

UC Merced

Journal of California and Great Basin Anthropology

Title

Early Holocene Settlement and Subsistence in Relation to Coastal Paleogeography:
Evidence from CA-SBA-1807

Permalink

<https://escholarship.org/uc/item/5m8306rn>

Journal

Journal of California and Great Basin Anthropology, 7(1)

ISSN

0191-3557

Author

Erlandson, John M.

Publication Date

1985-07-01

Peer reviewed

- Kington, J. A.
1980 Daily Weather Mapping from 1781. *Climatic Change* 3: 7-36.
- Koerper, Henry C.
1981 Prehistoric Subsistence and Settlement in the Newport Bay Area and Environs, Orange County, California. Ph.D. dissertation, 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): 1-33.
- Lamb, Hubert H.
1977 *Climate, Past Present and Future, 2, Climatic History and the Future*. London: Methuen and Co.
- Lindgren, S., and J. Neumann
1981 The Cold and Wet Year 1695 – a Contemporary German Account. *Climatic Change* 3: 173-187.
- Moratto, Michael J., Thomas F. King, and Wallace B. Woolfenden
1978 Archaeology and California's Climate. *The Journal of California Anthropology* 5(2): 147-161.
- Namias, Jerome
1969 Use of Sea-Surface Temperatures in Long Range Predictions. *World Meteorological Organization Technical Note No. 103*.
- O'Neil, Stephen, and Nancy Evans
1980 Notes on Historical Juaneño Villages and Geographical Features. *Journal of California and Great Basin Anthropology* 2(2): 226-232.
- Pisias, Nicklas G.
1978 Paleooceanography of the Santa Barbara Basin During the Last 8000 Years. *Quaternary Research* 10: 366-384.
1979 Model for Paleooceanographic Reconstructions of the California Current During the Last 8000 Years. *Quaternary Research* 11: 373-386.
- Roden, Gunnar I.
1966 A Modern Statistical Analysis and Documentation of Historical Temperature Records in California, Oregon and Washington, 1821-1964. *Journal of Applied Meteorology* 5: 3-24.
- Schneider, Stephen H., and Clifford Mass
1975 Volcanic Dust, Sunspots and Temperature Trends. *Science* 190: 741-746.
- Soutar, Andrew, and Peter A. Crill
1977 Sedimentation and Climatic Patterns in the Santa Barbara Basin During the 19th and 20th Centuries. *Geological Society of America Bulletin* 88: 1161-1172.
- Stuvier, M., and P. D. Quay
1980 Changes in Atmospheric Carbon-14 Attributed to a Variable Sun. *Science* 207: 11-19.
- Tont, Sargun A.
1975 The Effect of Upwelling on Solar Irradiance Near the Coast of Southern California. *Journal of Geographical Research* 80(36): 5031-5034.
1976 Short-Period Climatic Fluctuations: Effects on Diatom Biomass. *Science* 194: 942-944.
- Wallace, William J.
1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11(3): 214-230.



Early Holocene Settlement and Subsistence in Relation to Coastal Paleogeography: Evidence from CA-SBA-1807

JON M. ERLANDSON

During the summer of 1984, archaeological investigations on the coast west of Santa Barbara provided preliminary data from an early Milling Stone site (CA-SBA-1807) dating to 8,000 radiocarbon years B.P. Radio-

Jon M. Erlandson, Dept. of Anthropology, Univ. of California, Santa Barbara, CA 93106.

carbon dates from the site extend the absolute cultural chronology for the mainland coast of the Santa Barbara Channel nearly 700 years, bringing the local sequence into closer accord with the surrounding Channel Island and central California coastal areas. More importantly, analysis of the artifact and faunal assemblages from CA-SBA-1807 provides insight into the nature of settlement, subsistence, and paleoenvironments during a poorly known period of Santa Barbara Channel prehistory, Phase X of King's (1981) Early Period. This brief paper summarizes current knowledge of CA-SBA-1807 and discusses implications of the data for understanding the prehistory of the Santa Barbara Channel and other Early Period coastal sites of southern and central California.

LOCATION AND ENVIRONMENTAL CONTEXT

The site is situated on an uplifted marine terrace on the west rim of Cañada de Alegría (Fig. 1). It is located approximately five km. west of Gaviota State Beach and 17 km. east of Point Conception.

Cañada de Alegría contains a perennial stream with a relatively large catchment area (ca. 900 ha.). The modern shoreline is located immediately south of the site at the base of a nearly vertical sea cliff which drops 80 ft. to a rocky sand beach below. The mouth of Cañada de Alegría is periodically blocked by beach sand, forming a small seasonal estuary immediately behind the beach.

The site area contains heavy clay soils developed in Quaternary alluvium that overlies a marine abrasion platform of Last Interglacial age. This terrace is incised into shales of the Sisquoc and Monterey formations. The Santa Ynez Mountains rise steeply to the north, reaching elevations of nearly 1,000 feet within a kilometer of the coast.

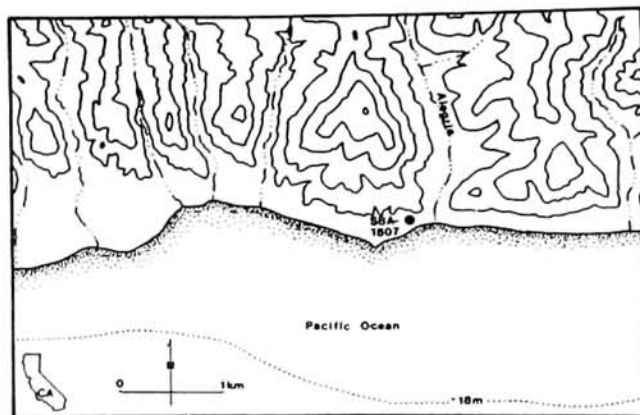


Fig. 1. Map showing the location of CA-SBA-1807 in relation to present coastline and the approximate location of the -18 m. isobath (contour interval = 61 m. or 200 ft.).

HISTORY OF ARCHAEOLOGICAL INVESTIGATION

Initially recorded in 1977 by C. Kuffner and K. Wallof, CA-SBA-1807 was described as a small (10 x 30-m.), shallow shell midden located on a slight knoll above the sea cliff south of the Southern Pacific railroad tracks. With the exception of two "possible chert core fragments" no artifacts were reported. The shell midden located south of the railroad was destroyed by Southern Pacific grading sometime after 1977.

During 1983, additional archaeological reconnaissance by WESTEC Services, Inc., resulted in the discovery of a second discrete midden deposit located north of the railroad tracks. Two 1 x 1-m. test units were excavated in this northern locus, one near the central area of the midden and one in a disturbed area on the site periphery (WESTEC 1984: 21). Archaeological remains recovered from the test units were analyzed in detail by the Office of Public Archaeology at the University of California, Santa Barbara, as part of a reconnaissance and shovel test pit (STP) program designed to define the boundaries of the site deposits in relation to a proposed pipeline development (Erlandson et al. 1984).

SITE CHRONOLOGY AND ARTIFACT ASSEMBLAGE

Six radiocarbon dates were obtained for CA-SBA-1807, all derived from marine shell samples. These range in age between 6,340 and 8,000 radiocarbon years B.P. (Table 1), although the youngest assayed sample was collected from equivocal surface contexts outside of the central midden area. Analysis of $^{13}\text{C}/^{12}\text{C}$ ratios on one sample suggest that errors associated with isotopic fractionation and the reservoir effect very nearly cancel each other out. Further, dendrocalibration of the dates places the earliest occupation of CA-SBA-1807 at nearly 8,800 calendar years B.P. (M. Stuiver, personal communication 1985). Thus, the site is attributable to Phase X of King's (1981) Early Period, a poorly understood phase in Santa Barbara Channel regional prehistory (Glassow, Wilcoxon, and Erlandson n.d.).

The inventory of formal artifacts from CA-SBA-1807 is small, despite a number of episodes of reconnaissance, limited surface collections, and the excavation of two test units and 57 STPs (the latter mostly on the site periphery). Nonetheless, the artifact assemblage is consistent with an early Milling Stone (Wallace 1955) occupation of the site — numerous sandstone manos and metate fragments are present, and the surface chipped-stone inventory is dominated by large, rela-

tively crude, flake and core tools. Several crude biface fragments have been observed, including a large contracting-stem projectile point base. Chipped-stone debitage is abundant, consisting predominantly of local Monterey chert, although local or nearby quartzites and Franciscan chert are also present. The presence of small quantities of exotic obsidian indicates an early participation in inter-regional exchange networks.

FAUNAL REMAINS

The shellfish assemblage from CA-SBA-1807 is notable for the abundance of quiet-water bay or estuary species. Over 95% of the identifiable shell recovered from WESTEC's test unit 2 consisted of such species (Table 2). However, this shellfish assemblage may have been biased by the recovery methods used during excavation. Although 1/8-in. mesh was used to screen the excavated sediments, artifacts and faunal remains were hand picked from screen residuals in the field.

Experience working in similar clay soils has shown that such recovery techniques often underrepresent the smaller and more fragile classes of artifacts and faunal remains. This problem can have pronounced effects on shellfish assemblages, often underestimating the importance of rocky-shore species such as *Mytilus californianus*. The shellfish assemblage from STPs excavated at CA-SBA-1807

Table 1
RADIOCARBON DATES FROM CA-SBA-1807

| Lab No. | Date | Material | Provenience |
|------------|-------------|---------------------------|----------------------|
| Beta-10228 | 7720 ± 90 | Mixed shell | Unit 2: 20-30 cm. |
| Beta-10736 | 6340 ± 80 | <i>Polonices lewisii</i> | Surface |
| Beta-12347 | 7830 ± 70 | Mixed shell | Unit 2: 30-40 cm. |
| Beta 12949 | 7840 ± 110* | Mixed shell | Unit 12: 80-100 cm. |
| Beta-12950 | 7770 ± 100 | <i>Saxidomus nuttalli</i> | Unit 12: 100-120 cm. |
| Beta-12951 | 8000 ± 110 | <i>Saxidomus nuttalli</i> | Unit 12: 120-140 cm. |

* Adjustment for isotopic fractionation ($^{13}\text{C}/^{12}\text{C}$) results in a date of 8235 ± 115.

Table 2
SHELLFISH REMAINS (WEIGHT IN GRAMS) FROM TEST UNIT 2

| Habitat*/Taxa | Depth in cm. | | | | Total | Percent |
|-------------------------------|--------------|-------------|-------------|-------------|--------------|--------------|
| | 0-10 | 10-20 | 20-30 | 30-40 | | |
| Bay/Estuarine species | | | | | | |
| <i>Chione californianus</i> | 6.8 | 3.5 | — | 2.4 | 12.7 | 6.0 |
| <i>Chione undatella</i> | 5.3 | 8.4 | 28.1 | 9.6 | 51.4 | 24.2 |
| <i>Chione</i> sp. | 5.8 | 7.6 | 1.4 | — | 14.8 | 7.0 |
| <i>Ostrea lurida</i> | — | 0.5 | 0.6 | 0.4 | 1.5 | 0.7 |
| <i>Protothaca staminea</i> | 0.4 | 2.5 | 2.8 | 0.9 | 6.6 | 3.1 |
| <i>Saxidomus nuttalli</i> | 19.6 | 18.1 | 16.9 | 9.2 | 63.8 | 30.1 |
| <i>Trachycardium</i> | 0.7 | 0.2 | 0.2 | — | 1.1 | 0.5 |
| Non-Estuarine species | | | | | | |
| <i>Mytilus californianus</i> | 0.2 | 0.4 | 0.5 | 0.4 | 1.5 | 0.7 |
| <i>Olivella biplicata</i> | — | — | — | 1.4 | 1.4 | 0.7 |
| <i>Tivela stultorum</i> | — | 2.6 | 1.9 | — | 4.5 | 2.1 |
| Undifferentiated shell | | | | | | |
| Crab | 0.2 | 0.2 | — | 0.1 | 0.5 | 0.2 |
| Pelecypod | 3.5 | 12.7 | 15.5 | 4.7 | 36.4 | 17.1 |
| Other shell | 3.3 | 4.6 | 5.7 | 2.4 | 16.0 | 7.5 |
| Total | 45.8 | 61.3 | 73.6 | 31.5 | 212.2 | 100.0 |

*Compiled from Ricketts, Calvin, and Hedgpeth (1968).

was recovered through laboratory sorting of water-screen residuals and showed a distribution of taxa and habitats similar to that from test unit 2. However, only shell remains larger than 1/4-in. were specifically identified, and over 60% of the assemblage remains unsorted. A visual scan of this unsorted shell suggests that *Mytilus* and other rocky-shore species are present in relatively small quantities (J. Moore, personal communication 1985).

The presence of abundant bay/estuarine shellfish remains is intriguing because of the marked contrast to modern intertidal habitats in the site vicinity. Today, there appear to be no major bays or estuaries that would support such species west of the Goleta Slough or south of the Santa Ynez River mouth.

A relatively small amount of bone was recovered from CA-SBA-1807, and this has only partially been analyzed. At present, it is not known if the dearth of bone is due to the limited excavation or to taphonomic processes which may act to selectively deteriorate bone at the site.

Of the identified skeletal elements, those of land mammals appear to be predominant although most of the identified remains are from species that could be of natural rather than cultural origin. A small number of identifiable fish bones were also recovered, including three elasmobranchs (batray, thornback, and shovelnose guitarfish) and four teleost species (sardine, white croaker, pile perch, and white sea bass). Among the identified species, at least six are common inhabitants of estuaries and/or shallow bay habitats (Johnson 1980a, 1980b). Thus, the limited fish-bone assemblage recovered also suggests that CA-SBA-1807 was located adjacent to extensive bay/estuary habitats during the early Holocene.

DISCUSSION

Early Holocene Coastal Environments

The recovery of a primarily bay/estuarine faunal assemblage at CA-SBA-1807 suggests

that major environmental changes have occurred in the site vicinity over the course of the Holocene. The most important process involved in these changes may well be sea-level fluctuation. While the nature of Holocene sea-level changes is the subject of some debate, it seems likely that sea levels ca. 8,000 radiocarbon years ago would have stood between 15 and 20 m. lower than at present (Inman 1983: 9), after rising rapidly over the preceding ten millennia. During this earlier period, eustatic rise probably outstripped sedimentation and tectonic uplift, resulting in the deep inundation of coastal drainages. According to a model proposed by Inman (1983: 19), this process would have formed a deep embayment within Cañada de Alegría and other coastal drainages in the vicinity. Such an embayment would have provided ideal sheltered habitats for the shellfish species that dominate the faunal assemblage from CA-SBA-1807.

In all likelihood, the site was probably also situated considerably farther from the open coast than at present. Study of coastal erosion along the Santa Barbara Channel mainland has shown that sea cliffs are retreating at rates averaging between 15 and 25 cm. per year (Norris 1968). These rates probably reflect intensified recent erosion due to the damming of coastal rivers and a reduction in littoral sediment. However, extrapolation of Holocene rates equal to 50% of the modern standard back 6,000 years (to the point of relative sea-level stabilization) suggests that CA-SBA-1807 may have been fronted by a coastal plain between 450 and 750 m. wide.

While such an estimate should be regarded with caution, the figures correlate reasonably well with calculations which extrapolate the 25-m. sea-cliff height seaward at an average wave-cut terrace slope of 1.5 degrees (Inman 1983: 12). This latter calculation suggests that the sea cliff may have retreated up to 930 m. over the past 6,000 years. In addition,

a sea level 15 to 25 m. below the present ocean surface would have extended the shoreline even further south at approximately 8,000 radiocarbon years ago. Coastal navigation charts indicate that the 18-m. isobath (submarine contour) lies approximately 1.4 to 1.7 km. south of the present shoreline (Fig. 1).

If this reconstruction is correct, CA-SBA-1807 would have been located at the head of a long, narrow embayment between 7,500 and 8,000 radiocarbon years ago. This embayment may have expanded until the sea level stabilized ca. 6,000 B.P., then would have gradually shrunk as a result of progressive sedimentation, tectonic uplift, and sea-cliff retreat.

This environmental reconstruction supports the idea that one of the most important determinants of Early Period settlement may have been an optimal location of villages in relation to a dynamic interface between three environmental features: stable landforms, fresh water, and the shoreline.

Early Period Chronology

In 1963, several radiocarbon samples from the Glen Annie Canyon site (CA-SBA-142) extended the absolute chronology of the Santa Barbara Channel mainland to between 6,600 and 7,300 radiocarbon years ago (Owen 1964). At the time, CA-SBA-142 was one of the earliest known sites from coastal California. Despite extensive use of radiocarbon dating along the Santa Barbara Channel mainland, no dates older than 7,300 B.P. were obtained in the intervening 22 years (Breschini, Haversat, and Erlandson 1984).

In the meantime, chronologies from surrounding coastal regions have surpassed the Santa Barbara area in length, extending the Early Period to close to or beyond 9,000 years B.P. (e.g., Greenwood 1972; Glassow 1981). This chronological pattern has led to a situation wherein settlement of the Santa

Barbara Channel mainland coast, despite its attractive resource base, appears not to have occurred until after settlement of less productive surrounding areas.

The dating of CA-SBA-1807 extends the Early Period chronology of the mainland area by nearly 700 years and significantly reduces absolute differences between the established sequences for various areas of south-central coastal California. It seems likely that further research will continue to extend the cultural chronology of the Santa Barbara mainland coast.

CONCLUSIONS

Preliminary investigations at CA-SBA-1807 have provided information concerning early Holocene human settlement and subsistence in relation to coastal paleogeography along the Santa Barbara Channel mainland coast. Inman's (1983) model of Holocene coastal development is proposed as a variable to consider in understanding the evolution of human land-use along the south-central California coast. Despite earlier warnings (i.e., Warren and Pavesic 1963; Bickel 1978), many archaeologists continue to underestimate the magnitude of Holocene environmental change in coastal California, and the effects of such change on prehistoric human adaptation and its potential significance for interpretations of the archaeological record.

ACKNOWLEDGEMENTS

I thank Jerry Moore, Tom Rockwell, Lynn Gamble, Madonna Moss, Brenda Bowser, and anonymous referees for their constructive comments. Much of the data presented in this paper was collected under terms of a contract between Arthur D. Little, Inc., and the Office of Public Archaeology (OPA), Social Process Research Institute, University of California, Santa Barbara. Additional data were collected during joint investigations by WESTEC Services, Inc., and OPA under the direction of the author. Funding was provided by Chevron USA, Inc. Minze Stuiver (University of Washington) kindly provided access to

unpublished dendrocalibration data. The shell from CA-SBA-1807 was identified by Brian Haley, the fish bone by Brenda Bowser, and all other bone by Jean Hudson. The assistance of these specialists is greatly appreciated. Nonetheless, responsibility for the interpretations presented rests solely with the author.

REFERENCES

- Bickel, Polly McW.
1978 Changing Sea Levels along the California Coast: Anthropological Implications. *The Journal of California Anthropology* 5: 6-20.
- Breschini, G. S., T. Haversat, and J. Erlandson
1984 California Radiocarbon Dates: Third Edition. Salinas: Coyote Press.
- Erlandson, J., P. Snethkamp, R. Bookspan, J. Johnson, T. Rockwell, and F. Duncan
1984 Archaeological Investigations in Support of the Proposed Chevron/Texaco Onshore Developments: Point Conception to Gaviota Areas, Santa Barbara County California, Vol. 1. Santa Barbara: University of California Office of Public Archaeology.
- Glassow, Michael A.
1981 Archaeological Data Recovery Program in Relation to Space Shuttle Development, Vandenberg Air Force Base, California, Vol. 1. Santa Barbara: University of California Office of Public Archaeology.
- Glassow, M. A., L. R. Wilcoxon, and J. Erlandson
n.d. Cultural and Environmental Change During the Early Period of Santa Barbara Channel Prehistory. In: *Hunter-Gatherer Subsistence Economies in Coastal Environments*, J. Parkington and G. Bailey, eds. Cambridge: Cambridge University Press (in press).
- Greenwood, Roberta S.
1972 9,000 Years of Prehistory at Diablo Canyon. San Luis Obispo County Archaeological Society Occasional Papers 7.
- Inman, Douglas L.
1983 Application of Coastal Dynamics to the Reconstruction of Paleocoastlines in the Vicinity of La Jolla, California. In: *Quaternary Coastlines and Marine Archaeology*, P. Masters and N. Flemming, eds, pp. 1-49. New York: Academic Press.

- Johnson, John R.
 1980a Reconstructing the Prehistoric Fishery of the Goleta Lagoon. MS on file, Department of Anthropology, University of California, Santa Barbara.
- 1980b Analysis of Fish Remains. In: Cultural Resources Technical Report: Proposed Embarcadero Residential Development, J. B. Serena, ed., pp. 215-223. Santa Barbara: University of California Social Process Research Institute.
- King, Chester D.
 1981 The Evolution of Chumash Society. Ph.D. dissertation, University of California, Davis.
- Norris, R.
 1968 Sea Cliff Retreat Near Santa Barbara, California. California Division of Mines and Geology Information Service 21.
- Owen, Roger C.
 1964 Early Milling Stone Horizon (Oak Grove), Santa Barbara County, California: Radiocarbon Dates. *American Antiquity* 30: 210-213.
- Ricketts, Edward F., Jack Calvin, and Joel W. Hedgpeth
 1968 *Between Pacific Tides*. Stanford: Stanford University Press.
- Wallace, William J.
 1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11: 214-230.
- Warren, C. N., and M. G. Pavesic
 1963 Shell Midden Analysis of Site SDi-603 and Ecological Implications for Cultural Development of Batiquitos Lagoon, San Diego County, California. Los Angeles: University of California Archaeological Survey Annual Report 1962-1963: 407-438.
- WESTEC Services, Inc.
 1984 Report of Archaeological Testing Program for the Proposed Point Arguello Project, Santa Barbara County, California. MS on file, Department of Anthropology, University of California, Santa Barbara.

Fish Remains from an "Open" Archaeological Site in the Fort Rock Basin, South-Central Oregon

KATHRYN ANNE TOEPEL
 RUTH L. GREENSPAN

Archaeological field studies in the Great Basin traditionally have focused on the excavation of caves and rockshelters containing stratified cultural deposits and well-preserved organic remains. A more recent emphasis on investigating "open" sites has primarily involved the examination of surficial archaeological characteristics, since it is often assumed that such sites lack significant subsurface cultural deposits with little or no preservation of organic materials.

This report presents results of test excavations at 35LK1016, an open archaeological site in Fort Rock Basin on the northwestern margin of the Great Basin.¹ Found below the surface at the site, in association with chipped and ground stone tools and debitage, were substantial quantities of fish bone and other faunal remains. This collection of fish bone is the largest yet reported from an archaeological site in Fort Rock Basin. The findings made at 35LK1016 provide an example of the scientific potential of open sites in the Great Basin.

SITE LOCATION

The site is located in Silver Lake Valley, the southwestern lobe of the three valleys that comprise Fort Rock Basin, Lake County, south-central Oregon (Fig. 1). Fort Rock Basin has been the scene of archaeological

