	–	–	–	–	0	–	–	2/0.6	–	–	–	0.1
ornaments	4/1.5	–	1/0.4	–	0.5	–	–	2/0.6	–	–	1/0.3	0.1
bone artifacts	23/8.6	33/7.2	39/15.9	–	7.9	–	14/6.4	3/0.9	–	–	1/0.3	1.2
quartz crystals	–	–	13/5.3	–	1.3		–	5/1.4	–	–	–	0.2
other	11/4.1	–	6/2.5	5/2.1	2.2	–	–	5/1.4	–	–	–	0.2
Totals	270/100	455/100	245/100	233/100	100	31/100	220/100	348/100	168/100	938/100	304/100	100

a. By number/percentage of collection (partly adapted from Basgall and True 1985:10.7-10.8).
b. Grenda (1997:172) made a distinction between manos and hand stones, suggesting that the latter are distinguished by a lesser degree of manufacture and differences in the amount of use wear. We do not make that distinction here and have combined the total number of manos and hand stones from Grenda (1997:Table 65). The artifact tabulations and percentages for this site were taken from Locus C only, as that is the locus where the Greven Knoll component was discovered.
c. Grenda (1997:198-199) referred to all scraper-type artifacts (including scraper, scraper-graver, scraper-knife, scraper-spokeshave) generically as unifaces, but assigned function where possible; at Locus C, two of the four unifaces were further defined as a “scraper/knife” and a “scraper/graver.” The other two unifaces from Locus C were of unknown function and are included in the “other” category in this table. Of the 21 unifaces defined as some type of scraper, all but the four from Locus C (and three others) came from Locus B, the earliest component of the site, dated at 8400 ± 60 RCYBP.
d. Defined as “flake tools” by Grenda (1997:209), but as having modified edges.

References: CA-RIV-6069 (Horne and McDougall 2008); Diamond Valley (McDougall 2001a); Elsinore (Grenda 1997; Towner et al. 1997); San Sevaine (Grenda et al. 1998b); CA-SBR-7691 (Parr et al. 2000); Siphon (Sutton et al. 1993); Wilson (Wasson et al. 1978); Sassone (Eberhart and Wasson, 1975); Hi Card Ranch (McCarthy 1986). The McCue site (McDonald et al. 1987) is not included since it is an uncontrolled collection.

Note: The Greven Knoll and Simpson sites are not included in this table because their artifacts were not clearly reported as belonging to one or the other site (Hicks 1958), but they are the sites from which the newly named Greven Knoll Pattern is taken because that is where it was first identified. Moreover, the Greven Knoll site was identified as having the earliest component of the two, with the Simpson site having a later component (Hicks 1958; Grenda 1998).

with a Greven Knoll I assignment. The Locus B component was dated between 7,200 and 5,600 BP (McDougall 2001a:Table 8-14). The upper component (at Loci A and B), viewed here as Greven Knoll II, yielded a variety of artifacts (see Table 3), including three points (two Pinto series), and was dated between 4,000 and 3,000 BP (McDougall 2001a). All of the sourced obsidian from both components came from the Coso Volcanic Field to the north (McDougall 2001a:Table 8-16). The site was interpreted as a residential location.

The nearby CA-RIV-5086 site (McDougall 2001b) (Figure 1) contained two components. The first (Stratum I) included an apparent paleosol dating to the Late Pleistocene or Early Holocene (McDougall 2001b:832). Cultural materials included ground stone fragments and a Lake Mojave point. This component might represent a Greven Knoll I occupation. This component was dated to about 9,000 BP by projectile point cross-dating and two radiocarbon assays (9190 ± 50 RCYBP and 9310 ± 60 RCYBP) on charcoal from the stratum soils.

A later component at RIV-5086 (Stratum II) (McDougall 2001b) yielded Pinto and Elko points, 13 ground stone items (manos, metates, unidentified fragments), 70 flaked stone tools (mostly core and flake tools), debitage, some obsidian (all sourced specimens were from the Coso Volcanic Field), and a few faunal remains. The assemblage indicates a Greven Knoll assignment, and the presence of both Pinto and Elko points suggests the possibility that Stratum II was a mix of Greven Knoll I and II components.

An isolated flexed burial, dating to 8,128 cal BP, was discovered at the neighboring CA-RIV-5786 site (Wyss 2001:242) (Figure 1). This burial was that of a male who was tightly flexed and interred under a cairn of three large basin metates. It is the earliest known burial from the region (Wyss 2001:242), and the mortuary type is characteristic of Greven Knoll I.

Of great interest is the CA-RIV-6069 site (Horne and McDougall 2008) (Figure 1), now also known as CA-RIV-8712, Locus D (Lerch and Cannon 2008), located in the Lakeview area southeast of Lake Perris. Three occupational components were identified at the site (Horne and McDougall 2008; Lerch and Cannon 2008), the earliest of which (the lower component) was dated between about 9,400 and 8,900 BP (Horne and McDougall 2008:91). The site was then apparently abandoned until a brief reoccupation at about 7,500 BP (the middle component). The uppermost component dated between about 2,300 and 2,100 BP (Horne and McDougall 2008:91). RIV-6069 is one in a group of sites (some of which contained cultural deposits of up to 4 m deep) within an area of more than 75 acres having late prehistoric surface artifacts such as ceramics, along with milling features such as bedrock metates and mortars as well as red pictographs.

The two lower components at RIV-6069 were combined for analysis into Analytical Unit 2 (AU-2) by Horne and McDougall (2008:100). AU-2 included many manos and metates, hammerstones, three discoidals (but no cogged stones), several dozen possible ceramic artifact fragments (see Horne and McDougall 2008:249), several bifaces, cores, faunal remains (including some marine shell), several possible *Olivella* beads, and a possible *Haliotis* pendant fragment. The AU-2 assemblage (see Table 3) is typical of a Greven Knoll I component. As noted above, the lowest component dated between about 9,400 and 8,900 BP (Horne and McDougall 2008:91), suggesting that the date of the inception of the Greven Knoll Complex may be a millennium earlier than is currently believed.

The presence of an apparent ceramic industry in the Greven Knoll I component at RIV-6069 is of particular interest. Several dozen pieces were found, including figurine and vessel fragments (see Griset 2008). These specimens are the earliest known in California. Other early ceramics were recovered at ORA-64 (Drover 1971, 1975; Macko et al. 1998), dated as early as 7,700 BP, and several other early (ca. 5,000 BP) fired clay artifacts were found at the Little Harbor site (CA-SCAI-17) (Drover 1978:81). Additional ceramics of similar antiquity from other sites will be needed to develop an interpretation of these materials.

A long Holocene occupation was represented at the Lake Elsinore site, or CA-RIV-2798 (Grenda 1997; also see Lerch and Smith 1984) (Figure 1). A radiocarbon date of 8100 ± 60 RCYBP from Locus B, as well as early bead types and crescents from other areas of the site, established the presence of an Early Holocene occupation (Grenda 1997:276). In addition, two radiocarbon dates (4800 ± 60 and 4750 ± 70 RCYBP) from feature contexts at Locus C provided evidence of an early to middle Holocene transitional occupation. The Lake Elsinore site assemblage (see Table 3) contained a high percentage of manos and metates compared to projectile points, as well as numerous cores, bifaces, unifaces, flaked tools, hammerstones, several metate caches, and an inhumation consisting of the scattered remains of an adult individual (Grenda 1997:96). This assemblage is considered herein to be typical of Greven Knoll I. The presence of a natural and stable lake at the site "was probably the main factor that drew people to its shores" (Grenda 1997: xix). According to Grenda (1997:287), however, there was little evidence to indicate that the site inhabitants "were ever forced to rely on lake resources because of a failure in terrestrial resources."

A number of distinctions can be made between the early Encinitas (Topanga I) manifestations along the coast and those in the interior valleys and mountains (Greven Knoll I). One of the major technological changes between Topanga I and II on the coast was the adoption of the mortar and pestle about 5,000 BP, but it appears that this technology was never adopted to any significant degree by inland Encinitas peoples, possibly reflecting their closer relationship with desert groups who did not exploit acorns. Further, an abundance of scraper planes is a marker for Topanga I (Treganza and Bierman 1958), but such artifacts are rare in Greven Knoll I assemblages (see Table 2). Also, since Greven Knoll I sites are located away from the coast, they do not contain shellfish remains. Other differences between Greven Knoll I and Topanga I, such as settlement patterns and subsistence practices, remain to be identified.

The Greven Knoll Pattern, Phase II

Sometime around 4,000 BP, several changes to Greven Knoll I artifact assemblages mark the transition to Greven Knoll II (see Table 2). Manos, metates, core tools, a few late discoidals, a paucity of scraper planes, flexed inhumations, and rare cremations remained traits in Greven Knoll II. Important changes (see Table 2) included an increase in the percentage of manos and a decrease in the percentage of points and bone tools. Elko points appeared, although Pinto points were still used. The reason for the addition of Elko series points is not clear, since both Pinto and Elko forms were likely intended as atlatl dart points and no new weapons technology (e.g., the bow and arrow) was introduced during this time. Significant contact with desert groups continued, but there is little evidence of contact with the coast. Greven Knoll II is not well represented in the archaeological record. It appears to have dated between about 4,000 and 3,000 BP.

One interesting difference between Greven Knoll I and II is the relatively larger number of manos recovered from Greven Knoll II sites (see Table 3). This suggests that processing of certain resources, such as small seeds or small animals, may have been an important element in Greven Knoll II economies. It is also possible that the treatment of the manos themselves changed, as the higher percentage of miscellaneous ground stone during Greven Knoll I could indicate that ground stone was being reprocessed in some manner, making manos more difficult to recognize. The mortar and pestle technology adopted along the coast by Topanga and La Jolla groups was not generally embraced in the interior by Greven Knoll II groups.

It appears that many Greven Knoll sites contain both Greven Knoll I and II components, suggesting that settlement patterns did not change substantially between these two phases. As previously noted, Pinto points continued to be used, and Elko points were added to the tool inventory. Sites containing both Pinto and Elko points include the Sayles site (CA-SBR-421A) (Kowta 1969), some of the Crowder Canyon sites (CA-SBR-421C, -421D, and -713) (Basgall and True 1985), the McCue site (CA-RIV-112) (McDonald et al. 1987), and CA-RIV-5086 (McDougall 2001b) (see Figure 1).

A notable Greven Knoll II site is McCue (CA-RIV-1120) (McDonald et al. 1987) near Riverside. Unfortunately, the materials from the site were collected by vandals, and no formal excavations were ever conducted. The artifact collection included numerous manos and metates, no scraper planes or discoidals, 36 Elko points and two Pinto points, as well as a variety of other flaked stone artifacts. Interestingly, the obsidian was derived from sources to the north (e.g., Coso Volcanic Field, Bodie Hills, Mono Glass Mountain), with only one piece identified from Obsidian Butte to the south. Seventeen samples came from unknown sources, most likely "Apache tears" (lapillus) from the Mojave Desert (Bouey 1987). Clearly, the technological influences and trade contacts were principally with groups to the north. The assignment of this site as Greven Knoll II is admittedly tenuous.

In the inland valleys a number of sites contain Greven Knoll II components. Some of these are in Los Angeles and Orange counties but are considered expressions of Greven Knoll II rather than Topanga II due to the lack of shellfish remains and shell beads indicative of coastal contact. Located near La Verne, the Wilson site (CA-LAN-518) (Figure 1) produced many manos and metates (63 percent of the artifact collection), hammerstones, scraper planes (uncommon in Greven Knoll I and II assemblages), choppers, an anvil, a stone "disk" (probably a discoidal), and a few large unclassified point bases (Wasson et al. 1978). No chronometric data are available from this site, but the artifact assemblage suggests a Greven Knoll II assignment. Three other nearby sites, Mesarica (CA-LAN-230) (Eberhart 1962), Sassone (CA-LAN-339) (Eberhart and Wasson 1975), and Mud Springs (CA-LAN-75) (Cody 1988) produced similar assemblages (see Figure 1).

Farther south, in the Prado Basin of the Santa Ana River Canyon, a number of sites with apparent Greven Knoll II components have been investigated (see Goldberg and Arnold 1988). Two of these sites, CA-ORA-614 and CA-SBR-3690 (Figure 1), yielded few diagnostic materials but were thought to date between 4,000 and 3,000 BP (Macko et al. 1983). Later work in the same area (Langenwalter and Brock 1985) resulted in the investigations of seven sites thought to have "late Milling Stone or early Intermediate" components. The collections from these sites (CA-RIV-652, -653, -1098, -2754, and -2755; SBR-5243 and -5245) contained materials consistent with Greven Knoll II. Later excavations at RIV-653 and -1098 (Grenda and Gray 1997) supported this general assignment, herein classified as Greven Knoll II. Grenda and Gray (1997:57) considered these two sites to be loci of the same site, and a later component was indicated by radiocarbon dates from a hearth.

Two significant sites herein assigned to Greven Knoll II were excavated in the Summit Valley in the western San Bernardino Mountains. The first, the Siphon site (CA-SBR-6580) (Figure 1), is located at the headwaters of the Mojave River (Sutton et al. 1993). Siphon is a single-component site that contained a large number of manos and metates, a few mortars and pestles (unusual for Greven Knoll sites), numerous core tools, hammerstones, modified flakes, and a cremation associated with a metate cairn.

Two Pinto points and three "Summit Valley Barbed" points were recovered, the latter identified as a new type but "reminiscent" of the Elko series (Sutton et al. 1993:44). The site was dated by six radiocarbon assays within a tight time range (3,525 to 3,125 RCYBP; cal 3,875 to 3,325 BP), indicating that it was occupied within a fairly short time span of some 500 years. The desert influences at the Siphon site seem clear, but the site appears to be more closely related to southern California than to the desert, as is also the case for the nearby Crowder Canyon sites (Basgall and True 1985; Kowta 1969). The second Summit Valley site, CA-SBR-7691 (Parr et al. 2001) (Figure 1), was smaller but yielded similar materials, although no points were recovered. Based on obsidian hydration analysis and artifact comparison with the Siphon site, SBR-7691 seems to be contemporary with the Siphon site (Parr et al. 2001:20). Neither of these Summit Valley sites contained scraper planes, a major hallmark of the Greven Knoll III phase (formerly the Sayles Complex; see Kowta [1969] and discussion below). The presence of a cremation at the Siphon site, though a rare event in Greven Knoll sites, is not inconsistent with a Greven Knoll II assignment.

Farther south, on the Santa Rosa Plateau south of Lake Elsinore, the Hi Card Ranch site (CA-RIV-1806) (Figure 1) appears to have had a Greven Knoll II component, albeit a very late one. Artifacts included abundant manos and metates, a few Elko and Humboldt points, unifaces, cores, hammerstones, and a discoidal, but no Pinto points or scraper planes (McCarthy 1986). No discrete inhumations were found, but isolated human bones were present, one of which was radiocarbon dated to 2615 ± 100 RCYBP (2875 to 2675 cal BP) (McCarthy 1986:73). The artifact assemblage provided evidence that while the occupants focused their subsistence on plant resources, hunting was also a common activity (McCarthy 1986:73). Hi Card Ranch is probably at the southern geographic extent of Greven Knoll II; the presence of Elko points and Coso obsidian links it to the north.

The artifact assemblages from Greven Knoll II sites (Table 3) exhibit an interesting pattern. The highest percentages of manos, metates, and hammerstones are from the valley sites. The reason for this pattern is unclear but may be related to resource utilization, such as the exploitation of grasses (using manos and metates) and maintenance of those milling tools (using hammerstones). Although scraper planes are rare to absent in Greven Knoll II assemblages (Table 3), a few have been recovered from sites in valley settings, including Sassone (LAN-339) (Eberhart and Wasson 1975) and Wilson (LAN-518) (Wasson et al. 1978). Experimental work with scraper planes by Kowta (1969), Hester and Heizer (1972), and Salls (1983, 1985) demonstrated that these tools can be efficiently employed in pulping and shredding the fiber of yucca leaves; others have proposed that scraper planes were used to resurface manos and metates (e.g., Treganza and Bierman 1958).

Coincidentally, beginning about 3,500 years ago, there was significant cultural change along the Los Angeles/Orange County coast and the southern Channel Islands. Populations appear to have expanded, sedentism increased, subsistence patterns changed, and new artifact types appeared (e.g., Raab et al. 1995; Koerper et al. 2002). These changes coincided with the movement into southern California of Takic peoples, who replaced most of the Topanga II groups (see Sutton 2009). The inland Greven Knoll II groups were apparently not replaced; rather, they were cut off from interaction with coastal (Topanga II) groups, became "isolated," and adopted new subsistence strategies to usher in Phase III of the Greven Knoll Pattern (e.g., Kowta 1969:50).

The Greven Knoll Pattern, Phase III (formerly the Sayles Complex)

The final phase of the Greven Knoll Pattern of the Encinitas Tradition is Greven Knoll III, originally designated the Sayles Complex (Kowta 1969). The

Sayles assemblage defined by Kowta (1969) is clearly associated with the earlier Greven Knoll phases, so the Sayles Complex is herein renamed Greven Knoll III. Greven Knoll III traits include abundant manos and metates, Elko points, choppers, hammerstones, a few mortars and pestles, flexed inhumations under cairns, and only rare cremations. The appearance of scraper planes is a major marker trait for Greven Knoll III. A comparison of artifact assemblages from several Greven Knoll III sites is presented in Table 4.

The type site for Greven Knoll III is the Sayles site (SBR-421A) (Figure 1), excavated in 1965 and 1966 (Kowta 1969). Based on artifact frequencies (see Table 5), Kowta (1969:32-33) divided the deposit into upper and lower components (called "horizons" by Kowta), and he reported a major difference between the two components. The lower component contained a higher percentage of manos and metates, and the upper component contained more bifaces and points. Both components had similar percentages of cores/core tools, scrapers, scraper planes, and hammerstones. This suggests a change in the subsistence pattern, including an increase in hunting in the upper component. It is interesting that both Smith (1963:21-22, 269) and Kowta (1969:1, 11, 45, 87) mentioned cogged stones from the Sayles site several times, but neither provided much detail about them.

Due to the near absence of radiocarbon dates (but see below), a temporal assignment for the Sayles site is problematic. Kowta (1969:35) estimated that it was occupied between 3,000 and 1,000 BP, and it appears that there were several Gypsum points found at the site (Kowta 1969:Plate 3i-j). The assemblage from the lower component seems to equate to Greven Knoll II, while the upper component assemblage may represent Greven Knoll III. Interestingly, there were a fairly large number of small, unclassified projectile points present in both components, many of which are reminiscent of Rose Spring and Cottonwood forms (see Kowta 1969:Plate 3a-f). If so, this would indicate that some of the occupation of the site occurred after the introduction of the bow and arrow into the region.

Two other sites in Crowder Canyon (Basgall and True 1985) appear to be multicomponent. The first site, CA-SBR-421C (Figure 1), contained two cultural soil strata, the lower one (Stratum II) producing the majority of the artifacts. This component yielded abundant manos and metates, no mortars and only one pestle, fairly large numbers of core tools, scraper planes, and hammerstones, as well as Pinto (n = 2) and Elko (n = 5) projectile points (see Table 4). Also discovered were two caches containing milling equipment and a possible inhumation covered with a metate (see Basgall and True 1985:7.6). Some obsidian was recovered, most of which was sourced to the Coso Volcanic Field, although a few specimens came from Obsidian Butte. Based on obsidian hydration values, Basgall and True (1985:7.10) estimated an occupation between 2,800 and 1,650 BP, although a radiocarbon assay on charcoal collected from the soil in Stratum II yielded a date of 5,400 RCYBP (Basgall and True 1985:7.6). The lower component from SBR-421C is interpreted as Greven Knoll III (primarily due to the large number of scraper planes), although the presence of Pinto points could suggest a Greven Knoll II presence. The upper component may represent a later occupation of some kind.

The second multicomponent Crowder Canyon site, CA-SBR-421D (Figure 1), produced a smaller number of artifacts, but the overall assemblage was similar in character to SBR-421C (see Table 4). The obsidian was derived mostly from the Coso Volcanic Field, with a few specimens coming from Obsidian Butte. Radiocarbon dates placed the occupation between about 2,650 and 1,650 BP (Basgall and True 1985:8.47). As with SBR-421C, the presence of Pinto points and some of the obsidian hydration readings indicate a possible earlier component (Basgall and True 1985:8.13), perhaps Greven Knoll II.

Table 4. Comparison of Artifact Categories from Selected Greven Knoll III (Sayles) Components[a]

Artifact Type	Blue Cut (SBR-12569/H)	Sayles (SBR-421A)	Sayles (SBR-421B)	Sayles (SBR-421C)	Sayles (SBR-421D)	Ridge (SBR-713)	Pate Mesa (SBR-1543)	Liberty Grove (SBR-901)	Chaffey Hillside (SBR-895)	Average Percentage
manos	5/11.6	107/12.1	18/19.4	238/22.8	126/20.2	119/16.1	20/23.4	458/26.0	31/25.0	19.7
metates	3/7.0	32/3.6	1/1.0	61/5.8	29/4.7	35/4.8	25/29.3	162/9.2	15/12.1	8.6
pestles	7/16.3	–	–	1/0.1	1/0.1	4/0.5	1/1.1	4/0.2	2/1.6	2.2
mortars/bowls	2/4.7	–	–	–	1/0.1	6/0.8	–	–	4/3.2	1.0
misc. ground stone	3/7.0	1/0.1	–	23/2.2	11/1.8	11/1.5	6/7.0	48/2.7	2/1.6	2.7
bifaces/points	–	106/12.1	4/4.3	29/2.8	54/8.7	39/5.3	2/2.2	103/5.9	1/0.8	4.7
core/core tools	12/27.9	230/26.0	4/4.3	104/9.9	48/7.7	114/15.4	6/7.0	126/7.2	12/9.6	12.8
scrapers	1/2.3	120/13.6	12/12.9	111/10.6	88/14.1	75/10.1	3/3.5	56/3.2	–	7.9
scraper planes	1/2.3	160/18.1	26/27.9	285/27.3	96/15.4	125/16.9	4/4.6	48/2.8	27/21.7	15.3
edge-mod flakes	–	–	17/18.3	107/10.2	87/13.9	31/4.2	5/5.7	–	22/17.7	7.8
hammerstones	5/11.6	78/8.4	11/11.8	80/7.7	48/7.7	71/9.6	3/3.5	687/39.1	10/6.7	11.8
cogstones	–	1/0.1	–	–	–	–	–	6/0.3	–	0.1
discoidals	1/2.3	–	–	–	–	–	–	9/0.4	–	0.3
stone balls	–	–	–	–	–	–	–	–	–	–
donut stones	–	–	–	–	–	–	–	1/0.1	–	0.1
slate pins	–	–	–	–	–	–	–	–	–	–
pipes	–	–	–	–	–	–	–	–	–	–
ornaments	–	5/0.5	–	–	4/0.4	61/8.2	3/3.5	6/0.3	–	1.5
bone artifacts	3/7.0	–	–	1/0.1	–	49/6.6	7/8.1	46/2.6	–	2.7
quartz crystals	–	2/0.2	–	5/0.5	5/0.5	–	–	–	–	0.1
other	–	47/5.3	–	–	29/4.7	–	1/1.1	–	–	1.2
Totals	43/100	889/100	93/100	1,045/100	627/100	740/100	85/100	1,760/100	126/100	100

a. By number/percentage of collection.

References: SBR-12569/H (Sutton and Gardner 2008); SBR-421A (Kowta 1969); SBR-421B (Basgall and True 1985); SBR-421C (Basgall and True 1985); SBR-421D (Basgall and True 1985); SBR-713 (Basgall and True 1985); SBR-1543 (Langenwalter and Brock 1985); SBR-901 (Salls 1983); SBR-895 (Martz 1976; Allen 1982).

Table 5. Comparison of Artifact Categories by Component at the Sayles Site (SBR-421A).

Artifact Type	Lower Component			Upper Component			Overall Average[a]
	Locus A	Locus B	Average	Locus A	Locus B	Average	
manos	50/13.6	39/12.0	89/12.9	7/7.4	11/11.5	18/9.5	107/12.1
metates	15/4.1	15/4.7	30/4.3	2/2.1	–	2/1.1	32/3.6
pestles	–	–	–	–	–	–	–
mortars/bowls	–	–	–	–	–	–	–
misc ground stone	–	–	–	1/1.1	–	1/0.5	1/0.1
bifaces/points	48/13.1	26/8.0	74/10.7	26/27.7	6/6.2	32/16.8	106/12.1
core/core tools	95/25.9	94/28.9	189/27.3	13/13.8	28/29.2	41/21.6	230/26.0
scrapers	4813.1	39/12.0	87/12.6	16/17.0	17/17.7	33/17.4	120/13.6
scraper planes	61/16.6	65/20.0	126/18.2	15/16.0	19/19.8	34/17.9	160/18.1
edge-modified flakes	–	–	–	–	–	–	–
hammerstones	31/8.4	28/8.7	59/8.5	5/5.3	10/10.4	15/7.9	74/8.4
cogged stones	–	–	–	one from the site surface		1/0.1	1/0.1
discoidals	–	–	–	–	–	–	–
stone balls	–	–	–	–	–	–	–
donut stones	–	–	–	–	–	–	–
slate pins	–	–	–	–	–	–	–
pipes	–	–	–	–	–	–	–
ornaments	3/0.8	1/0.1	4/0.6	1/1.1	–	1/0.5	5/0.5
bone artifacts	–						–
quartz crystals	two specimens in unknown context						2/0.2
other	16/4.4	18/5.6	34/4.9	8/8.5	5/5.2	13/6.8	47/5.3
Totals	367/100	325/100	692/100	94/100	96/100	190/100	885/100

a. By number/percentage of collection.

Note: Compiled from Kowta (1969:Tables 4 and 5, also see Tables 7 and 8); the upper component extended from 0 to 12 inches at Locus A and 0 to 6 inches at Locus B; the lower component extended from 12 to 48 inches at Locus A and 6 to 48 inches at Locus B.

Additional excavations were undertaken at two other sites (CA-SBR-421B and -713) (Figure 1) in Crowder Canyon (Basgall and True 1985) that appeared to be single-component Greven Knoll III sites. SBR-421B yielded Greven Knoll III materials, including a few small projectile points. Some obsidian was recovered, all of which came from the Coso Volcanic Field. The hydration rim measurements on these specimens suggested that SBR-421B was occupied about 2,000 BP (Basgall and True 1985:6.16). No other chronometric data are available. The Ridge site (SBR-713) had a typical Greven Knoll III artifact inventory, including many scraper planes and a few mortars and pestles. Several Elko points were identified, and all the obsidian came from northern sources, primarily the Coso Volcanic Field. The Ridge site was interpreted as a general use site associated with the exploitation of plant materials (Basgall and True 1985:5.72). Based on a suite of seven radiocarbon dates, site occupation generally dated between 2,300 and 1,000 BP (Basgall and True 1985:5.15). The presence of mortars and pestles indicates an occupation a little later than others in the area.

Drawing on the work by Kowta (1969) and their own research, Basgall and True (1985:10.1-10.12) noted that (1) the Crowder Canyon sites generally date between 3,000 and 1,000 BP, but there may have been a small occupation as early as 4,500 BP at SBR-421C; (2) the sites were abandoned by 1,000 BP; (3) deer and jackrabbits were the primary faunal resources; and (4) plant resources played a key role in the subsistence regime. Based on data from both Kowta (1969) and Basgall and True (1985), it seems reasonable to propose that Greven Knoll II groups (and perhaps even Greven Knoll I groups) occupied the western San Bernardino Mountain region and were ancestral to Greven Knoll III groups, who seem to have occupied some of the same sites where Greven Knoll II groups had resided.

Excavations at the Blue Cut site (CA-SBR-12569) (Figure 1) in the Cajon Pass (Sutton and Gardner 2008) revealed a single-component site and resulted in the recovery of a small collection of manos and metates, a few mortars and pestles, a late discoidal, cores, hammerstones, one scraper, and debitage, but no projectile points (see Table 4). In addition, several "roasting pits" were discovered, but there were no caches of milling tools and no human remains. The assemblage reflects a Greven Knoll III component, although the absence of points and the presence of roasting pits are interesting and suggest that the site was a special-purpose locality. No temporally diagnostic artifacts were recovered. Radiocarbon assays obtained on charcoal from the roasting pits indicated that the site was occupied between about 1,800 and 1,300 BP.

A number of sites in the inland valleys of southern California appear to contain Greven Knoll III components. Grenda (1998) proposed that the *Yukaipa't* site, or SBR-1000 (see above), which possessed a protohistoric component (a Serrano village), also had a Millingstone component (possibly Greven Knoll II). The site is not reliably dated. It is possible that *Yukaipa't* also had a Greven Knoll III component, but this has not been clearly demonstrated. The presence of various trade items provided evidence that *Yukaipa't* was a major center in a wide-ranging trade and exchange system (Grenda 1998:110). The site also yielded a flexed inhumation with a cremation above it and "two or three" other flexed inhumations, all undated (Hicks 1958:5).

The Liberty Grove site (CA-SBR-901) (Figure 1) in the San Bernardino Valley above Cucamonga Creek produced many manos and metates, a few pestles, core tools, hammerstones, a relatively small percentage of scraper planes, cogged stones, discoidals, bone tools, two Pinto points, and a few unclassified projectile points (Salls 1983) (see Table 4). The abundance of manos and metates and the presence of scraper planes suggest a Greven Knoll III assignment, although the Pinto points and discoidals suggest the possibility of a Greven Knoll II component. A large number of hammerstones were found at Liberty Grove, by far the highest percentage of any Greven Knoll III component (see Table 4), perhaps reflecting metate rejuvenation activities. The site was radiocarbon dated between about 2,000 and 800 BP. Salls (1983:161-162) suggested that Liberty Grove, along with other small encampments in the area, was part of a central-based wandering settlement and subsistence pattern (cf., Beardsley et al. 1956:138). Salls (1983) further argued that data from the site supported Kowta's (1969) proposal that the "Millingstone" persisted much later in time in interior regions.

The Chaffey Hillside site (CA-SBR-895) (Martz 1976; Allen 1982) is located in the foothills of the San Gabriel Mountains, northeast of the Liberty Grove site (Figure 1). The SBR-895 collection included manos and metates, mortars and pestles, scrapers, highly fragmented large mammal bone, and a leaf-shaped point. The assemblage is typical of Greven Knoll III, but the virtual absence of projectile points and faunal remains may indicate that the site represents a temporary camp reflecting an emphasis on specialized plant processing (yucca and acorns) (Allen 1982:76; Salls 1983:151). Its proximity to the Liberty Grove site may signify that it was an ancillary site to a more permanent settlement at Liberty Grove (Allen 1982:76). A radiocarbon assay on midden-derived charcoal yielded a date of 1450 ± 70 RCYBP.

The Pate Mesa site (CA-SBR-1543) (see Figure 1), located in the Prado Basin area of the Santa Ana River Canyon, may have contained a Greven Knoll III component (Langenwalter and Brock 1985; also see Goldberg and Arnold 1988). Manos (n = 20), metates (n = 25), one pestle, several points, considerable faunal material (including marine shell), and four scraper planes were recovered from SBR-1543. Cogged stones, discoidals, and a stone ball were reported from the site by collectors in the 1930s, but these findings have not been confirmed (see Langenwalter and Brock 1985:7-41). The presence of scraper planes is suggestive of a Greven Knoll III component, although the percentage of metates seems high for Greven Knoll III (see Table 4). Obsidian data suggest an occupation several thousand years old.

A comparison of artifact inventories between Greven Knoll II and III components (see Table 2) shows that Greven Knoll III components have fewer manos and metates and more scraper planes, ornaments, and bone artifacts. Both phases typically lack mortars or pestles, cogged stones, and discoidals. This pattern was noted by Kowta (1969:33) for the Crowder Canyon area and appears to hold true across much of interior southern California.

Part of the definition of Greven Knoll III is a paucity of hunting-related tools, primarily projectile points. Interestingly, however, there were a fairly large number of small projectile points found at the Sayles site (SBR-421A) (Kowta 1969:Plate 3). Many of these points appear to represent Rose Spring and Cottonwood forms typically associated with the bow and arrow. Such technology is thought to have diffused into coastal southern California about 1,500 BP but is generally absent from Greven Knoll III sites, even those that were occupied as late as 1,000 BP.

In the vicinity of Perris Reservoir, Wilke (1974:22) noted the virtual absence of projectile points at sites prior to ca. 900 BP (also see Robinson 1998:36), supporting the idea that Greven Knoll III lacked points, perhaps because the bow and arrow had not yet diffused into the area. In that region, only Cottonwood points have been found, prompting Wilke (1974:22; also see Rogers 1945:172) to suggest that hardwood tips were used on arrows prior to the arrival of Cottonwood points.

There are several possible explanations for the scarcity of arrow points from many late Greven Knoll III components. First, it is possible that bow and arrow technology was adopted ca. 1,500 BP but that arrow points were made of wood rather than stone (e.g., Wilke 1974:22), so they have not been identified in the archaeological record. Second, there is the potential that the Takic disruption of Greven Knoll II groups, thought to have occurred ca. 3,500 BP, may have impacted inland social and political institutions to the point that Greven Knoll III hunters were isolated from the new bow and arrow technology until after 1,000 BP when Takic influences diffused into the region (e.g., Sutton 2009). This hypothesis of isolation is challenged, however, by the fact that Greven Knoll III groups apparently continued their use of obsidian from the Coso Volcanic Field between 3,000 and 1,000 BP. This obsidian may well have come by way of continued trade with groups in the Mojave Desert possessing the bow and arrow. It is also possible that trade for obsidian did not occur and that the obsidian used by Greven Knoll III groups was scavenged from earlier sites. Third, it may be that Greven Knoll III groups used so few projectiles that they simply did not adopt the available new technology.

One of the major differences between Greven Knoll II and III assemblages (see Table 2) is the relative abundance of scraper planes in Greven Knoll III components. Scraper planes were recognized early on as important Sayles (now Greven Knoll III) artifacts, prompting Kowta (1969) to suggest a subsistence focus on yucca. Kowta (1969:55) argued that scraper planes from these later components were functionally specific for processing agave and/or yucca and served as the basic tool for an adaptive strategy centered on these plants.[3] Yucca root is high in calories (160 per 100 g), carbohydrates, and potassium (e.g., see Ingram 2008).

Kowta (1969:52-53) also proposed that with the onset of the Altithermal and drier conditions along the coast, yucca exploitation spread coastward and was adopted by coastal (e.g., Topanga) groups (also see Johnson 1966:4, 16). There is now good reason to doubt this interpretation. First, Greven Knoll assemblages, dating to the same basic time as Topanga on the coast (although Greven Knoll may be earlier, as suggested by the dates from RIV-6069), generally contain few scraper planes while they are abundant in Topanga assemblages. Second, all the (few) scraper planes from the Siphon site (dated between about 3,875 and 3,325 BP) that were submitted for protein residue analysis tested negative for yucca proteins (Sutton et al. 1993) (also see above). Lastly, recent work on roasting features in the Transverse Ranges (Milburn et al. 2008) indicated that yucca did not become a major resource until after about 2,300 BP. Thus, it appears that scraper planes appeared earlier on the coast than in the interior. If scraper planes in Greven Knoll III sites were related to the exploitation of yucca, it may have been a relatively late phenomenon.

Finally, Greven Knoll III appears to have survived in the interior until about 1,000 BP (Kowta 1969). At about this time it was apparently replaced by a new cultural tradition of Takic influences moving east from the coastal region (Sutton 2009).

Summary and Discussion

The origin and nature of the Millingstone Horizon in southern California have long been intriguing issues. The first people in southern California appear to have arrived along the coast as early as 12,000 BP (e.g., Erlandson et al. 2007a). These maritime adapted (Paleocoastal) people had migrated down the coast from the north, as indicated by discoveries on the northern Channel Islands and the mainland coast of central California. Mainland sites of equivalent age have not yet been discovered in California south of roughly the city of Ventura. Thus, there is little evidence to indicate a significant Paleocoastal occupation in Los Angeles or Orange counties, although it is always possible that Paleocoastal sites lie undiscovered under alluvium (e.g., Erlandson 1994:259) or inundated along the coastal plain.

Given this scenario, it seems possible that the first people into coastal southern California (south of Ventura) were San Dieguito groups who moved west from the desert. If so, the Topanga Pattern could have developed in situ from that foundation, perhaps with influences from existing Millingstone groups on the central coast to the north (e.g., Kowta 1969; Grenda and Altschul 2002:140; Jones et al. 2002) or even in northern California (e.g., Wallace 1978; True et al. 1979; True and Baumhoff 1985). A similar situation might have taken place in the San Diego area with the transition from San Dieguito to La Jolla (e.g., Koerper et al. 1991). Early people may have just added millingstone technology to their technological inventory as changing conditions made small seeds more economical.

On the other hand, perhaps the initial Encinitas entity was the La Jolla Pattern that originated from a San Dieguito base along the San Diego coast. La Jolla could have moved north and rapidly developed a new manifestation, the Topanga Pattern. The La Jolla and Pauma patterns do appear to be somewhat earlier than Topanga, and an in situ development of Encinitas from a local existing San Dieguito foundation seems more likely than a migration of “Millingstone” groups from the desert to the coast. A San Dieguito presence in Los Angeles and Orange counties may be indicated by possible San Dieguito components at the Irvine site (ORA-64) and perhaps Malaga Cove (LAN-138).

Setting aside a central coast origin hypothesis, milling technology would have either developed in situ or been brought in via diffusion or migration. Milling equipment is rare in the earlier Lake Mojave Complex in the Mojave Desert and in the San Dieguito Tradition of southern California. Such technology is present but not a salient feature in Pinto assemblages in the Mojave Desert (Sutton et al. 2007:238). If milling equipment in southern California was derived from the Mojave Desert, it may have come in as early as 9,000 BP (see Sutton et al. 2007).

It is also possible that Greven Knoll may have developed from a San Dieguito base. Several early inland sites, such as those at lakes Perris and Elsinore, contained Lake Mojave and Silver Lake points. There is evidence to suggest that the Lake Mojave and Pinto complexes represent a single cultural tradition in the Mojave Desert (Warren 1991:264-267; 1994:113) or perhaps overlap in time (Sutton et al. 2007:237). If Greven Knoll I did develop from a San Dieguito (Lake Mojave) base, and Pinto represents a continuation of Lake Mojave, then Pinto Complex groups may have had a considerable influence on the development of early expressions of Greven Knoll.

Alternatively, it is possible that the early manifestations of Greven Knoll represent the actual migration of Pinto groups, probably Hokan (Moratto 1984:551), from the Mojave Desert as environmental conditions became increasingly xeric. The general view is that the Pinto Complex derived from the Lake Mojave Complex (Warren 1994:113) but that Pinto evolved a new settlement and subsistence system in response to the desiccation of the Pleistocene lakes. Relatively few Pinto sites are known in some areas of the Mojave Desert, however, and some earlier scholars had hypothesized that the Mojave Desert was largely abandoned during Pinto times (e.g., Wallace 1962:175; Shutler 1967:305). It may be that the relative paucity of Pinto materials in the Mojave Desert is due to the movement of Pinto groups into interior southern California very early, perhaps as early as 9,400 BP. This is consistent with the idea proposed by Taylor (1961:75) that Hokan groups migrated to the coast from the deserts sometime before or near the beginning of the Altithermal, possibly bringing Millingstone technology and culture with them (also see Moratto 1984:546-547).

If Pinto Complex groups from the Mojave Desert influenced the development of Greven Knoll I, or if actual Pinto groups migrated west and “became” Greven Knoll I, there should be similarities between Pinto and Greven Knoll manifestations (taking into account environmental differences). As previously discussed, milling equipment is present in Pinto assemblages in the Mojave Desert (Sutton et al. 2007:238), and it seems plausible that Pinto groups brought the technology with them into southern California. Both cremation and inhumation were practiced by Pinto groups in the Mojave Desert (Sutton 1996:231), traits also seen in interior southern California and on the coast after about 2,500 BP. Finally, Pinto points are present in both the Pinto and Greven Knoll I components.

If Pinto groups had such an important influence on Greven Knoll populations, then what may have been their influence on Topanga I? Topanga I and Greven Knoll I share several technological traits (such as metates and core tools) and differ in other traits (such as the Topanga I emphasis on shellfish). Each of these traits is either very general (millingstones) or geographically based (shellfish on the coast). A major difference between Topanga I and Greven Knoll I is mortuary practices, with Topanga I having secondary cairn burials and no cremations and Greven Knoll I having flexed inhumations and occasional cremations. Traits with more variables, such as mortuary patterns and basketry decorations, tend to be better cultural indicators than traits with fewer variables, such as basic milling technology. This difference in mortuary patterns suggests that Topanga I and Greven Knoll I represented different cultural groups and not just seasonal coastal and inland variants of the same group. Further, it suggests that Greven Knoll I was more closely related to Pinto.

Early Encinitas mortuary practices are worth further examination. As far as is currently known, the mortuary practices of La Jolla I and Greven Knoll I included flexed inhumations, but Topanga I did not. It may be that desert influences (e.g., flexed inhumation) penetrated everywhere across southern California except in the Topanga I area. Perhaps the early Encinitas Tradition had a "northern" variant (Topanga I) and a "southern" variant (La Jolla I). This would imply that Topanga I developed in situ from a San Dieguito base but that a population replacement of San Dieguito occurred elsewhere; that is, Greven Knoll and La Jolla groups (and Pauma?) could have been immigrants (e.g., Pinto groups?) from the desert. Flexed inhumations were finally adopted by Topanga II groups, suggesting the possibility of some sort of diffusion, migration, or combination thereof.

This is not to say that Topanga I and Greven Knoll I peoples were not in contact. Cogged stones are generally a Topanga I trait, the vast majority found at Bolsa Chica and at sites along and north of the Santa Ana River drainage (see above). The few cogged stones found in Greven Knoll I components probably reflect some contact or trade with coastal groups, although the paucity of shell artifacts in Greven Knoll I components indicates that such contact was limited. In addition, if Topanga I and Greven Knoll I represent different cultural entities and Greven Knoll I groups brought milling technology with them from the desert, then that technology must have diffused to the coast. This would probably have resulted in a change of subsistence patterns as well as settlement patterns (see Moratto 1984:163, 547).

As noted above, Warren (1968:6) outlined the ecological adaptation of the Encinitas Tradition as reflecting a well-developed collecting economy with evidence of hunting being infrequent. This has been viewed by many as representing a shift from hunting to plant processing. Many researchers have assumed that the presence of millingstones can automatically be interpreted as evidence of plant processing, but more recent research has shown that other resources, such as small animals, were also processed using this technology (Yohe et al. 1991). The "Millingstone equals plants" assumption led to the interpretation that Encinitas groups (particularly the Greven Knoll Pattern) intensified the exploitation of plant foods and de-emphasized the use of faunal resources. While this assumed resource shift was not seen as being as dramatic on the coast where shellfish and sea mammals were present (see Erlandson and Colten 1991), research into the subsistence facet of the inland Encinitas Tradition has tended to support this interpretation (e.g., Kowta 1969; Allen 1982; Salls 1983; Basgall and True 1985; McCarthy 1986).

Kowta (1969:56) argued that the Millingstone archetype originated in the desert with a subsistence focus on yucca and that Topanga I should include yucca processing technologies, such as scraper planes (and it does). If Kowta were right, the earliest evidence of scraper planes should be in the eastern part of interior California, that is, in Greven Knoll I assemblages. This is not the case, however, as Greven Knoll I assemblages generally lack scraper planes. That being said, one must remember that the sample of Greven Knoll I sites is small, and most sites are poorly dated.

Moreover, the paucity of vertebrate animal remains in Encinitas faunal assemblages led to the view, now long held, that hunting was not an important facet of Encinitas economies. Hunting usually refers to humans actively seeking, killing, butchering, and consuming animals that are generally mobile species being pursued and captured by some method (see Ingold 1987:80). However, the low frequencies of vertebrate faunal remains from Encinitas assemblages may be due to a variety of factors, including taphonomic processes, prehistoric processing techniques (such as schlepping [Daly 1969] or bone pulverizing [Sutton 1993; Yohe 1996]), the use of ¼-inch screen during excavation, and analytical techniques (microfaunal remains had rarely been sought or considered).

The idea that hunting was not a major factor in Encinitas economies has been reexamined (Koerper 1981:481; Drover et al. 1983:53). For example, excavations at the Irvine site (ORA-64), which had a Topanga I component, resulted in the recovery of a substantial number of faunal remains (Drover et al. 1983). A similar argument was made by Sutton et al. (1993) based on investigations at the Siphon site (SBR-6580) (Sutton et al. 1993), a Greven Knoll II site in the San Bernardino Mountains (see above). Excavations at the Siphon site resulted in the recovery of highly fragmented large mammal bones and the identification of several species of large mammals through the use of protein residue analysis (Sutton et al. 1993). This led Sutton (1993:138) to conclude that "the traditional ecological model for Millingstone Horizon subsistence ecology…should be critically reevaluated," and he argued that rather than a shift from hunting to plant collecting, the inception of the Encinitas Tradition may actually indicate a change in processing technology and methods, possibly due to decreasing resource availability. For instance, people may have begun pulverizing long bones and other skeletal elements on metates during hard times in order to maximize the extraction of grease and protein (e.g., Yohe 1995:69). As Sutton (1993:139) observed, there may have been no shift of subsistence focus (from animals to plants) at all; rather, people may have simply become more efficient at resource processing. This change in view could be significant for enhancing our understanding of cultural development and evolution in southern California and elsewhere.

The debate regarding the roles of gathering and hunting in the general Millingstone adaptation requires some consideration of gender roles and economic organization. Based on ethnographic analogy, many researchers have assumed that the presumed Millingstone plant processing focus means that much of the work was done by women. On this point, McGuire and Hildebrandt (1994:42) observed:

> It is here that the Milling Stone Horizon runs headlong into traditional formulations of gender which see women responsible for most aspects of plant gathering and processing…If, indeed, millingstones, handstones, and cobble-based processing tools are the immutable

> signatures of women…we are relegated to an analytical framework that acknowledges only half of a social group…At this point, the Milling Stone Horizon begins to collapse under the weight of its own femininity.

McGuire and Hildebrandt (1994:42) further noted that the Millingstone adaptation "stands as a unique adaptive strategy, perhaps with no good ethnographic counterpart…[that challenges] some of the traditional perspectives regarding gender-ascribed tool kits and work organization."

Based on their analysis of resource acquisition and processing, as well as burial associations, McGuire and Hildebrandt (1994:51) suggested that a "consistent pattern of relatively undifferentiated gender roles can be seen," a very different pattern than that observed in ethnographic California. We agree that the Millingstone adaptation was unique but believe that the gender roles in hunting should be reevaluated based on (1) a more precise understanding of the animals taken and the technologies used to take them, and (2) the new data regarding the processing of animals (Koerper 1981; Drover et al. 1983; Sutton 1993).

In sum, then, it is proposed that at about 10,000 BP, San Dieguito groups (probably Hokan) arrived from the deserts and occupied all of southern California. Soon afterward (ca. 9,000 BP), as environmental conditions further deteriorated in the deserts, Pinto Complex groups (also probably Hokan) moved west and occupied the northern portion of inland southern California, bringing milling technology with them. These Pinto groups never migrated to the coast, but their milling technology diffused there. With the addition of milling technology by about 9,400 BP, the inland groups became Greven Knoll I and the coastal groups (different polities than Greven Knoll groups) became Topanga I. The hypothesis that the adoption of millingstone technology represented a shift from hunting to an emphasis on seeds and other plant resources requires further testing.

Beginning around 5,000 BP along the coast, Topanga I groups acquired mortar and pestle technology (see Glassow 1996a), presumably related to the adoption of balanophagy, and became Topanga II. It seems that Topanga II sites are more numerous, indicating a population increase, perhaps driven by a new emphasis on acorns. A similar pattern emerged along the Santa Barbara coast (Glassow 1996b:22).

Gamble and King (1997:67) proposed that prior to 5,500 BP in the Santa Monica Mountains, sites were situated in defensible locations, perhaps indicating loose ties with other settlements. After 5,500 BP, sites became larger and were located at less defensible locations. After about 4,500 BP, sites were moved back to the defensible locations. The reasons for this are unclear. Leonard (1971:118-119) thought that Millingstone (Topanga II) sites in the Santa Monica Mountains were permanent villages and also argued that the absence of shell in inland sites reflected little interaction between coastal and interior Millingstone (Topanga) groups before 3,500 BP.

In the Marina del Rey area, Topanga I groups established small camps along the bluffs above the lagoon and used some marine resources, including fish and shellfish, although there is little indication that they resided there. By Topanga II, use of the bluff sites continued, and there is some evidence that the lowlands adjacent to the marsh (the former lagoon) were utilized. Actual habitation sites are not yet known for the area but may have been located in the Baldwin Hills to the east (Altschul et al. 2005).

In the Newport Bay area in Orange County, Koerper et al. (2002:63, 73) noted a decrease in radiocarbon dates between 4,000 and 3,000 BP. They proposed that occupation (of Topanga II groups) then shifted from Newport Bay to Bolsa Chica in Huntington Beach (see above). Sometime around 3,000 BP, the population apparently shifted back to Newport Bay and the San Joaquin Hills. This latter population shift generally coincides with the Takic entry into the area (Sutton 2009).

What Happened to the Encinitas Tradition?

The Encinitas Tradition was remarkably successful, spanning many millennia. It eventually ended, but at different times in different places for different reasons. Chronicling the end of the Encinitas Tradition by location and time is another reason that the definition of patterns and phases remains important.

About 3,500 years ago along the coasts and the western portion of the inland valleys of Los Angeles and Orange counties (essentially the territory occupied historically by the Gabrielino), Topanga II groups were physically replaced by a new Takic population (Sutton 2009). The Takic brought with them new settlement and subsistence systems, currently recognized in the archaeological record as the beginning of the Intermediate Period. In the Santa Monica Mountains, Topanga III groups apparently persisted for approximately another 1,500 years until they were absorbed or replaced by the Gabrielino and/or Chumash about 2,000 years ago.

Along the San Diego coast after about 4,000 BP, the La Jolla III phase emerged, and the inland Pauma II expression appeared after about 3,000 BP. Both of these Encinitas patterns were replaced by the Cuyamaca Complex (Yuman Tradition) about 1,300 years ago. Takic groups apparently never penetrated south of northern San Diego County, and the Yuman Tradition may well have developed from the preceding La Jolla Pattern.

Greven Knoll II persisted until about 3,000 BP. It was just before that time that the Takic replaced Topanga II in the coastal areas of Los Angeles and Orange counties (Sutton 2009). Whatever relationships (e.g., trade, political, and/or ceremonial) Greven Knoll II groups had with Topanga II groups would have been curtailed or ended by that event. As a result, Greven Knoll II people were forced to make adjustments, and in doing so, became Greven Knoll III (e.g., Kowta 1969). Thus, Greven Knoll III groups maintained a general Encinitas adaptation for another 2,000 years.

Greven Knoll III ended about 1,000 years ago, replaced by "late" complexes linked to the Takic groups that occupied the region into ethnographic times. Sutton (2009) proposed that Greven Knoll III (Sayles Complex) people were biologically and linguistically proto-Yuman. Beginning about 1,000 BP, these people would have adopted Takic languages and became the Serrano, Luiseño, Cahuilla, and Cupeño, but they remained biologically Yuman.

How and why the Encinitas Tradition persisted in the northern portion of inland southern California for so long after it ended along the coast are challenging questions. Kowta (1969) proposed that Greven Knoll III developed as a response to increasingly xeric conditions. On the other hand, the environmental circumstances that led to such conditions in the San Bernardino Mountains ca. 3,000 BP, when Greven Knoll III originated, were not limited to that area but were spread across all southern California. Thus, all groups in the region would have been forced to adapt to the new conditions. The millingstone technology must have been exceptionally useful, functional in many ways, and easily adapted to new requirements.

What About the Channel Islands?

One particularly intriguing characteristic of the Encinitas Tradition is its apparent absence on the Channel Islands. Prior to about 3,200 BP, the Channel Islands were occupied by people biologically similar to the Chumash (e.g., Kerr 2004; Potter 2004; Sutton 2009) and seemingly unrelated to the groups (probably

Hokan) that occupied southern California. There is little indication of an Encinitas occupation on the southern Channel Islands (e.g., Meighan 2000:7) and no Encinitas marker artifacts, such as cogged stones or discoidals, are known from there, although Encinitas-looking artifacts (e.g., metates and core tools) are known from San Clemente Island (McKusick and Warren 1959). The groups on the Channel Islands had a maritime-oriented economy, while the Encinitas Tradition appears to have been a mainland, littoral, and terrestrially focused adaptation that had little apparent connection to the Channel Islands.

Based on current evidence (e.g., Cassidy et al. 2004; Rondeau et al. 2007), it seems that before ca. 3,200 BP, groups on the southern Channel Islands were relatively isolated and independent polities. Not only does there seem to have been relatively little island interaction with the southern California mainland, contact with the northern Channel Islands also seems to have been limited at best.

There is, however, some evidence for interaction between the southern Channel Islands and the southern California mainland between about 5,000 and 4,500 BP. This involved the Western Nexus interaction sphere (Sutton and Koerper 2009), which included the manufacture of OGR beads on San Nicolas Island and their exchange to the mainland. At that time, Encinitas groups on the mainland were Hokan (proto-Yuman?), while people on the southern Channel Islands were biologically similar to the Chumash until replaced on the southern Channel Islands by the Takic (ca. 3,200 BP) (see Sutton 2009).

The arrival of Takic peoples on the southern Channel Islands after about 3,200 BP and the subsequent biological replacement of the earlier populations by Takic people resulted in the beginning of considerable commerce between the southern Channel Islands and the mainland, especially in shell beads and steatite (Sutton 2009). These events undoubtedly precipitated important readjustments in the social and political dynamics throughout much of coastal southern California.

Concluding Remarks

In this article, we provide a brief history of the Millingstone concept and the Encinitas Tradition. We advocate using the concepts of pattern and phase for the Encinitas Tradition and propose a new pattern (Greven Knoll) that we believe better exemplifies the expression of the Encinitas Tradition in inland southern California. It is hoped that by revisiting the Encinitas Tradition in southern California we can enhance our understanding of the geographic and temporal manifestations of this cultural tradition and of the changes that ultimately resulted in the replacement of the Millingstone way of life in southern California.

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Notes

1. As defined by Farmer (1953:177), a discoidal is "a round stone usually a third to a quarter as thick as its diameter" and is carefully shaped. Discoidals have flat to curved surfaces, sometimes with beveled edges and polished surfaces (e.g., Farmer 1953; Sutton 1978). Distinctions have been proposed to separate "early" discoidals (meaning early in the Holocene) from "late" discoidals (meaning, perhaps, Middle Holocene) (cf., Underbrink and Koerper 2006:117). Koerper

(personal communication 2009) tentatively suggested that the earlier kinds were frequently crafted of either soft stones (e.g., sandstone or siltstone) or vesicular basalt, while the later kinds were generally made of hard stone (e.g., granite but not vesicular basalt) and frequently exhibit polished surfaces. "Late" discoidals are typically disk shaped, have slightly convex edges rounded to the face, and similarly sized slightly convex faces. As a group, "early" discoidals are disk shaped but characterized by broad morphological diversity. Their edges can be either straight or angled, the latter resulting in faces of different sizes. The faces run the gamut of deeply concave, to flat, to slightly convex, to domed. The encircling edges can be convex, flat, or even concave. When the published descriptions permit, we will designate discoidals as either early or late.

2. The term "millingstone" has been commonly used to refer to metates alone, to manos and metates in tandem, or to manos, metates, mortars, and pestles. For the purposes of this article, since mortars and pestles represent a significant change in technology, we make a clear distinction between metates/manos and mortars/pestles when possible.

3. Various interpretations of the function of scraper planes can be found in Treganza and Bierman (1958), Kowta (1969), Hester and Heizer (1972), Eberhart and Wasson (1975), Jackson (1977), Salls (1983, 1985), Gilreath and Jackson (1985), McCarthy (1986), Wilke et al. (1986), and Hale (2001:163).

References Cited

Allen, Kathleen C.
1994 *The Spatial and Temporal Distribution of Prehistoric Burial Practices in the "Shoshonean Wedge" Area of Coastal Southern California*. Master's thesis, Department of Anthropology, California State University, Fullerton.

Allen, Lawrence P.
1982 *The Chaffey Hillside Site, CA-SBr-895: Report of the Cultural Resource Mitigation Program*. Report submitted to the U. S. Army Corps of Engineers, Los Angeles District. Report on file at the San Bernardino County Archaeological Information Center, Redlands.

Altschul, Jeffrey H., Anne Q. Stoll, Donn R. Grenda, and Richard Ciolek-Torrello
2003 *At the Base of the Bluff: Archaeological Inventory and Evaluation Along Lower Centinela Creek, Marina del Rey, California*. Playa Vista Archaeological and Historical Project, Playa Vista Monograph Series, Test Excavation Report 4, Statistical Research, Inc., Tucson, Arizona.

Altschul, Jeffrey H., Richard Ciolek-Torrello, Donn R. Grenda, Jeffrey A. Homburg, Su Benaron, and Anne Q. Stoll
2005 Ballona Archaeology: A Decade of Multidisciplinary Research. *Proceedings of the Society for California Archaeology* 18:283-301. Chico.

Altschul, Jeffrey H., John G. Douglass, Richard Ciolek-Torrello, Sarah Van Galder, Benjamin R. Vargas, Kathleen L. Hull, Donn R. Grenda, Jeffrey A. Homburg, Manuel Palacios-Fest, Steven Shelley, Angela Keller, and David Maxwell
2007 Life at the Nexus of the Wetlands and Coastal Prairie, West Los Angeles. *Proceedings of the Society for California Archaeology* 20:34-42. Chico.

Anonymous
1938 Daily Notes for the Banning Site, December 21, 1937-February 10, 1938. WPA Anthropological Project #7680. Manuscript on file at the University of California, Irvine, Library Special Collections.

Basgall, Mark E., and D. L. True
1985 *Archaeological Investigations in Crowder Canyon, 1973-1984: Excavations at Sites SBr-421B, SBr-421C, SBr-421D, and SBR-713.* 2 vols. Report submitted to Caltrans. Report on file at the San Bernardino County Archaeological Information Center, Redlands.

Beardsley, Richard K., Preston Holder, Alex D. Krieger, Betty J. Meggers, John B. Rinaldo, and Paul Kutsche
1956 Functional and Evolutionary Implications of Community Patterning. In *Seminars in Archaeology*, edited by Robert Wauchope, pp. 130-157. Memoirs No. 11. Society for American Archaeology, Salt Lake City.

Bouey, Paul D.
1987 Appendix: Source Analysis of Obsidian Samples. *Journal of California and Great Basin Anthropology* 9(1):70-73.

Breschini, Gary S., Trudy Haversat, and Jon Erlandson (compilers)
1990 *California Radiocarbon Dates*. 6th ed. Coyote Press. Salinas, California.

Bull, Charles S.
1983 Shaking the Foundations: The Evidence for San Diego Prehistory. *San Diego State University Cultural Resource Management Center Casual Papers* 1(3):5-64.
1987 A New Proposal: Some Suggestions for San Diego Prehistory. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 35-42. San Diego County Archaeological Society Research Papers No. 1. San Diego.

Butler, William B.
1974 The San Pedro Village Site: A Primary Subsistence Village on the Southern California Coast. *Pacific Coast Archaeological Society Quarterly* 10(3&4):1-98.

Byrd, Brian F.
1996 *Coastal Archaeology of Las Flores Creek and Horno Canyon, Camp Pendleton, California*. Report submitted to U. S. Army Corps of Engineers. Report on file at the South Coastal Information Center, San Diego State University.
1997 *Coastal Archaeology at CA-SDI-10,728, Las Flores Creek, Camp Pendleton, California*. Report submitted to U. S. Army Corps of Engineers. Report on file at the South Coastal Information Center, San Diego State University.
1998 Harvesting the Littoral Landscape During the Late Holocene: New Perspectives from Northern San Diego County. *Journal of California and Great Basin Anthropology* 20(2):195-218.
2000 *Coastal Views of Prehistoric Middens: Archaeological Investigations and Paleoecological Reconstructions Along Las Flores Creek, Camp Pendleton, California*. Report submitted to the U.S. Navy. Report on file at the South Coastal Information Center, San Diego State University.

Byrd, Brian F., Drew Pallette, and Carol Serr
1995 *Archaeological Testing Along San Mateo and San Onofre Creeks, Northwestern Camp Pendleton, San Diego County, California*. Report submitted to the U.S. Navy. Report on file at the South Coastal Information Center, San Diego State University.

Byrd, Brian F., and L. Mark Raab
2007 Prehistory of the Southern Bight: Models for a New Millennium. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 215-227. AltaMira Press, Lanham, Maryland.

Byrd, Brian F., and Seetha N. Reddy
2002 Late Holocene Adaptations Along the Northern San Diego Coast: New Perspectives on Old Paradigms. In *Catalysts to Complexity: Late Holocene Societies of the California Coast*, edited by Jon M. Erlandson and Terry L. Jones, pp. 41-62. University of California, Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 6.

Cassidy, Jim, L. Mark Raab, and Nina A. Kononenko
2004 Boats, Bones, and Biface Bias: The Early Holocene Mariners of Eel Point, San Clemente Island, California. *American Antiquity* 69(1):109-130.

Chace, Paul G., and Mark Q. Sutton
1990 The Kelly Site Complex: An Inland Encinitas Tradition Settlement in San Diego County. *Pacific Coast Archaeological Society Quarterly* 26(1):42-59.

Chartkoff, Joseph L., and Kerry Kona Chartkoff
1984 *The Archaeology of California*. Stanford University Press, Stanford.

Christenson, Lynne E.
1981 *Mammalian Faunal Butchering Practices at an Inland La Jollan Site, San Diego, California*. Master's thesis, Department of Anthropology, San Diego State University.

Ciolek-Torrello, Richard, and John G. Douglass
2002 Hunting and Gathering in the Wetlands: A Coastal Perspective from La Ballona, Southern California. Paper presented at the 67th Annual Meeting of the Society for American Archaeology, Denver.

Ciolek-Torrello, Richard, Donn R. Grenda, Angela Keller, and Anne Q. Stoll
2006 *A Passage in Time: The Archaeology and History of the Santa Susana Pass State Historic Park, California*. Technical Series 87, Statistical Research, Inc., Tucson, Arizona.

Cleland, James H., Andrew L. York, and Lorraine M. Willey
2007 *Piecing Together the Prehistory of Landing Hill: A Place Remembered*. EDAW Cultural Publications No. 3. San Diego.

Cody, Annie K.
1988 An Analysis of Mullers from the Mud Springs Site: An Inquiry into the Milling Stone Horizon. *Journal of the Archaeological Survey Association of Southern California* 12(2):1-48.

Cooley, Theodore G.
1998 Observations on Settlement and Subsistence During the Late La Jolla Complex—Preceramic Interface as Evidence at Site CA-SDI-11,767, Lower San Diego River Valley, San Diego County, California. *Proceedings of the Society for California Archaeology* 11:1-6. Fresno.

Connolly, Thomas J., Jon M. Erlandson, and Susan E. Norris
1995 Early Holocene Basketry and Cordage from Daisy Cave, San Miguel Island, California. *American Antiquity* 60(2):309-318.

Corum, Joyce M.
1977 *An Examination of Intersite Variability During the Millingstone Horizon of Southern California*. Master's thesis, Department of Anthropology, California State University, Northridge.

Cottrell, Marie G.
1978a A Report of Test Excavations at CA-ORA-433. *Pacific Coast Archaeological Society Quarterly* 14(3):1-32.
1978b A Report of Test Excavations at CA-LAn-702. *Pacific Coast Archaeological Society Quarterly* 14(2):26-51.

Couch, Jeffrey S., Joanne S. Couch, and Nancy Anastasia Wiley
2009 Saved by the Well: The Keystone Cache at CA-ORA-83, The Cogged Stone Site. *Proceedings of the Society for California Archaeology* 21:147-156. Chico.

Crabtree, Robert H., Claude N. Warren, and D. L. True
1963 Archaeological Investigations at Batiquitos Lagoon, San Diego County, California. *University of California Archaeological Survey Annual Report* 1962-1963:319-439. Los Angeles.

Dallas, Herb, Jr.
2004 Revisiting the Little Sycamore Site: An Early Period Millingstone Site Along the Santa Monica Coastline. *Proceedings of the Society for California Archaeology* 14: 157-167. Chico.

Daly, Patricia
1969 Approaches to Faunal Analysis in Archaeology. *American Antiquity* 34(2):146-153.

Davis, Emma Lou
1978 Two Dated La Jollan Burials and Their Place in California Prehistory: A Review. *Pacific Coast Archaeological Society Quarterly* 12(4):1-44.

de Barros, Philip
1992 *Final Test Investigation Report for CA-SBr-5096, Caltrans Project Title: Highway 71 Improvement Project 08-SBd-71-pm 5.775*. Report submitted to Caltrans. Report on file at the San Bernardino County Archaeological Information Center, Redlands.

Dixon, Keith A.
1968 Cogged Stones and Other Ceremonial Cache Artifacts in Stratigraphic Context at ORA-58, A Site in the Lower Santa Ana River Drainage, Orange County. *Pacific Coast Archaeological Society Quarterly* 4(3):57-65.
1970 A Brief Report on Radiocarbon and Obsidian Hydration Measurements from ORA-58 (The Banning-Norris or Fairview Hospital Site), Orange County, California. *Pacific Coast Archaeological Society Quarterly* 6(4):61-68.

Douglass, John G., Jeffrey H. Altschul, and Richard Ciolek-Torrello (editors)
2005 *Overlooking the Wetlands: Archaeological Investigations at the West Bluffs Project, CA-LAN-63, CA-LAN-64, and CA-LAN-206A, Playa del Rey, California*. Technical Report 05-93, Statistical Research, Inc., Tucson, Arizona.

Drover, Christopher E.
1971 Three Fired-Clay Figurines from 4-ORA-64, Orange County, California. *Pacific Coast Archaeological Society Quarterly* 7(4):45-49.

1975 Early Ceramics from Southern California. *The Journal of California Anthropology* 2(1):101-107.

1978 Prehistoric Ceramic Objects from Santa Catalina Island. *The Journal of California Anthropology* 5(1):78-83.

Drover, Christopher E., and James N. Spain

1972 An Early, Articulated Inhumation from 4-ORA-64: A Discussion. *Pacific Coast Archaeological Society Quarterly* 8(4):35-44.

Drover, Christopher E., Henry C. Koerper, and Paul E. Langenwalter II

1983 Early Holocene Human Adaptation on the Southern California Coast: A Summary Report of Investigations at the Irvine Site (CA-ORA-64), Newport Bay, Orange County, California. *Pacific Coast Archaeological Society Quarterly* 19(3&4):1-84.

Eberhart, Hal

1961 The Cogged Stones of Southern California. *American Antiquity* 26(3):361-370.

1962 Mesarica: A San Gabriel Valley Site. *The Masterkey* 36(2):69-76.

Eberhart, Hal, and Warren Wasson

1975 The Sassone Site (LAn-339): A Milling Stone Horizon Station in the San Gabriel Valley. *California Anthropologist* 5(1&2):9-45.

Erlandson, Jon M.

1994 *Early Hunter-Gatherers of the California Coast*. Plenum, New York.

Erlandson, Jon M., and Roger H. Colten

1991 An Archaeological Context for Early Holocene Studies on the California Coast. In *Hunter-Gatherers of Early Holocene Coastal California*, edited by Jon M. Erlandson and Roger H. Colten, pp. 1-10. University of California, Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 1.

Erlandson, Jon M., Michael E. Macko, Henry C. Koerper, and John Southon

2005 The Antiquity of *Olivella* Shell Beads at CA-ORA-64: AMS Radiocarbon Dated Between 9420 and 7780 cal BP. *Journal of Archaeological Science* 32(3):393-398.

Erlandson, Jon M., and Torben C. Rick, Terry L. Jones, and Judith F. Porcasi

2007 One If by Land, Two If by Sea: Who Were the First Californians? In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 53-62. AltaMira Press, Lanham, Maryland.

Farmer, Malcolm F.

1936 Preliminary Report on an Archaeological Reconnaissance of Indian Habitation Sites in the Baldwin Hills Region of Los Angeles County, California, January 13, 1936. Manuscript on file at the South Central Coastal Information Center, California State University, Fullerton.

1953 Southern California Discoidals. *The Masterkey* 27(4):177-183.

Fitzgerald, Richard T.

1993 *Archaic Milling Cultures of the Southern San Francisco Bay Region*. Coyote Press Archives of California Prehistory 35. Coyote Press, Salinas.

2000 *Cross Creek: An Early Holocene/Millingstone Site.* California State Water Project, Coastal Branch Series Paper No. 12, published by the San Luis Obispo County Archaeological Society. San Luis Obispo, California.

Fitzgerald, Richard T., and Terry L. Jones
1999 The Milling Stone Horizon Revisited: New Perspectives from Northern and Central California. *Journal of California and Great Basin Anthropology* 21(1):67-93.

Fitzgerald, Richard T., Terry L. Jones, and Adella Schroth
2005 Ancient Long-Distance Trade in Western North America: New AMS Radiocarbon Dates from Southern California. *Journal of Archaeological Science* 32(3):423-434.

Flint, Richard F., and Edward S. Deevey, Jr. (editors)
1960 *American Journal of Science, Radiocarbon Supplement*, Vol. 2:201.

Foster, Karen Rasmussen
1999 The Red Beach Site and 3,000 Years of Coastal Settlement Change. *Pacufuc Coast Archaeological Society Quarterly* 35(1):57-81.

Gallegos, Dennis R.
1985 *Batiquitos Lagoon Revisited.* San Diego State University Cultural Resource Management Center Casual Papers 2(1). San Diego.
1987 A Review and Synthesis of Environmental and Cultural Material for the Batiquitos Lagoon Region. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 23-34. San Diego County Archaeological Society Research Papers No. 1. San Diego.
1991 Antiquity and Adaptation at Agua Hedionda, Carlsbad, California. In *Hunter-Gatherers of Early Holocene Coastal California*, edited by Jon M. Erlandson and Roger H. Colten, pp. 1-10. University of California, Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 1.
1992 Patterns and Implications of Coastal Settlement in San Diego County: 9000 to 13000 Years Ago. In *Essays on the Prehistory of Maritime California*, edited by Terry L. Jones, pp. 205-216. Center for Archaeological Research at Davis Publication No. 10. University of California, Davis.
2002 Southern California in Transition: Late Holocene Occupation of Southern San Diego County. In *Catalysts to Complexity: Late Holocene Societies of the California Coast*, edited by Jon M. Erlandson and Terry L. Jones, pp. 27-39. University of California, Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 6.

Gallegos, Dennis R., and Richard Carrico
1984 *Windsong Shores Data Recovery Program for Site W-131, Carlsbad, California*. Report on file at the South Coastal Information Center, San Diego State University.

Gallegos, Dennis R., and Carolyn Kyle
1998 *Five Thousand Years of Maritime Subsistence at CA-SDI-48, on Ballast Point, San Diego County, California*. Coyote Press Archives of California Prehistory 40. Salinas, California.

Gamble, Lynn H., and Chester King
1997 Middle Holocene Adaptations in the Santa Monica Mountains. In *Archaeology of the California Coast During the Middle Holocene*, edited by Jon M. Erlandson and Michael A. Glassow, pp. 61-72. University of California, Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 4.

Gamble, Lynn H., and Glenn S. Russell
2002 A View from the Mainland: Late Holocene Cultural Developments Among the Ventureño Chumash and the Tongva. In *Catalysts to Complexity: Late Holocene Societies of the California Coast*, edited by Jon M. Erlandson and Terry L. Jones, pp. 101-126. University of California, Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 6.

Gilreath, Amy J., and Robert J. Jackson
1985 Appendix A: Technological Flaked Stone Analysis. In *Archaeological Investigations in Crowder Canyon, 1973-1984: Excavations at Sites SBr-421B, SBr-421C, SBr-421D, and SBR-713 (Vol. 2)*, by Mark A. Basgall and D. L. True, pp. A-1–A-91. Report submitted to Caltrans. Report on file at the San Bernardino County Archaeological Information Center, Redlands, California.

Glassow, Michael A.
1996a The Significance to California Prehistory of the Earliest Mortars and Pestles. *Pacific Coast Archaeological Society Quarterly* 32(4):14-26.
1996b *Purisimeño Chumash Prehistory: Maritime Adaptations Along the Southern California Coast*. Harcourt Brace, Fort Worth, Texas.

Glassow, Michael A., Lynn H. Gamble, Jennifer E. Perry, and Glenn S. Russell
2007 Prehistory of the Northern California Bight and the Adjacent Transverse Ranges. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 191-213. AltaMira Press, Lanham, Maryland.

Goldberg, Susan K., and Jeanne E. Arnold
1988 *Prehistoric Sites in the Prado Basin, California: Regional Context and Significance Evaluation*. Report submitted to the U.S. Army Corps of Engineers. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Golla, Victor
2007 Linguistic Prehistory. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 71-82. AltaMira Press, Lanham, Maryland.

Grenda, Donn R.
1997 *Continuity & Change: 8,500 Years of Lacustrine Adaptation on the Shores of Lake Elsinore*. Technical Series 59, Statistical Research, Inc., Tucson, Arizona.
1998 *Between the Coast & the Desert: Archaeological Data Recovery at the Yukaipa't Site, CA-SBR-1000, Yucaipa, California*. Technical Series 70, Statistical Research, Inc., Tucson, Arizona.

Grenda, Donn R., and Jeffrey H. Altschul
2002 Movable Feast: Isolation and Mobility Among Southern California Hunter-Gatherers. In *Islanders and Mainlanders: Prehistoric Context for the Southern California Bight*, edited by Jeffrey H. Altschul and Donn R. Grenda, pp. 113-146. SRI Press, Tucson, Arizona.

Grenda, Donn R., and Deborah W. Gray
1997 *Hunting the Hunters: Archaeological Testing at CA-RIV-653 and CA-RIV-1098, Riverside County, California*. Technical Series 65, Statistical Research, Inc., Tucson, Arizona.

Grenda, Donn R., Christopher J. Doolittle, and Jeffrey H. Altschul (editors)
1998a *House Pits and Middens: A Methodological Study of Site Structure and Formation Processes at CA-ORA-116, Newport Bay, Orange County, California*. Technical Series 69, Statistical Research, Inc., Tucson, Arizona.

Grenda, Donn R., Christopher J. Doolittle, and Matthew A. Sterner (compilers)
1998b *Early Hunter-Gatherers and Historic Settlers along San Sevaine Creek*. Technical Report 98-7, Statistical Research, Inc., Tucson, Arizona.

Griset, Suzanne
2008 Analysis of Baked Clay Items from CA-Riv-6069. Appendix E in *CA-RIV-6069: Early Archaic Settlement and Subsistence in the San Jacinto Valley, Western Riverside County, California*, by Melinda C. Horne and Dennis P. McDougall. Report submitted to the Metropolitan Water District of Southern California. Report on file at the Eastern Information Center, University of California, Riverside.

Hale, Micah J.
2001 *Technological Organization of the Millingstone Pattern in Southern California*. Master's thesis, Department of Anthropology, California State University, Sacramento.

Hampson, R. Paul
1992 *Evaluation of CA-RIV-4043H, CA-RIV-4044/H, and CA-RIV-4045, Lake Elsinore, California*. Report submitted to the U.S. Army Corps of Engineers. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Harding, Mabel
1951 La Jollan Culture. *El Museo* 1(1):10-11, 31-38.

Harrison, William M.
1964 *Prehistory of the Santa Barbara Coast, California*. Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

Heizer, Robert F., and Edwin M. Lemert
1947 Observations on Archaeological Sites in Topanga Canyon, California. *University of California Publications in American Archaeology and Ethnology* 44(2):237-258. Berkeley.

Herring, Alika K.
1961 Three Unusual Artifacts from Orange County, California. *Science of Man* 1(June issue):132.
1968 Surface Collections from Ora-83, a Cogged Stone Site at Bolsa Chica, Orange County, California. *Pacific Coast Archaeological Society Quarterly* 4(3):3-37.

Hester, Thomas R., and Robert F. Heizer
1972 Problems in the Functional Interpretation of Artifacts: Scraper Planes from Mitla and Yagul, Oaxaca. *Contributions of the University of California Archaeological Research Facility* No. 14. Berkeley.

Hicks, Frederick
1958 Archaeological Investigations in the Yucaipa Valley. *San Bernardino County Museum Association Quarterly* 6(1).

Horne, Melinda C., and Dennis P. McDougall
2008 *CA-RIV-6069: Early Archaic Settlement and Subsistence in the San Jacinto Valley, Western Riverside County, California*. Report submitted to the Metropolitan Water District of Southern California. Report on file at the Eastern Information Center, University of California, Riverside.

Howard, William J., and L. Mark Raab
1993 *Olivella* Grooved Rectangle Beads as Evidence of a Mid-Holocene Southern Channel Islands Interaction Sphere. *Pacific Coast Archaeological Society Quarterly* 29(3):1-11.

Ingold, Tim
1980 Hunters, Pastoralists, and Ranchers. *Cambridge Studies in Social Anthropology* No. 28. Cambridge, England.

Ingram, Stephen
2008 *Cacti, Agaves, and Yuccas of California and Nevada*. Cachuma Press, Los Olivos, California.

Jackson, J. Brantley
1977 *Plane Sense: A Technological and Functional Analysis of a Stone Tool Category*. Master's thesis, Department of Anthropology, Washington State University, Pullman.

Jenkins, Dennis L., and Jon M. Erlandson
1996 *Olivella* Grooved Rectangle Beads from a Middle Holocene Site in the Fort Rock Valley, Northern Great Basin. *Journal of California and Great Basin Anthropology* 18(2):296-302.

Johnson, John R., and Joseph G. Lorenz
2006 Genetics, Linguistics, and Prehistoric Migrations: An Analysis of California Indian Mitochondrial DNA Lineages. *Journal of California and Great Basin Anthropology* 26(1):33-64.

Johnson, Keith L.
1966 Site LAN-2: A Late Manifestation of the Topanga Complex in Southern California Prehistory. *University of California Anthropological Records* 23. Berkeley.

Jones, Terry L.
2008 Culture or Adaptation: Milling Stone Reconsidered. In *Avocados to Millingstones: Papers in Honor of D. L. True*, edited by Georgie Waugh and Mark E. Basgall, pp. 137-153. Monographs in California and Great Basin Anthropology No. 5. Archaeological Research Center, Department of Anthropology, California State University, Sacramento.

Jones, Terry L., Judith F. Porcasi, Jereme W. Gaeta, and Brian F. Codding
2008 The Diablo Canyon Fauna: A Coarse-Grained Record of Trans-Holocene Foraging from the Central California Mainland Coast. *American Antiquity* 73(2):289-316.

Jones, Terry L., Richard T. Fitzgerald, Douglas J. Kennett, Charles H. Miksicek, John L. Fagan, John Sharp, and Jon M. Erlandson
2002 The Cross Creek Site (CA-SLO-1797) and its Implications for New World Colonization. *American Antiquity* 67(2):213-230.

Kaldenberg, Russell L.
1982 Rancho Park North: A San Dieguito-La Jolla Shellfish Processing Site in Coastal Southern California. *Imperial Valley College Museum Society Occasional Paper* No. 6. El Centro, California.

Kennett, Douglas J., Brendan J. Culleton, James P. Kennett, Jon M. Erlandson, and Kevin G. Cannariato
2007 Middle Holocene Climate Change and Human Population Dispersal in Western North America. In *Climate Change and Cultural Dynamics: A Global Perspective on Mid-Holocene Transitions*, edited by David G. Anderson, Kirk A. Maasch, and Daniel H. Sandweiss, pp. 531-557. Elsevier Press, New York.

Kerr, Susan L.
2004 *The People of the Southern Channel Islands: A Bioarchaeological Study of Adaptation and Population Change in Southern California*. Ph.D. dissertation, Department of Anthropology, University of California, Santa Barbara.

King, Chester D.
1962 Excavations at Parker Mesa (Lan-215). *University of California Archaeological Survey Annual Report* 1961-1962:91-156. Los Angeles.
1967 The Sweetwater Mesa Site (LAn-267) and its Place in Southern California Prehistory. *University of California Archaeological Survey Annual Report* Vol. 9:25-76. Los Angeles.
1990 *Evolution of Chumash Society: A Comparative Study of Artifacts Used for Social System Maintenance in the Santa Barbara Channel Region Before A.D. 1804*. Garland Publishing, New York.

King, Chester D., Thomas Blackburn, and Ernest Chandonet
1968 The Archaeological Investigations of Three Sites on the Century Ranch, Western Los Angeles County, California. *University of California Archaeological Survey Annual Report* 1968:12-107. Los Angeles.

Klar, Kathryn A.
2002 The Island Chumash Language: Implications for Interdisciplinary Work. *Proceedings of the Fifth California Islands Symposium*, pp. 654-658. Santa Barbara Museum of Natural History, Santa Barbara.

Koerper, Henry C.
1979 On the Question of the Chronological Placement of Shoshonean Presence in Orange County, California. *Pacific Coast Archaeological Society Quarterly* 15(3):68-84.
1981 *Prehistoric Subsistence and Settlement in the Newport Bay Area and Environs, Orange County, California*. Ph.D. dissertation, Department of Anthropology, University of California, Riverside.

Koerper, Henry C., and Christopher E. Drover
1983 Chronology Building for Coastal Orange County: The Case from CA-Ora-119-A. *Pacific Coast Archaeological Society Quarterly* 19(2):1-34.
1984 Horizon and Tradition on the Southern California Coast: A Rejoinder. *Journal of California and Great Basin Anthropology* 6(2):269-272.

Koerper, Henry C., and Roger D. Mason
1998 A Red Ochre Cogged Stone from Orange County. *Pacific Coast Archaeological Society Quarterly* 34(1):59-72.

Koerper, Henry C., Paul E. Langenwalter II, and Adella B. Schroth
1991 Early Holocene Adaptations and the Transition Phase Problem: Evidence from the Allan O. Kelly Site, Agua Hedionda Lagoon. In *Hunter-Gatherers of Early Holocene Coastal California*, edited by Jon M. Erlandson and Roger H. Colten, pp. 43-62. University of California, Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 1.

Koerper, Henry C., Roger D. Mason, and Mark L. Peterson
2002 Complexity, Demography, and Change in Late Holocene Orange County. In *Catalysts to Complexity: Late Holocene Societies of the California Coast*, edited by Jon M. Erlandson and Terry L. Jones, pp. 63-81. University of California, Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 6.

Koerper, Henry C., David E. Earle, Roger D. Mason, and Paul Apodaca
1996 Archaeological, Ethnohistoric, and Historic Notes Regarding ORA-58 and Other Sites Along the Lower Santa Ana River Drainage, Costa Mesa. *Pacific Coast Archaeological Society Quarterly* 32(1):1-36.

Koerper, Henry C., Karl Reitz, Sherri Gust, and Steven Iverson
2006 A Pattern Recognition Study of Cogged Stone Behavior. *Proceedings of the Society for California Archaeology* 19:120-127. Chico.

Kowta, Makoto
1969 The Sayles Complex: A Late Millingstone Assemblage from Cajon Pass and the Ecological Implications of its Scraper Planes. *University of California Publications in Anthropology* Vol. 6. Berkeley.
1986 Grist for the Mills of History: LAN-1 and the Milling Stone Horizon. In *A New Look at Some Old Sites,* edited by Francis A. Riddell, pp. 37-47. Coyote Press Archives of California Prehistory No. 6. Salinas, California.

Kyle, Carolyn E.
1995 A 2,000 Year Old Milling Tool Kit from SDI-10148, San Diego California. *Proceedings of the Society for California Archaeology* 8:207-216. San Diego.

Lambert, Vincent
1983 A Surface Collection from the Del Rey Hills, Los Angeles County, California. *Journal of New World Archaeology* 5(3):7-19.

Langenwalter II, Paul E., and James Brock
1985 *Phase II Archaeological Studies of Prado Basin and the Lower Santa Ana River*. Report submitted to the U. S. Army Corps of Engineers. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Leonard, N. Nelson III
1971 Natural and Social Environments of the Santa Monica Mountains (6000 B.C. to 1800 A.D.). *University of California Archaeological Survey Annual Report* 13:93-135. Los Angeles.

Lerch, Michael K., and Amanda C. Cannon (editors)
2008 *Mystic Paavo': Cultural Resources Survey and Evaluation of The Villages of Lakeview Specific Plan, Riverside County, California.* Technical Report 05-34. Statistical Research, Redlands. Report submitted to San Bernardino County Planning. Report on file with the Eastern Information Center, University of California, Riverside.

Lerch, Michael K., and Gerald A. Smith
1984 *Cultural Resources Assessment of the Proposed Lake Elsinore Management Project, Riverside County, California*. Report submitted to Engineering-Science. Report on file with the Eastern Information Center, University of California, Riverside.

Littlewood, Robert A.
1960 An Analysis of Skeletal Material from the Zuma Creek Site (LAn-174). *University of California Archaeological Survey Annual Report* 1959-1960:135-154. Los Angeles.

Macko, Michael E.
1998 *Neolithic Newport: Executive Summary: Results of Implementing Mitigation Measures Specified in the Operation Plan and Research Design for the Proposed Newporter North Residential Development at ORA-64*. Report submitted to Irvine Community Development Company. Report on file at the South Central

Coastal Information Center, California State University, Fullerton.

Macko, Michael E., Jeffrey S. Couch, and Henry C. Koerper
2005 Implications of Ritual Biface Caches from the Irvine Site. *Journal of California and Great Basin Anthropology* 25(1):93-107.

Macko, Michael E., Edward B. Weil, J. Weisbord, and J. Cooper
1983 *Final Report Mira Loma-Serrano 500 kV DC and Serrano-Villa Park 220 kV Transmission Line Project: Cultural Resource Survey and Test Excavations at CA-Ora-614, CA-SBr-3690, and CA-SBr-4032*. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Martz, Patricia
1976 *Description and Evaluation of the Cultural Resources: Cucamonga, Demens, Deer, and Hillside Creek Channels, San Bernardino and Riverside Counties, California. Technical Report 0-76-1.* Report submitted to the U. S. Army Corps of Engineers, Los Angeles District. Report on file at the South Central Coastal Information Center, California State University, Fullerton.
1977 *Archaeological Investigations at CA-SBR-1000, Yucaipa, California*. Report submitted to the Yucaipa Valley County Water District. Report on file at the San Bernardino County Archaeological Information Center, Redlands.
1984 *Social Dimensions of Chumash Mortuary Populations in the Santa Monica Mountains Region*. Ph.D. dissertation, Department of Anthropology, University of California, Riverside.

Mason, Roger D., and Mark L. Peterson
1994 *Newport Coast Settlement Systems: Analysis and Discussion,* Vol. 1. Report submitted to Coastal Community Builders. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Mason, Roger D., Henry C. Koerper, and Paul E. Langenwalter II
1997 Middle Holocene Adaptations on the Newport Coast of Orange County. In *Archaeology of the California Coast During the Middle Holocene*, edited by Jon M. Erlandson and Michael A. Glassow, pp. 35-60. University of California Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 4.

Masters, Patricia M., and Ivano W. Aiello
2007 Postglacial Evolution of Coastal Environments. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 35-51. AltaMira Press, Lanham, Maryland.

Masters, Patricia M., and Dennis R. Gallegos
1997 Environmental Change and Coastal Adaptations in San Diego County During the Middle Holocene. In *Archaeology of the California Coast During the Middle Holocene*, edited by Jon M. Erlandson and Michael A. Glassow, pp. 11-21. University of California Los Angeles, Institute of Archaeology, Perspectives in California Archaeology Vol. 4.

McCarthy, Daniel F.
1986 Archaeological Studies at Hi Card Ranch (CA-RIV-1806), Santa Rosa Plateau, Riverside County, California. *Pacific Coast Archaeological Society Quarterly* 22(2):45-79.

McCown, B. E.
1955 Temeku: A Page from the History of the Luiseño Indians. *Archaeological Survey Association of Southern California* Paper No. 3.

McDonald, Meg, and James D. Eighmey
2008 Late Period Prehistory in San Diego. In *Prehistoric and Historic Archaeology of Metropolitan San Diego: An Historic Properties Background Study*, prepared by ASM Affiliates, Inc., Carlsbad, California, pp. 109-169. Report submitted to the City of San Diego Metropolitan Wastewater Department. Report on file at the South Coastal Information Center, San Diego State University.

McDonald, Meg, Philip J. Wilke, Andrea Kaus, and Chris Moser
1987 McCue: An Elko Site in Riverside, California. *Journal of California and Great Basin Anthropology* 9(1):46-73.

McDougall, Dennis P.
2001a CA-RIV-5045: The Diamond Valley Pinto Site. In *Final Report of Archaeological Investigations, Volume II, Chapter 8: Archaic and Late Prehistoric Occupation Sites*, edited by Melinda C. Horne and Susan E. Rapp, pp. 739-830. Report submitted to the Metropolitan Water District of Southern California. Report on file at the Eastern Information Center, University of California, Riverside.
2001b CA-RIV-5086/H. In *Final Report of Archaeological Investigations, Volume II, Chapter 9: Archaic and Late Prehistoric Occupation Sites*, edited by Melinda C. Horne and Susan E. Rapp, pp. 831-871. Report submitted to the Metropolitan Water District of Southern California. Report on file at the Eastern Information Center, University of California, Riverside.

McGuire, Kelly R.
1995 *Test Excavations at CA-FRE-61, Fresno County, California*. California State University, Bakersfield, Museum of Anthropology, Occasional Papers in Anthropology 5. Bakersfield.

McGuire, Kelly R., and William R. Hildebrandt
1994 The Possibilities of Women and Men: Gender and the California Milling Stone Horizon. *Journal of California and Great Basin Anthropology* 16(1):41-59.

McKusick, M. B., and Claude N. Warren
1959 Introduction to San Clemente Archaeology. *University of California Archaeological Survey Annual Report* 1958-1959:105-139. Los Angeles.

Meighan, Clement W.
1959 Californian Cultures and the Concept of an Archaic Stage. *American Antiquity* 24(3):289-305.
1963 Pre-Milling Stone Cultures. *Nevada State Museum Anthropological Papers* No. 9:78-81. Carson City.
1965 Pacific Coast Archaeology. In *The Quaternary of the United States*, edited by H. E. Wright and David G. Frey, pp. 709-720. Princeton University Press, Princeton, New Jersey.
2000 Overview of the Archaeology of San Clemente Island, California. *Pacific Coast Archaeological Society Quarterly* 36(1):1-17.

Meighan, Clement W., and Janet Scalise (editors)
1988 *Obsidian Dates IV*. University of California, Los Angeles, Institute of Archaeology Monograph No. 24.

Milburn, Douglas, Uyen Doan, and Joanna Huckabee
2008 Spatial and Temporal Distributions of Archaeological Heated Rock Food Cooking

Structures in the Transverse Mountains Ranges: Proposed Markers of Land-Use Shifts Since the Early Holocene. Paper presented at the 42nd Annual Meeting of the Society for California Archaeology, Burbank.

Moratto, Michael J.
1984 *California Archaeology*. Academic Press, Orlando, Florida.

Moriarty, James R.
1966 Cultural Phase Divisions Suggested by Typological Change Coordinated with Stratigraphically Controlled Radiocarbon Dating at San Diego. *The Anthropological Journal of Canada* 4(4):20-30.
1967 Transitional Pre-Desert Phase in San Diego County, California. *Science* 155(3762):553-556.
1968 The Environmental Variations of the Yuman Culture Area of Southern California: Part I. *The Anthropological Journal of Canada* 6(2):2-20.

Moriarty, James R., George Shumway, and Claude N. Warren
1959 Scripps Estates Site I (SDi-525): A Preliminary Report on an Early Site on the San Diego Coast. *University of California Archaeological Survey Annual Report* 1958-1959:185-216. Los Angeles.

Muñoz, Jeanne
1975 Report of Archaeological Investigations of the Southwest Portion of CA-ORA-83. *Pacific Coast Archaeological Society Quarterly* 11(3):1-32.

Noah, Anna C.
1998 Prehistoric Fishing on the San Diego Coast. *Pacific Coast Archaeological Society Quarterly* 34(2):1-31.

Osborne, Douglas
1958 Western American Prehistory–An Hypothesis. *American Antiquity* 24(1):47-52.

Parr, Robert E., David J. Scott, and Mark Q. Sutton
2001 Archaeological Investigations at CA-SBR-7691, A Millingstone Horizon Site in the Summit Valley, San Bernardino County, California. *San Bernardino County Museum Association Quarterly* 48(1).

Peck, Stuart L.
1955 *An Archaeological Report on the Excavation of a Prehistoric Site at Zuma Creek, Los Angeles County, California*. Archaeological Survey Association of Southern California Paper No. 2. Los Angeles.

Pigniolo, Andrew, Theodore Cooley, Joyce Clevenger, and Lynn Christenson
1991 *The Archaeology of a La Jolla Complex Coastal Camp: Data Recovery at CA-SDI-10,945, Point Loma Naval Facilities, San Diego, California*. Report submitted to U. S. Navy. Report on file at the South Coastal Information Center, San Diego State University.

Porcasi, Judith F.
1995 Shobhan Paul Site (CA-LAN-958) Chipped Stone Analysis. In *The Shobhan Paul Site (CA-LAN-958): Archaeological Investigations of a Coastal Millingstone Horizon Occupation*, edited by Roy A. Salls, pp. 58-109. Coyote Press Archives of California Prehistory 43. Salinas, California.

Porcasi, Judith F., and Paul Porcasi
2002 New Dates and Data from Archaic Malibu with Some Regional Considerations. *Pacific Coast Archaeological Society Quarterly* 38(4):21-43.

Raab, L. Mark, and William J. Howard
2002 Modeling Cultural Connections Between the Southern Channel Islands and Western United States: The Middle Holocene Distribution of *Olivella* Grooved Rectangle Beads. In *Proceedings of the Fifth California Islands Symposium*, pp. 590-597. Santa Barbara Museum of Natural History, Santa Barbara.

Raab, L. Mark, Katherine Bradford, and Andy Yatsko
1994 Advances in Southern Channel Islands Archaeology: 1983-1993. *Journal of California and Great Basin Anthropology* 16(2):243-270.

Raab, L. Mark, Judith F. Porcasi, Katherine Bradford, and Andy Yatsko
1995 Debating Cultural Evolution: Regional Implications of Fishing Intensification at Eel Point, San Clemente Island. *Pacific Coast Archaeological Society Quarterly* 31(3):3-27.

Reddy, Seetha N.
2000 *Lagoonal Riches, Marine Plenitude and Bountiful Harvests: Subsistence, Settlement and Behavioral Modeling at SDI-4416, Camp Pendleton, California*. Report submitted to the U. S. Army Corps of Engineers. Report on file at the South Coastal Information Center, San Diego State University.

Robinson, Mark C.
1998 *Arrow Points from the Eastside Reservoir Project: Typology and Chronology in the Late Prehistory of Riverside County, California*. Master's thesis, Department of Anthropology, University of Oregon, Eugene.

Rogers, David Banks
1929 *Prehistoric Man of the Santa Barbara Coast*. Santa Barbara Museum of Natural History, Santa Barbara, California.

Rogers, Malcolm J.
1929 The Stone Art of the San Dieguito Plateau. *American Anthropologist* 31(3):454-467.
1939 *Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas*. San Diego Museum of Man Papers 3. San Diego.
1945 An Outline of Yuman Prehistory. *Southwestern Journal of Anthropology* 1(2):167-198.

Rondeau, Michael F., Jim Cassidy, and Terry L. Jones
2007 Colonization Technologies: Fluted Projectile Points and the San Clemente Island Woodworking/Microblade Complex. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 63-70. AltaMira Press. Lanham, Maryland.

Rosenthal, Jeffrey S., William R. Hildebrandt, and Jerome H. King
2001 *Donax* Don't Tell: Reassessing Late Holocene Land Use in Northern San Diego County. *Journal of California and Great Basin Anthropology* 23(2):179-214.

Rozaire, Charles E.
1960 The Archaeology at Encino, California. *University of California Archaeological Survey Annual Report* 1959-1960:307-355. Los Angeles.

Rozaire, Charles E., and R. E. Belous
1950 *Preliminary Report on the Archaeology of the La Ballona Creek Area, Los Angeles County, California*. Manuscript on file at the South Central Coastal Information Center, California State University, Fullerton.

Ruby, Jay
1961 Excavations at Zuma Mesa (LAn-40). *University of California Archaeological Survey Annual Report* 1960-1961:190-231. Los Angeles.

Salls, Roy A.
1983 *The Liberty Grove Site: Archaeological Interpretations of a Late Millingstone Site on the Cucamonga Plain*. Master's thesis, Department of Anthropology, University of California, Los Angeles.
1985 The Scraper Plane: A Functional Interpretation. *Journal of Field Archaeology* 12(1):99-106.
1995 Introduction. In *The Shobhan Paul Site (CA-LAN-958): Archaeological Investigations of a Coastal Millingstone Horizon Occupation*, edited by Roy A. Salls, p. 1. Coyote Press Archives of California Prehistory No. 43. Salinas, California.

Shumway, George, Carl L. Hubbs, and James R. Moriarty
1961 Scripps Estates Site, San Diego, California: A La Jolla Site Dated 5460 to 7370 Years Before the Present. *Annals of the New York Academy of Sciences* 93(3):37-132.

Shutler, Richard, Jr.
1967 Cultural Chronology in Southern Nevada. In *Pleistocene Studies in Southern Nevada*, edited by H. M. Wormington and Dorothy Ellis, pp. 304-308. Nevada State Museum Anthropological Papers No. 13. Carson City.

Smith, Brian F.
1986 *A Brief Summary of Excavations, Evaluation of Uniqueness, and Impact Analysis of the Charles H. Brown, Sr. Site (W-1137)*. Report on file on file at the South Coastal Information Center, San Diego State University.
1987 A Reinterpretation of the Transitional Phase. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis R. Gallegos, pp. 61-71. San Diego County Archaeological Society Research Papers No. 1. San Diego.

Smith, Gerald A.
1942 Traces of Ancient Man at Bloomington, California. *The Masterkey* 16(4):124-127.
1963 *Archeological Survey of the Mojave River Area and Adjacent Regions*. San Bernardino County Museum Association, Redlands, California.

Sutton, Mark Q.
1978 A Series of Discoidals from Northern San Diego County, California. *The Journal of California Anthropology* 5(2):266-270.
1993 On the Subsistence Ecology of the "Late Inland Millingstone Horizon" in Southern California. *Journal of California and Great Basin Anthropology* 15(1):134-140.
1996 The Current Status of the Archaeology of the Mojave Desert. *Journal of California and Great Basin Anthropology* 18(2):221-257.
2008 From the Desert to the Sea to All of Southern California: Some Thoughts on the Early Prehistory of the Los Angeles Basin. Paper presented at the 42nd Annual Meeting of the Society for California Archaeology, Burbank.
2009 People and Language: Defining the Takic Expansion into Southern California. *Pacific Coast Archaeological Society Quarterly* 41(2&3):31-93.

Sutton, Mark Q., and Jill K. Gardner
2008 *Out of the Blue: Data Recovery Investigations at the Blue Cut Site (CA-SBR-12569/H): BNSF Railway Co. Cajon Subdivision Third Main Track Keenbrook to Summit Project, Cajon Pass, San Bernardino, California*. Technical Report 08-38, Statistical Research, Inc., Tucson, Arizona.

Sutton, Mark Q., and Henry C. Koerper
2009 The Middle Holocene Western Nexus: An Interaction Sphere Between Southern California and the Northwestern Great Basin. *Pacific Coast Archaeological Society Quarterly* 41(2&3):1-29.

Sutton, Mark Q., Joan S. Schneider, and Robert M. Yohe II
1993 The Siphon Site (CA-SBR-6580): A Millingstone Horizon Site in Summit Valley, California. *San Bernardino County Museum Association Quarterly* 40(3).

Sutton, Mark Q., Mark E. Basgall, Jill K. Gardner, and Mark W. Allen
2007 Advances in Understanding Mojave Desert Prehistory. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 229-245. AltaMira Press, Lanham, Maryland.

Tartaglia, Louis J.
1980 *An Archaeological Assessment of the Walker Cairn Site (4-LAN-21), Chatsworth, California*. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Taylor, Walter W.
1961 Archaeology and Language in Western North America. *American Antiquity* 27(1):71-81.

Thomas, David B., and John Beaton
1968 The Trancas Canyon Cemetery Site (4-Lan-197): An Analysis of Mortuary Customs. *University of California Archaeological Survey Annual Report* 1968:162-174. Los Angeles.

Towner, Ronald H., Keith B. Knoblock, and Alex V. Benitez
1997 Flaked and Ground Stone Analysis. In *Continuity & Change: 8,500 Years of Lacustrine Adaptation on the Shores of Lake Elsinore*, by Donn R. Grenda, pp. 167-248. Technical Series 59, Statistical Research, Inc., Tucson, Arizona.

Treganza, Adán E.
1950 *The Topanga Culture and Southern California Prehistory*. Ph.D. dissertation, Department of Anthropology, University of California, Berkeley.

Treganza, Adán E., and Alice Bierman
1958 The Topanga Culture: Final Report on Excavations, 1948. *University of California Anthropological Records* 20(2). Berkeley.

Treganza, Adán E., and Constance G. Malamud
1950 The Topanga Culture: First Season's Excavation of the Tank Site, 1947. *University of California Anthropological Records* 12(4). Berkeley.

True, D. L.
1958 An Early Complex in San Diego County, California. *American Antiquity* 23(3):255-263.
1970 *Investigations of a Late Prehistoric Complex in Cuyamaca Rancho State Park, San Diego County, California.* University of California, Los Angeles, Archaeological Survey Monograph.
1980 The Pauma Complex in Northern San Diego County: 1978. *Journal of New World Archaeology* 3(4):1-39.

1987 Malaga Cove: One More Comment. *Journal of California and Great Basin Anthropology* 9(2):273-282.

True, D. L., and Martin A. Baumhoff
1985 Archaeological Investigations at Lake Berryessa, California, Berryessa II. *Journal of California and Great Basin Anthropology* 7(1):21-45.

True, D. L. Martin A. Baumhoff, and J. E. Hellen
1979 Milling Stone Cultures in Northern California: Berryessa I. *Journal of California and Great Basin Anthropology* 1(1):124-154.

True, D. L., and Eleanor Beemer
1982 Two Millingstone Inventories from Northern San Diego County, California. *Journal of California and Great Basin Anthropology* 4(2):233-261.

True, D. L., and Rosemary Pankey
1985 Radiocarbon Dates for the Pauma Complex Component at the Pankey Site, Northern San Diego County, California. *Journal of California and Great Basin Anthropology* 7(2):240-244.

True, D. L., Rosemary Pankey, and Claude N. Warren
1991 Tom-Kav: A Late Village Site in Northern San Diego County, California, and Its Place in the San Luis Rey Complex. *University of California Anthropological Records* 30. Berkeley.

Underbrink, Susan, and Henry C. Koerper
2006 A Taxonomic Tour of Cogged Stone Types. *Proceedings of the Society for California Archaeology* 19:111-119. Chico.

Vanderpot, Rein, Jeffrey H. Altschul, and Donn R. Grenda
1993 *Whelan Lake (CA-SDI-6010): A La Jollan Campsite on the Lower San Luis Rey River, San Diego County, California*. Technical Series 40, Statistical Research, Inc., Tucson, Arizona.

Van Galder, Sarah, Richard Ciolek-Torrello, Amanda Cannon, and Tina Fulton
2007 8,000 Years of Subsistence Along Santa Monica Bay, A Faunal Perspective. Paper presented at the 41st Annual Meeting of the Society for California Archaeology, San Jose.

Van Horn, David M.
1983 *Archaeological Survey Report: A 30± Acre Tract at the Northwest Corner of Manchester & Hastings Avenues in the City of Los Angeles*. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Van Horn, David M., and Laurie S. White
1997 *LAN-206 and the West Bluff Property*. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Van Horn, David M., Laurie S. White, Lee A. DiGregorio, Susan M. Colby, and Roy A. Salls
2003 *Excavations at the Berger Site (Lan-206): a Prehistoric Millingstone and Intermediate Deposit in the City of Los Angeles*. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Vellanoweth, René L.
1995 New Evidence from San Nicholas Island on the Distribution of *Olivella* Grooved Rectangle Beads. *Pacific Coast Archaeological Society Quarterly* 31(4):13-22.

2001 AMS Radiocarbon Dating and Shell Bead Chronologies: Middle Holocene Trade and Interaction in Western North America. *Journal of Archaeological Science* 28(9):941-950.

Walker, Edwin F.
1937 Sequence of Prehistoric Material Culture at Malaga Cove, California. *The Masterkey* 11(6):210-214.
1939 Prehistoric Mortuary Cairns at Chatsworth, California. *The Masterkey* 13(4):131-135.
1951 *Five Prehistoric Archeological Sites in Los Angeles County, California*. Publications of the Frederick Webb Hodge Anniversary Publication Fund Vol. 6, Southwest Museum. Los Angeles.

Wallace, William J.
1954 The Little Sycamore Site and the Early Milling Stone Cultures of Southern California. *American Antiquity* 20(2):112-123.
1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11(3):214-230.
1962 Prehistoric Cultural Development in the Southern California Deserts. *American Antiquity* 28(2):172-180.
1978 Post-Pleistocene Archeology, 9000 to 2000 B.C. In *California*, edited by Robert F. Heizer, pp. 25-36. Handbook of North American Indians, Vol. 8, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.
1984 Prehistoric Cultural Development in the South Bay District, Los Angeles County, California. *Pacific Coast Archaeological Society Quarterly* 20(3):1-4.
1985 A Last Look at Malaga Cove. In *Woman, Poet, Scientist: Essays in New World Anthropology Honoring Dr. Emma Lou Davis*, edited by Thomas C. Blackburn, pp. 136-144. Ballena Press Anthropological Papers No. 29. Los Altos, California.
1986 Archaeological Research at Malaga Cove. In *A New Look at Some Old Sites*, edited by Francis A. Riddell, pp. 21-27. Coyote Press Archives of California Prehistory No. 6. Salinas, California.

Wallace, William J., Edith S. Taylor, Roger J. Desautels, H. Robert Hammond, Heriberto Gonzales, James Bogart, and John Peter Redwine
1956 The Little Sycamore Shellmound, Ventura County, California. *Archaeological Research Associates, Contributions to California Archaeology* No. 2. Los Angeles.

Warren, Claude N.
1964 *Cultural Change and Continuity on the San Diego Coast*. Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.
1967 The San Dieguito Complex: A Review and Hypothesis. *American Antiquity* 32(2):168-185.
1968 Cultural Tradition and Ecological Adaptation on the Southern California Coast. In *Archaic Prehistory in the Western United States*, edited by C. Irwin-Williams, pp. 1-14. Eastern New Mexico University Contributions in Anthropology 1(3). Portales.
1984 Horizon and Tradition on the Southern California Coast: A Comment. *Journal of California and Great Basin Anthropology* 6(2):266-268.
1991 *Archaeological Investigations at Nelson Wash, Fort Irwin, California. Fort Irwin Archaeological Project Research Report No. 23.* 2 vols. Report submitted to the U.S. Army. Report on file at the San Bernardino County Archaeological Information Center, San Bernardino County Museum, Redlands, California
1994 Water and Man in the Deep Desert: A Model for Changing Settlement Patterns of the Early Holocene. In *Kelso Conference Papers 1987-1992, A Collection of Papers and Abstracts from the First Five Kelso Conferences on the Prehistory of the Mojave Desert*, edited by G. Dicken Everson and Joan S. Schneider, pp. 113-122. California State University,

Bakersfield, Museum of Anthropology Occasional Papers in Anthropology No. 4.

2008 Highway Archaeology, Batiquitos Lagoon and the Coastal Decline Model: An Historical Sketch. Paper presented at the 42nd Annual Meetings of the Society for California Archaeology, Burbank.

Warren, Claude N., and Max G. Pavesic
1963 Appendix I: Shell Midden Analysis of Site SDi-603 and Ecological Implications for Cultural Development of Batiquitos Lagoon, San Diego County, California. *University of California Archaeological Survey Annual Report* 1962-1963:407-438. Los Angeles.

Warren, Claude N., D. L. True, and Ardith A. Eudey
1961 *Early Gathering Complexes of Western San Diego County: Results and Interpretations of an Archaeological Survey*. University of California Archaeological Survey Annual Report 1960-1961:1-106. Los Angeles.

Warren, Claude N., Gretchen Siegler, and Frank Dittmer
2008 Paleoindian and Early Archaic Periods. In *Prehistoric and Historic Archaeology of Metropolitan San Diego: An Historic Properties Background Study*, prepared by ASM Affiliates, Inc., Carlsbad, California, pp. 13-107. Report submitted to the City of San Diego Metropolitan Wastewater Department. Report on file at the South Coastal Information Center, San Diego State University.

Wasson, Warren, Dana Bleitz-Sanburg, Delmer Sanburg, Jr., Ralph Marshall, Robert Fondren, and Ron Amerine
1978 The Wilson Site (CA-LAn-518). *Pacific Coast Archaeological Society Quarterly* 14(2):1-18.

Waugh, Georgie
2003 Prehistory of the Transverse Ranges of California: An Archaeological Investigation in the Santa Clara River Valley. *Monographs in California and Great Basin Anthropology* No. 4. Archaeological Research Center, California State University, Sacramento.

West, G. James
1979 *The Archaeology of Ven-100*. California Department of Parks and Recreation Archeological Reports 17. Sacramento.

Whitney-Desautels, Nancy
1997 *Cultural Resources Assessment of the Hellman Ranch, Seal Beach, California*. Report on file at the South Central Coastal Information Center, California State University, Fullerton.

Wilke, Phillip J.
1974 Settlement and Subsistence at Perris Reservoir: A Summary of Archaeological Investigations. In *Perris Reservoir Archeology: Late Prehistoric Demographic Change in Southeastern California*, edited by James F. O'Connell, Philip J. Wilke, Thomas F. King, and Carol L. Mix, pp. 20-29. California Department of Parks and Recreation Archeological Reports No. 14. Sacramento.

Wilke, Philip J., Meg McDonald, and Louis A. Payen
1986 *Excavations at Indian Hill Rockshelter, Anza-Borrego Desert State Park, California: 1984-1985*. Report on file with the California Department of Parks and Recreation, Sacramento.

Willey, Gordon R., and Philip Phillips
1958 *Method and Theory in American Archaeology*. University of Chicago Press, Chicago.

Winterbourne, John W.
1968a Orange County California Historical Research Project: Report of Banning Estate Excavation (Norris Property). *Pacific Coast Archaeological Society Quarterly* 4(2):10-17.

1968b Orange County California Anthropological Project: Report of the Excavation of the Griset Site at Costa Mesa, Orange County. *Pacific Coast Archaeological Society Quarterly* 4(2):18-68.

Wyss, Marilyn J.
2001 Human Osteology. In *Final Report of Archaeological Investigations, Volume V: Technical Studies*, edited by Melinda C. Horne and Susan E. Rapp, pp. 231-242. Report submitted to the Metropolitan Water District of Southern California. Report on file at the San Bernardino County Archaeological Information Center, San Bernardino County Museum, Redlands.

Yohe, Robert M. II
1995 Vertebrate Faunal Remains from CA-MNO-2122. In *The Archaeology of CA-MNO-2122: A Study of Pre-Contact and Post-Contact Lifeways Among the Mono Basin Paiute*, by Brooke S. Arkush, pp. 65-70. University of California Press, Berkeley.

1996 An Analysis of the Vertebrate Faunal Remains from CA-SBR-1913. *San Bernardino County Museum Association Quarterly* 43(4):59-63.

Yohe, Robert M. II, and Paul G. Chace
1995 The Archaeology of Las Montanas (CA-SDI-10246): A Paleo-Economic Interpretation of a Milling Stone Horizon Site, San Diego County, California. *Coyote Press Archives of California Prehistory* 42. Salinas, California.

York, Andrew L., and Jackson Underwood
2002 *Archaeological Investigations Within the Hellman Ranch Specific Plan Area, Seal Beach, California*. Report on file at the South Coastal Information Center, San Diego State University.

York, Andrew, C. Dolan, Jackson Underwood, and T. Wahoff
1999 *Archaeological Investigations Along the Lower Santa Margarita River, San Diego County, California.* Report submitted to the U.S. Army Corps of Engineers. Report on file at the South Coastal Information Center, San Diego State University.