

FISHING PRACTICES OF EARLY HOLOCENE COASTAL CALIFORNIA: PRELIMINARY EVIDENCE FROM DAISY CAVE (CA-SMI-261)

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ABSTRACT

Analysis of fish remains from an 8,500-9,800 year old component at Daisy Cave indicates that early maritime peoples on San Miguel Island fished primarily in rocky shore and kelp bed habitats. Almost 3200 fish bones from at least 11 distinct taxa (cabezon, sheephead, surfperch, rockfish, etc.) were analyzed from a 1 x 0.5 m unit. The early occupants of Daisy Cave probably employed a variety of fishing techniques including gorge and line, nets, and spears. An early island emphasis on rocky open coast habitats differs from early mainland assemblages from the Santa Barbara Coast, where estuarine fish were emphasized.

INTRODUCTION

Native peoples of coastal California were highly skilled at fishing in numerous marine habitats, and for many historic and Late Holocene people fish were a focal point of the subsistence economy. The dietary significance of fish varied considerably both spatially and temporally throughout the region, however, a product of the wide variety of ecological niches, differential availability of subsistence resources, and changes in demography, technology, and food preferences. A large body of data on native California fishing practices has been assembled, but we still know relatively little about Early and Middle Holocene fishing. Forthcoming works by Erlandson et al. (1999), Rick (1999), Rick and Erlandson (1999), Rick and Glassow (1999), Vellanoweth and Erlandson (1999), and Vellanoweth et al. (1999) should help fill this gap. However, the lack of data on early fishing practices still presents a significant limitation on discussions of the evolution of maritime adaptations in the region. In this paper, we present data on a collection of over 3000 fish remains from a 1 x 0.5 m test unit (E7) excavated in Early Holocene deposits at CA-SMI-261 (Daisy Cave) on San Miguel Island (Figure 1). We describe the assemblage, assess the technology used in fishing, season of capture, and habitats exploited,

then briefly compare the Daisy Cave fishery with other Early Holocene sites from the Santa Barbara Channel region. We begin with a brief discussion of previous models of the evolution of native California fisheries.

FISHING ALONG THE CALIFORNIA COAST

Currently, the single most comprehensive study of fish remains on the California Coast is Salls' (1988) chronicle of prehistoric fisheries of the southern California Bight. Salls analyzed nearly 100,000 fish remains from 23 sites, documenting that at least 109 distinct species of fish were caught by people throughout the occupation of the region. His analysis revealed that people generally fished in the environments immediately surrounding each site. Even normally pelagic species could have been caught just outside of kelp beds, in submarine canyons, or in larger bays. Salls (1988:605-607) supported his conclusion by the general small size of these pelagic fish (especially tuna), their relative scarcity compared to other taxa, and limitations of the fishing gear employed by Chumash and Tongva people. Similar to Salls, Fitch (1969:61, 68-69; 1975:459) argued that though pelagic species are fairly abundant at VEN-3 and VEN-87, most fish

could have been caught from environments adjacent to the respective sites. King (1990) argued for a gradual elaboration of fishing practices through time, a process he thought began to intensify in the Early Period.

Recently, considerable research has focused on the Late Holocene elaboration of fishing along the southern California Coast (e.g., Bowser 1993a, 1993b; Colten and Arnold 1998; Davenport et al. 1993; Glassow 1980; Kennett 1998; Raab et al. 1995). Some of these studies emphasize an apparent intensification of marine fishing practices (especially on pelagic taxa) and concomitant declines in the importance of shellfish and sea mammals attributed to overharvest and increased population densities. Also emphasized is the development of more efficient technologies such as the circular shell fishhook and the plank tomol. Unfortunately, all these studies lack substantive data on the Early and Middle Holocene, and some rely on mainland sites with stratigraphic mixing problems (e.g., SLO-2 and SBA-1).

Fishing technology on the California coast has evolved numerous different forms over the last 10,000 years. In Early Holocene deposits, bone gorges are the only clear artifacts associated with fishing, but nets, watercraft, tidal traps (Fitch 1972), and spears were also probably employed (Rick 1999). These were the same basic forms used throughout the prehistory of California. The development of composite and circular shell fishhooks is one of the most significant technological innovations associated with subsistence and is thought to be directly related to an intensification of marine fishing. The composite bone fishhook appears to have first been used during the Middle Holocene (King 1990), while the circular shell fishhook is thought to be a Late Holocene phenomenon, appearing as early as 3300 RYBP on the southern islands (Raab et al. 1995; Strudwick 1985) and by at least 2000 RYBP on the Santa Barbara coast (Erlandson and Rick 1999). Similarly, the plank tomol is only thought to have been used within the last 2000 or so years, associated with an increase in pelagic fishing (particularly swordfish), trade, and sociopolitical complexity (Arnold 1995; Davenport et al. 1993). The presence of humans on the northern Channel

Islands by ca. 10,500 to 11,000 RYBP (Erlandson et al. 1996; Johnson et al. 1999), however, demonstrates a long history of seaworthy boats in the area. Similar to the circular shell fishhook, the antiquity of the plank canoe remains elusive and it is currently unreasonable to assume that seaworthy predecessors were not used earlier, particularly in light of extensive cross-channel voyaging and the increasing importance of fish as early as 5,000 years ago (Vellanoweth and Erlandson 1999).

EARLY HOLOCENE FISH REMAINS FROM DAISY CAVE

Daisy Cave is situated just above a rocky, surf-swept portion of the northeast coast of San Miguel Island. The sea floor drops off rapidly near Daisy Cave, suggesting that even when sea levels were considerably lower, the cave was still relatively close to the sea (Erlandson et al. 1996:357). This steep offshore topography might also have increased the range of marine habitats and fish available in the local area. Daisy Cave is a narrow fissure approximately 11 m deep and 1.5 m to 3 m wide, with an outer rock shelter approximately 4 m x 5 m wide, and a shell midden on the slope in front of the shelter. Archaeological deposits are located in all areas of the site, and at one time covered approximately 200 m² (Erlandson et al. 1996). Strata E and F date to the Early Holocene and Stratum G dates to the terminal Pleistocene, representing a series of short-term occupations over 3,000 years or more (see Erlandson et al. 1996).

The fish remains discussed here are from Unit E7, located on the vegetated slope in front of the rock shelter and outside of the dripline (see Erlandson et al. 1996). Late and Middle Holocene shell midden strata in this area were lost to erosion prior to excavation. While much of the Daisy Cave deposit has excellent stratification and preservation, stratigraphic variation in Unit E7 was minimal, so all the materials from the Early Holocene levels in this unit have been lumped together as Stratum E/F. While some fish remains may come from terminal Pleistocene Stratum G, fish bones are rare in this stratum in other areas of the site. Although not as well preserved as faunal

remains found elsewhere in the site, the fish bones from Unit E7 are well preserved compared to other California sites dating to this time period. The 0.125 m³ sample from Unit E7 is an initial sample of the Early Holocene fish assemblage from Daisy Cave and finer resolution data will soon be available (Rick 1999).

All taxonomic identifications were performed using collections at the Departments of Anthropology at the University of Oregon and the University of California, Santa Barbara, using methods outlined by Rick and Erlandson (1999) and Rick and Glassow (1999). To determine the importance of various habitats, we relied on modern fisheries data on the distribution of the identified taxa (e.g., Eschmeyer et al. 1983; Miller and Lea 1972). All excavated sediments were wet-screened over 1/8-inch mesh, and all fish remains were quantified using weight, NISP, and MNI measures (Grayson 1984). Identifications were made on vertebrae, dentaries, premaxillae, vomers, teeth, quadrates, supraoccipitals, and parasphenoids, suggesting that for at least some of the taxa whole fish were being transported and deposited at the site. No formal evidence of butchering or processing was identified on these fish remains, and only 5-10% of the fish remains are burned.

At least 11 distinct taxa were identified in Unit E7 from 3183 fish bones (Table 1). The density of fish bones in Unit E7 is quite high with more than 25,000 bones per m³, a figure comparable to many Late Holocene Channel Island sites (see Kennett 1998). Nearshore species such as surfperch, rockfish, cabezon, and sheephead dominate the assemblage, providing roughly 90% of the NISP and 97% of the identified teleost weight. Relatively minor amounts of clupeids, small sculpins, greenling, lingcod, and prickleback were also identified in the assemblage. No elasmobranchs were identified, probably reflecting the limited availability of sandy bottom habitats adjacent to Daisy Cave. However, preliminary analysis of Early Holocene fish bone from other units at Daisy Cave show that some elasmobranchs (angel shark and smoothhound) were captured by the site occupants.

The identified fish indicate that the cave's

occupants fished primarily in a rocky nearshore and kelp bed environment, and other habitats were probably only minimally exploited. Fishing could have occurred at any time of the year, but would have been best in seasons other than winter when wave action from storms was less intense. A number of bone gorges were identified in the Early Holocene deposits at Daisy Cave and it is probable that these were the primary method of capture, but nets, spears, and other fishing tackle may also have been employed. These lines of evidence suggest that the early occupants of Daisy Cave used a number of different fishing techniques.

DISCUSSION AND CONCLUSIONS

Fish remains from other Early Holocene sites in the Santa Barbara Channel area also suggest considerable variability in the fishing strategies of early coastal peoples. In a small sample (NISP=356) from SBA-1807, an 8,400-9,000 year old residential base located on the western Santa Barbara Coast (Erlandson 1994), at least 19 distinct taxa were identified, including 5 elasmobranchs and 14 teleosts. The assemblage is dominated by taxa (bat ray, sting ray, shovelnose guitarfish, surfperch, etc.) that dwell in the calm, sandy environments of bays and estuaries. The presence of white sea bass, barracuda, rockfish, and yellowtail suggest that other habitats, such as kelp beds, were also exploited. The dominance of estuarine or bay fish at SBA-1807 contrasts sharply with the fish identified at Daisy Cave.

At SBA-2057, a buried 8,300 year old site located about 0.5 km from the coast and near SBA-1807, over 3000 fish bones were analyzed (Erlandson 1994; Rick and Erlandson 1999). At least 15 different fish taxa, including 9 teleosts and 6 elasmobranchs were identified. The assemblage is dominated by clupeids, surfperch, small elasmobranchs, and flatfish. Similar to SBA-1807, fish were probably obtained primarily from bay and estuarine habitats (Rick and Erlandson 1999). Clupeid remains were most abundant in the assemblage, accounting for 38.6% of the edible meat contributed by teleosts (Rick and Erlandson 1999). The importance of clupeids suggests that the occupants of SBA-2057 relied

heavily on the use of nets to capture fish. Other methods such as spearing and gorge and line may also have been used, but in much lower frequencies.

We recently analyzed a small sample (NISP=241) of fish remains collected with 1/16-inch screening from a 9,300 year old shell midden at SRI-6 on Santa Rosa Island. The Early Holocene component at SRI-6 is exposed 6-8 m deep in marine terrace deposits at the mouth of Arlington Canyon, one of the largest drainages on Santa Rosa Island. At the time it was occupied, SRI-6 was probably located on the high coastal bluffs more than a kilometer from the outer coast (Erlandson et al. 1999). The assemblage was dominated by rocky coast dwelling shellfish, such as black abalone and California mussel, but small amounts of fish bone, sea mammal, and bird bone were also identified. Although most of the fish remains from this site were not identifiable to specific taxa, three teleosts dominated the identifiable elements: sheephead, rockfish, and clupeids (Erlandson et al. 1999). The identified taxa suggest that all the fish were probably obtained from nearshore rocky habitats or kelp beds adjacent to SRI-6, using a variety of different technologies.

In general, the two early island assemblages (SMI-261 and SRI-6) and the two mainland assemblages (SBA-1807 and SBA-2057) indicate fishing practices by Early Holocene people in a variety of habitats, including nearshore sandy environments, bays and estuaries, rocky shores, kelp beds, the surf zone, and possibly even offshore. Early Holocene people appear to have had the capability to catch nearly the full range of species that later people in the region caught. Similar to later people, Early Holocene people had an eclectic subsistence economy, relying on shellfish, fish, sea mammals, birds, land mammals and plants, etc. (Erlandson 1994). While the focus of their economy was on littoral resources such as shellfish, Early Holocene people were often maritime as indicated by their fishing and seafaring capabilities.

An intensification of marine fishing culminating in the Late Holocene is evident in the archaeological record of southern California. We

agree with Salls (1988), however, that people continued to fish largely in the areas adjacent to the sites they occupied. Late Holocene increases in pelagic taxa are probably the result of increased cross-channel voyages, greater trade and exchange, technological enhancements, and greater numbers of people fishing. The capabilities for intensive marine fishing practices were present by at least the Early Holocene, however, and the elaboration of fishing technology and the increasing dietary significance of fish over time is the product of several millennia of fishing and technological refinement. Evidence from Daisy Cave suggests that this process began at least 9,800 years ago along the southern California coast. Future research should focus on a wide range of sites throughout the Holocene to understand the full range and variability of fishing and other subsistence practices.

NOTES

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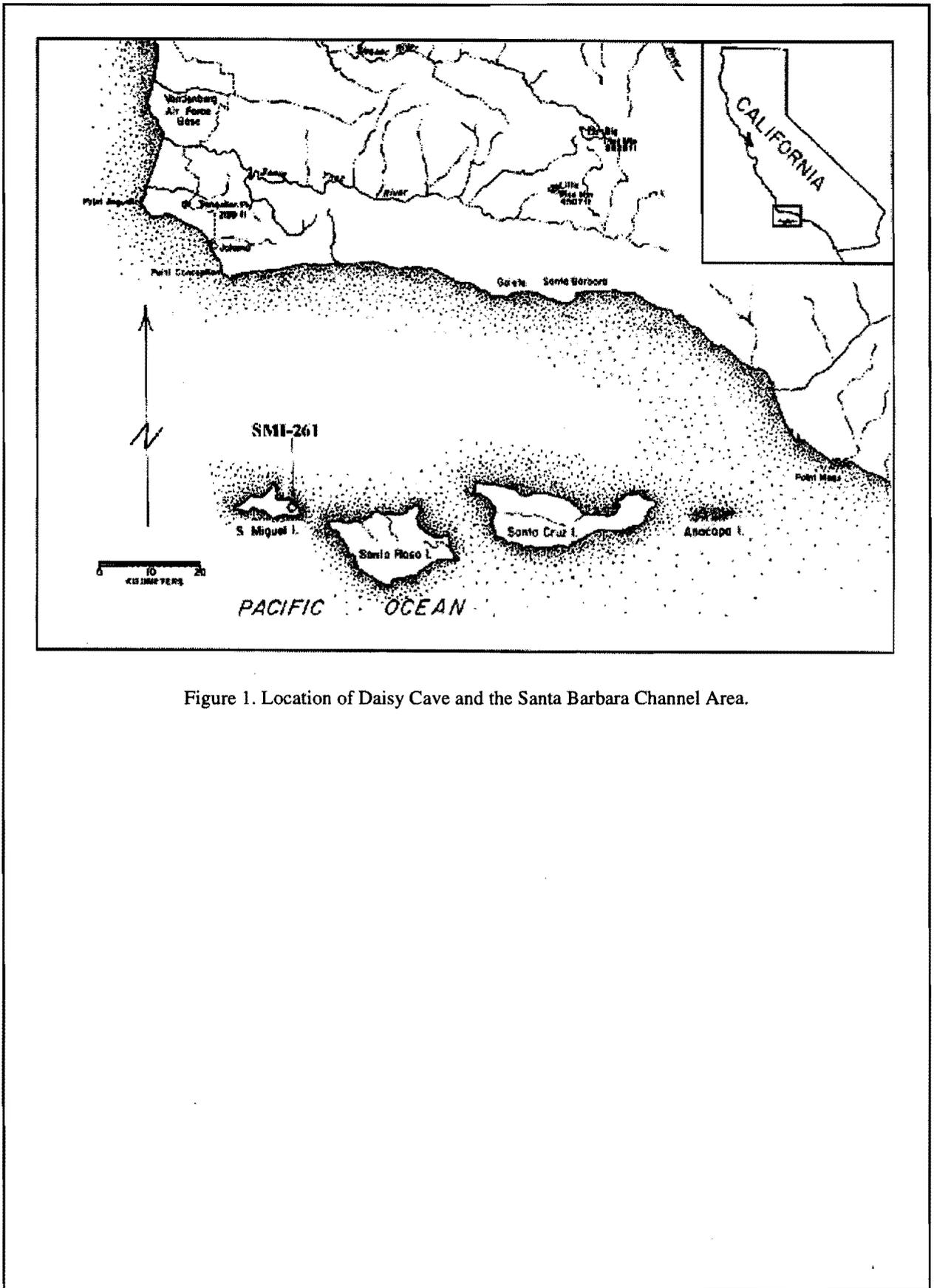


Figure 1. Location of Daisy Cave and the Santa Barbara Channel Area.

Table 1: NISP, Weight (g), and MNI of Fish Remains from Stratum E/F, Unit E7, Daisy Cave

<u>Taxon</u>	<u>NISP</u>	<u>%NISP^a</u>	<u>Wt.</u>	<u>%Wt.</u>	<u>MNI</u>	<u>%MNI</u>
Clupeidae (sardine/herring)	8	3.6	0.08	0.2	1	5.3
Cottidae (sculpin)	6	2.7	0.14	0.3	1	5.3
<i>Scorpaenichthys marmoratus</i> (cabezon vertebrae)	9	4.0	3.28	6.9	—	—
(cabezon cranial)	11	4.9	10.34	21.5	3	15.8
Embiotocidae (surfperch cranial)	49	21.8	5.05	10.5	5	26.3
(surfperch vertebrae)	75	33.3	4.33	9.1	—	—
Hexagrammidae (greenling)	3	1.3	0.07	0.1	1	5.3
<i>Ophiodon elongatus</i> (ling cod)	1	0.4	0.49	1.0	1	5.3
Labridae						
<i>Semicossyphus pulcher</i> (sheephead cranial)	19	8.5	15.63	32.5	2	10.5
(sheephead vertebrae)	1	0.4	0.82	1.7	—	—
Pleuronectiformes (flatfish)	1	0.4	0.01	0.1	1	5.3
Scorpaenidae (scorpionfishes, thornyheads, etc.)	1	0.4	0.34	0.7	—	—
<i>Sebastes</i> sp. (rockfish vertebrae)	29	12.9	4.14	8.6	—	—
(rockfish cranial)	11	4.9	3.18	6.6	3	15.8
Stichaeidae (prickleback)	1	0.4	0.14	0.3	1	5.3
Teleost sp. (vertebrae)	192	—	10.80	—	—	—
Teleost sp. (other elements)	2766	—	119.0	—	—	—
Teleost total	3183	100.0	177.84	100.0	19	100.0

^a Percentages are based on fish identified to family, genus, and species.