RADIOCARBON DATES FROM SINKYONE WILDERNESS STATE PARK: VARIABILITY AND CONCORDANCE

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During 1987 investigations in Sinkyone Wilderness State Park, CA-MEN-2139, a late period coastal site at Whale Gulch, yielded materials suitable for a comparison of obsidian hydration and radiocarbon dating methods. Radiocarbon samples included charcoal from a dense shell lense, terrestrial faunal remains, and two species of shellfish, one a grazer, the other a filter feeder. Results of the study are presented and implications discussed.

This paper briefly describes archaeological work completed in Sinkyone Wilderness State Park during the summer of 1987, with emphasis upon questions that were encountered in interpreting dates obtained from CA-MEN-2139, one of three sites investigated within the park. Archaeological investigations within the park were conducted in conjunction with work carried out within the King Range National Conservation Area. These projects were made possible through the cooperative efforts of BLM archaeologists, Francis Berg and Sharon Waechter, Breck Parkman of the State Department of Parks and Recreation, Santa Rosa Junior College, and Sonoma State University. This paper focuses on one of three sites investigated in the Sinkyone Wilderness State Park, in northern Mendocino county, just south of the King Range. The sites are within the territory of the Shelter Cove Sinkyone, a southern Athapaskan speaking group. One inland site and two coastal sites were subjected to limited excavation carried out from two perspectives, management and research. The scope of work was designed to test various sites and research goals are parallel to those developed for CA-HUM-182 within the King Range (Origer and Fredrickson 1987). Our efforts were aimed at answering questions as to the depth of the sites, the research potential of the sites, and the condition of the sites with regard to erosional and public use damage. In addition to CA-MEN-2139, CA-MEN-1925 and Ca-Men-2074 were also investigated (figure 1).

MEN-1925, the Low Gap Site, is located in a small saddle west of Indian Creek, a minor seasonal drainage. The site lies in a wooded interior environment about 1100 feet above sea level. The vegetation consists of mixed conifer forest of Douglas Fir and Redwood with dense broadleaf undergrowth. The materials collected consist mainly of Franciscan chert artifacts and flakes. No traces of shellfish remains were found, and very few bone fragments were recovered.

MEN-2074 is a coastal site located at the mouth of Jackass Creek along the edge of the ocean beach where, exposed to tidal action, the sandy midden is eroding rapidly. The site area is sparsely covered with grasses and forbes and other low plant cover. The materials recovered here include mammal bone,

marine shell, charcoal, and fire affected rock. The cultural deposit at this site is moderately deep, and the constituents occur within a wide range of depths with occasional localized concentrations.

Men-2139, the Whale Gulch site, is situated on a high coastal terrace near the eroding edge of a former stream channel south of, and well above the mouth of, Whale Gulch extending into an area that slumps into Whale Gulch. The vegetation on site consists of coastal prairie with dense grasses, coyote brush, vines and coastal alder. Two marsh ponds are situated about thirty-five meters southwest of the site. The archaeological site is marked by a shallow soil deposit containing shellfish remains, bone fragments, charcoal, and a limited quantity of formed tools. The deposit ranges in depth from approximately 10 cm to a maximum of 40 cm. Because the deposit is shallow and concise, and exhibits no apparent vertical change in constituents, it appears to have been laid down over a very short period of time. This site was chosen for further investigation because of its probable short occupation span, and because it contained a variety of datable materials with good associations. Several species of shellfish remains were collected, including the California mussel and the Giant Pacific or Gumboot chiton. Other species that were recovered include barnacle, abalone, limpet, urchin, and several other varieties of edible snails. Mammal bone, both terrestrial and marine, was found, with terrestrial mammal, especially deer, occurring in greatest abundance. The artifacts recovered from Whale Gulch consist of a hammerstone, an antler wedge tool, and one obsidian Gunther Barbed projectile point; no other artifacts, including flaked stone were recovered. The Gunther Barbed point prompted the hypothesis that the site was utilized during the late prehistoric period.

The temporal sequence of the region has been outlined by Valerie Levulett (1986) and William Hildebrandt (1981) and their investigations indicate that coastal occupation and use was generally late. Both radiocarbon and obsidian studies have been used to define the chronology of the King Range and nearby areas. Since a variety of datable materials was found in close association at Whale Gulch, we believed this was a good opportunity to date several constituents of the deposit to evaluate the suitability for radiometric dating of these materials. Obsidian hydration analysis performed on the Gunther Barbed point provided a mean hydration band measurement of 1.3 microns, and visual sourcing determined that the specimen's source was located at Grasshopper Flat/Lost Iron Well/Red Switchback within the East Medicine Lake Highlands (Hughes 1987). This relatively small hydration reading supported our initial hypothesis that the site was occupied late in time.

A charcoal sample collected from a very compact shell concentration within the 10 to 30 cm levels yielded a radiocarbon date of 170 +/- 70 years BP. This date is compatable with our obsidian hydration measurement and further supports our hypothesis that Whale Gulch is a late period site. The comparable dates of the obsidian and charcoal served as a time control and are used to compare radiocarbon dates obtained from shell and deer bone.

A sample of deer bone, found in association with the charcoal and shell samples, was selected for dating. The date of 110+/- 70 obtained from this sample also supports our hypothesis that the site was utilized during the late prehistoric period.

Two samples of mollusk shell, obtained from the same provenience from which the charcoal and associated deer bone were obtained, were submitted for radiocarbon dating. The first sample consisted of shell from the Cryptochiton stelleri, the Giant Pacific or Gumboot chiton. This organism is found among rocks in the intertidal zone of the rocky coast and is a grazing herbivore; it uses rasping teethlike structures to feed on algae and seaweed as it roams the rocks of the lower intertidal region. The chiton is rarely exposed to the open air as it resides mainly underneath rocks where it is indirectly exposed to wave action (Ricketts 1939).

The second sample of shell submitted was that of the Mytilus californianus, the California mussel. This organism occurs in beds on the rocks in the surf zone of the rocky coast. This mussel is interzonal, occurring throughout the intertidal zone (Ricketts 1939). It feeds on plankton by filtering the sea water through gill structures.

The chiton sample yielded a radiocarbon age of 730+/-70 BP; the mussel shell sample rendered a radiocarbon age of 450+/-70 BP. As is generally the case when marine shell is radiocarbon dated, both of these dates are older than the dates obtained from our other sources.

Dates obtained from terrestrial materials such as charcoal or mammal bone reflect the radiocarbon content in the atmosphere where radioactive carbon 14 is constantly being produced by the bombardment of cosmic rays. Radiocarbon in the marine environment is determined by the mixing of atmospheric radiocarbon with surface ocean waters and its subsequent down mixing into deep ocean layers and eventual re-emergence through processes known as upwelling which occur differentially along the coast of California (Berger, et al. 1966; Broecker 1974). A "reservoir effect" is created because the vertical mixing of atmospheric radiocarbon occurs at a very slow rate so that deeper ocean layers have considerably older radiocarbon ages than the atmospheric radiocarbon in the environment. Mollusks grow their shells in isotopic equilibrium with the environments in which they live and are known to reflect the reservoir age of the waters in which they grew (Mook and Vogel 1967).

Robinson and Thompson (1981) dated several shell species from various locations along the Pacific coast to obtain reservoir age correction factors which could be applied to the radiocarbon dating of marine shell. In order to apply the reservoir correction factor to a shell sample, the radiocarbon activity in the surface waters of the region must be calculated and compared with the terrestrial radiocarbon activity.

In Robinson and Thompson's determinations of Pacific coast reservoir ages, samples were taken along the coast from Alaska to San Diego. The samples used to compute these reservoir factors were obtained from Saxidomus spp. and Protothaca spp. samples collected before 1950. Because no reservoir age correction factors have been determined for the section of coast on which Whale Gulch lies and no clam species appear in the Whale Gulch site, it was not possible for us to directly apply any of the Robinson and Thompson correction factors to our shell dates. However, we can evaluate our dates in terms of Robinson and Thompson's findings.

REFERENCES CITED

Berger, Rainer; R.E. Taylor and W.F. Libby
1966 Radiocarbon Content of Marine Shells from the California and Mexican West Coast Science 153: 864-866

Broecker, Wallace
1974 Chemical Oceanography . Harcourt Brace Jovanovich, Inc.

Dietz, Stephen A., William Hildebrandt and Terry Jones
1988 Archaeological Investigations at Elkhorn Slough: CA-MNT-229 A Middle Period Site on the Central California Coast Northern California Anthropological Group, No. 3, Berkley, California,

Hildebrandt, William
1981 Native Hunting Adaptations on the North Coast of California Unpublished Doctoral Dissertation, University of California, Davis

Hughes, Richard E.
1987 Diachronic Variability in Obsidian Procurement Patterns in North Eastern California and Southcentral Oregon University of California Publications in Anthropology, Volume 17

Levulett, Valerie
1986 The Prehistory of Southwestern Humboldt County: A Study of Coastal Archaeological Sites in the King Range National Conservation Area Unpublished Doctoral Dissertation, University of California, Davis.

Mook, W.G. and J.C. Vogel
1968 Isotopic Equilibrium Between Shells and Their Environment Science 159: 874-875

Origer, T. and David A. Fredrickson
1987 A Research Design for Archaeological Investigations at Ca-Hum-182, Point Delgada, Shelter Cove, King Range National Conservation Area, Humboldt County, California Prepared in partial satisfaction of Cooperative Management Agreement no. CA-950-CA-6-020

Patch, Dorothy and Terry Jones
1984 Paleoenvironmental Change at Elkhorn Slough: Implications for Human Adaptive Strategies Journal of California and Great Basin Anthropology 6(1):19-43

Ricketts, E.F., Jack Calvin, Joel Hedgepeth (revised by David W. Phillips)
1985 Between Pacific Tides, fifth edition . Stanford University Press, Stanford, California

Robinson, Stephen W. and Gail Thompson
1981 Radiocarbon Correction for Marine Shell Dates with Application to Southern Pacific Northwest Coast Prehistory . Syesis 14:45-57

Taylor, R.E. and Rainer Berger
1967 Radiocarbon Content of Marine Shells from the Pacific Coasts of Central and South America . Science 158: 1180-1182

Vita-Finzi, Claudio and Neil Roberts
1984 Selective Leaching of Shells for Radiocarbon Dating Radiocarbon 26:1: 54-58

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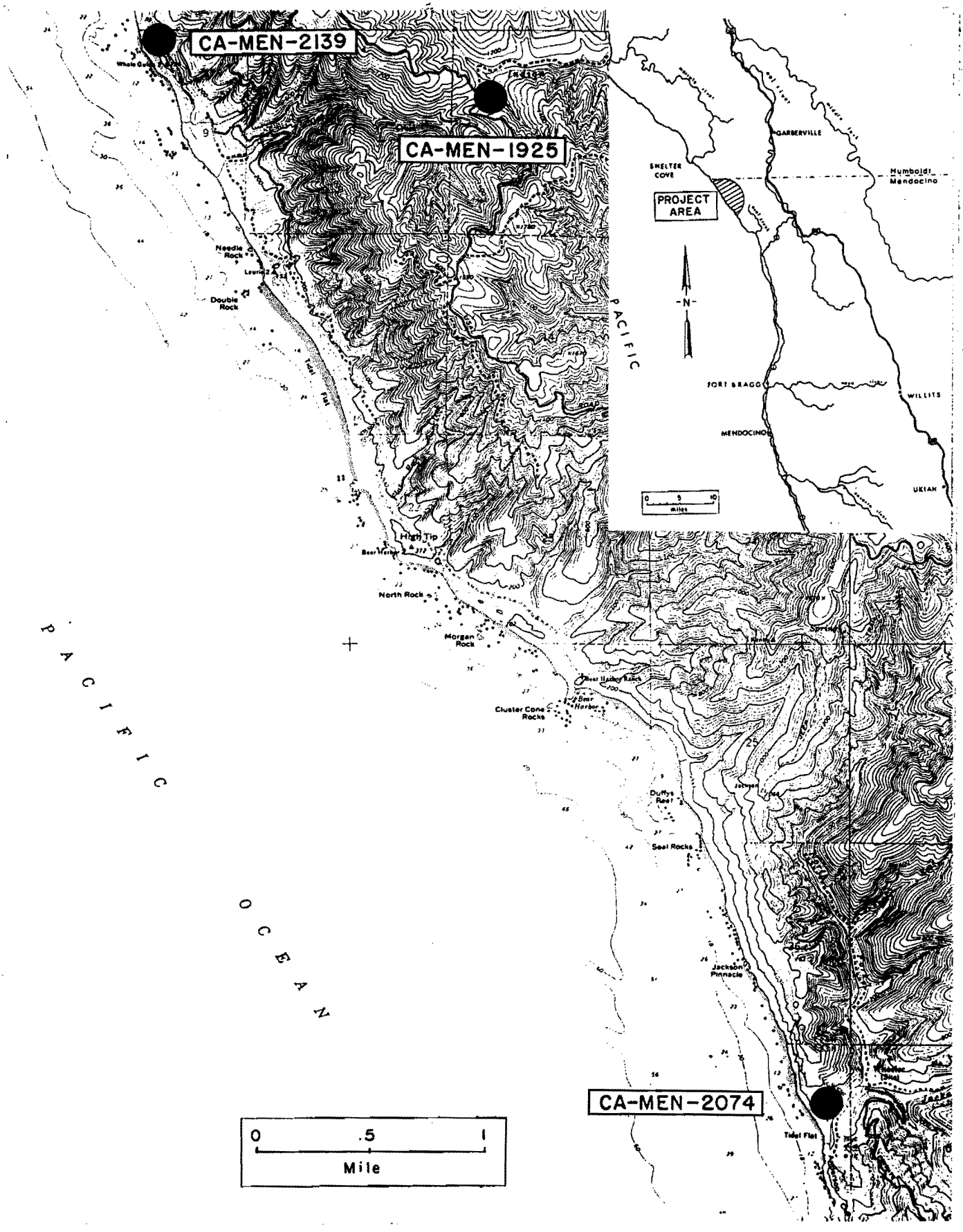
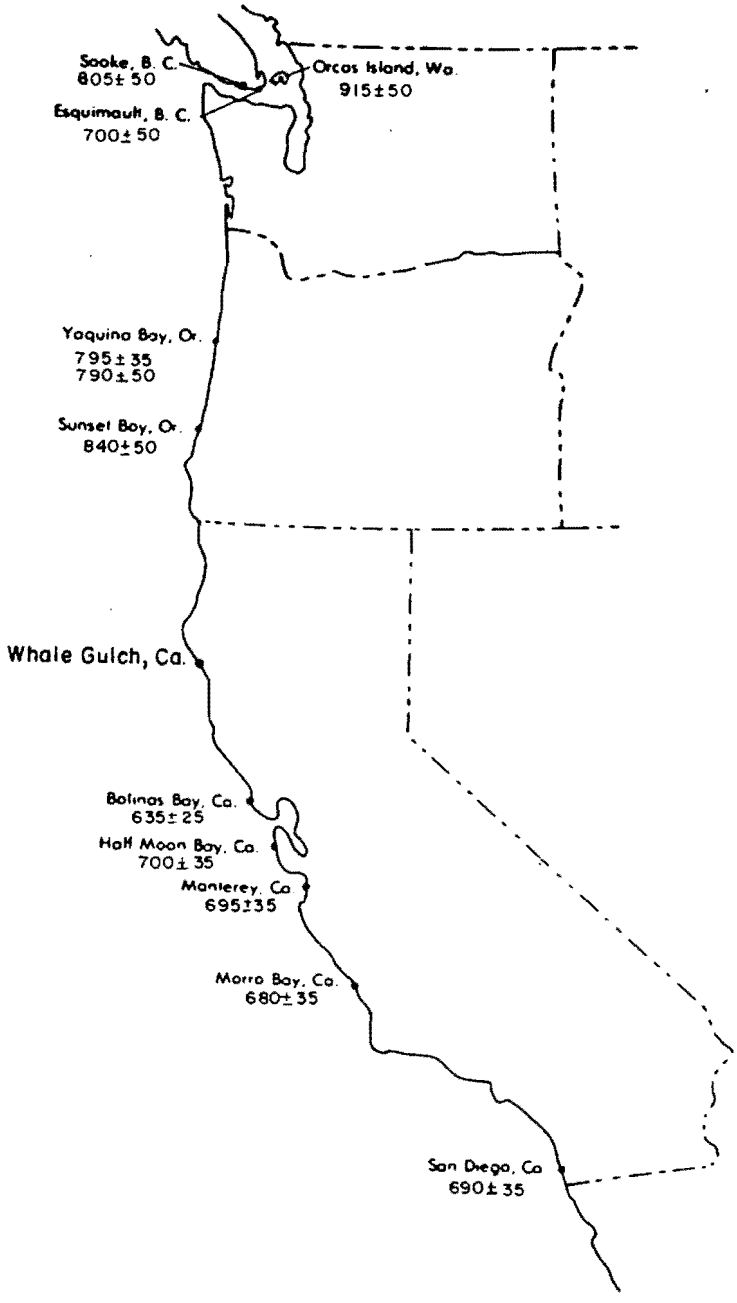

CA-MEN-2139
CA-MEN-1925
CA-MEN-2074
PROJECT AREA
SHELTER COVE
GARBERVILLE
Humboldt
Mendocino
FORT BRAGG
WILLITS
MENDOCINO
UKIAH
N
PACIFIC
OCEAN
Needle Rock
Double Rock
High Tip
North Rock
Morgan Rock
Cluster Cone Rocks
Duffys Reef
Seal Rocks
Jackson Pinnacle
Tidal Flat
0 .5 1
Mile

Figure 1



Adapted from Robinson and Thompson (1981).

Figure 2