ARCHAEOLOGICAL INVESTIGATIONS AT THE POINT BENNETT PINNIPED ROOKERY ON SAN MIGUEL ISLAND

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ABSTRACT

Point Bennett, on the western tip of San Miguel Island, California, is the site of one of the largest pinniped rookeries on the West Coast of North America. Findings from late Holocene shell middens situated on and adjacent to the modern rookery suggest that the pinniped population of this breeding area was considerably smaller between 1425 and 1500 AD than it is today. Archaeological evidence suggests that temporal variation in the size and species composition of the San Miguel pinniped community was a response to increased disturbance by Native American hunters between 500 and 1450 AD. These data are also consistent with evidence from other Northern Channel Island archaeological sites, which suggests an increase in the economic importance of pinniped meat during the late Middle Period.

Keywords: San Miguel Island, Archaeology, *Arctocephalus townsendi, Callorhinus ursinus, Eumetopias jubatus, Mirounga angustirostris, Enhydra lutris, Phoca vitulina, Zalophus californianus*.

INTRODUCTION

In this paper we present the preliminary results of archaeological investigations we conducted at two late Holocene middens located on and immediately adjacent to the Point Bennett pinniped rookery at the western end of San Miguel Island, California (Figure 1). These sites are of special interest because of the information they provide on the changing role of sea mammal hunting in the economy of the Native American population of the Santa Barbara Channel area. They also have the potential to illuminate the history of San Miguel's extraordinarily diverse pinniped community. Our data suggest that Native American hunters played an important role in shaping the history of the San Miguel pinniped community. In many respects, their impact on the San Miguel rookery appears to have been analogous to the effects that the commercial sealing activities of Euro-Americans had on other Pacific Coast pinniped breeding grounds during the nineteenth century.

During October of 1996 and 1997, test excavations were undertaken at archaeological sites near Point Bennett. Both sites, CA-SMI-602 and CA-SMI-528, suffer from extensive erosion, and the testing was designed to salvage as much information as possible from the deposits before they are lost. These sites are located on (SMI-602) or immediately adjacent to (SMI-528) the Point Bennett pinniped breeding ground. From the abundance of pinniped bone in surface collections, it was clear that the people responsible for these sites were to some extent exploiting the local pinniped population. To determine the nature of this

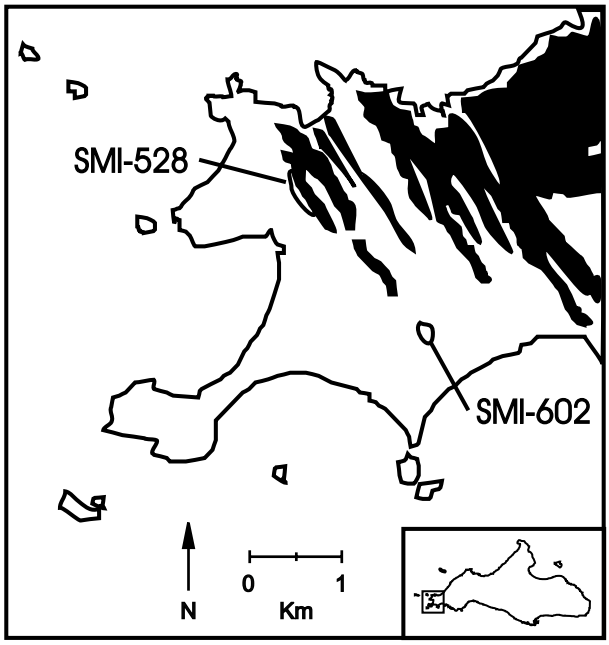

Figure 1. Map of the western end of San Miguel Island showing the locations of the archaeological sites, SMI-528 and SMI-602. Elevated areas of dune and the coastal plateau are indicated in black.

exploitation, we conducted a testing program with the goal of dating the middens and obtaining artifact and faunal samples sufficient to reconstruct temporal variation in prehistoric human exploitation of the rookery.

SITE DESCRIPTIONS

SMI-602 is a shallow, stratified shell midden located in the middle of the modern Point Bennett pinniped breeding ground about 250 m north of Adams Cove. The deposit contains a well-preserved 5 x 8 m house ring, marked by an oval arrangement of large flat rocks. Pinniped and otter bones litter the site's surface, along with a variety of artifacts including a pestle, bowl mortar fragment, projectile points, shell beads, microblades, microblade drills, and bead manufacturing detritus. Although mussel (*Mytilus californianus*) shell is the most abundant faunal constituent of the midden, fish bone is also very common. Human remains on the surface in the southern half of the site suggest the presence of an extensive cemetery. This complex deposit of midden and surface features covers an area of about 90 x 80 m. Our excavation revealed that the deposit has a depth of at least 0.6 m.

SMI-528 is a long, narrow shell midden that runs along the spine of a high, northwest-southeast trending dune located at the edge of the rookery. Areas deflated through wind erosion on either side of the dune's crest define its boundaries. This extremely large, complex site includes deposits from several episodes of human occupation. Our excavations were conducted near the northern terminus of the dune in an area where its western face is actively eroding. An intact, about 70 cm thick, dark brown-black midden deposit that we designated Stratum I is visible near the original surface of the dune at the top of this exposed face. In some areas, Stratum I is exposed on the surface of the dune; in others it is covered with 20 to 30 cm of sterile sand. Two other discrete strata can be seen eroding out of the face of the dune below this uppermost midden deposit: Stratum II is 530 to 555 cm below the dune surface and consists of a thin layer of black abalone shells, turban snail shells, and marine mammal bones; Stratum III is between 666 to 690 cm below surface and consists of a densely packed layer of large red abalone shells interspersed with some mussel shells and vertebrate remains. The surfaces of the eroding areas of the dune are littered with thousands of marine mammal bones, shells, fire-altered rock, ground stone implements, and some chipping debris derived from all three of these cultural strata.

FIELD AND LABORATORY METHODS

After collecting material eroding from the surfaces of these middens, we excavated a series of test pits in each site. In most cases these test pits had dimensions of 1 x 2 m. To obtain controlled samples of shell, fish bone, and small artifacts, columns were excavated into the sidewalls of each unit. When a unit lacked clear stratigraphy, arbitrary 10 cm levels were used. The material from the test pits was dry-processed in the field using 1/4-inch (6-mm) or 1/8-inch (3-mm) mesh shaker screens. The column samples were transported to the mainland where they were floated and water-processed through nested 12-mm, 6-mm, 3-mm, and 1.5-mm mesh geological screens. Faunal identifications were made through reference to comparative materials in the collections of the Department of Anthropology, University of California Santa Barbara; National Marine Mammal Laboratory, Seattle, Washington; Santa Barbara Museum of Natural History; and the Burke Museum of Natural History, Seattle, Washington.

CHRONOLOGY

Six shell samples from SMI-528 and four from SMI-602 were submitted for radiocarbon dating (Table 1). The resulting dates suggest that SMI-602 was first occupied in about 1460 AD, which is about 80 years before the first European explorers arrived in the Santa Barbara Channel area. Native Americans appear to have continued to live at the site until around 1660 AD. Our excavations produced no glass beads, metal artifacts, or other evidence of contact between the inhabitants of the site and Europeans. The lack of a significant difference between the radiocarbon dates of the samples from the top and the bottom of the 50 cm thick deposit at Unit 5 suggests that the midden in this area of SMI-602 accumulated very rapidly. The abundance of *Olivella* thin-lipped beads, drilled bead blanks, bead drills, and *Olivella* shell detritus in the midden suggests that bead manufacture occurred at the site and is consistent with a late prehistoric period occupation.

Six radiocarbon dates were obtained from SMI-528, four from Stratum I, one from Stratum II, and one from Stratum III (Table 1). These dates suggest that human activities in this area of SMI-528 spanned several millennia, with an earlier, somewhat sporadic, occupation between about 2992 to 3951 BC represented by Strata II and III, and a later, more intense occupation during the last half of the first millenium AD represented by Stratum I. These dates are consistent with the stratigraphic sequence of fishhooks and other chronologically sensitive artifacts we obtained during our excavations.

FAUNAL ANALYSIS

The faunal constituents of the column samples revealed significant differences between SMI-528 and SMI-602 in the proportions of fish, shellfish, and sea mammal remains when calculated in terms of meat weight (Table 2). SMI-602 contains extremely high concentrations of fishbone (836.5 kg meat /m^3). Although less abundant, sea mammal bones (262.7 kg meat/m^3), shellfish remains (23.5 kg meat/m^3), and bird bones (5.8 kg meat /m^3) are common. At SMI-528 in contrast, the 1 x 2-m test units excavated in the surface deposit (Stratum I) contained lower densities of fishbone (233.6 kg meat/m^3) and much higher densities of sea

Table 1. Radiocarbon dates from SMI-528 and SMI-602.

Site	Unit/ Stratum	Depth (cm)	Laboratory Number	Material	^{14}C Age	^{13}C/^{12}C Corrected Age	Calendar Date (AD/BC) 1 sigma
SMI-528	2/Stratum I	2	BETA-114032	*Haliotis rufescens*	1420+70	1860+70	AD 686 (768) 858
SMI-528	1/Stratum I	3	BETA-114037	*Haliotis cracherodii*	1660+70	2100+70	AD 448 (555) 636
SMI-528	1/Stratum I	66	BETA-114033	*Haliotis cracherodii*	1710+90	2150+90	AD 392 (483) 608
SMI-528	2/Stratum I	70	BETA-114035	*Haliotis rufescens*	1620+70	2070+70	AD 484 (589) 658
SMI-528	Stratum II	530-551	BETA-114036	*Haliotis cracherodii*	4420+70	4870+70	BC 2992 (2888) 2852
SMI-528	Stratum III	666-690	BETA-114034	*Haliotis rufescens*	5210+70	5670+70	BC 3951 (3895) 3768
SMI-602	2	39	BETA-098743	*Mytilus californianus*	460+60	900+60	AD 1555 (1656) 1690
SMI-602	5	48	BETA-098744	*Mytilus californianus*	650+60	1100+60	AD 1423 (1459) 1503
SMI-602	2/Stratum A	10	BETA-114533	*Mytilus californianus*	310+60	730+60	AD 1682 (1846) 1870
SMI-602	5	10	BETA-098742	*Mytilus californianus*	650+70	1100+70	AD 1418 (1459) 1510

Table 2. Estimated meat weight (kg/m^3) in SMI-528 and SMI-602 based on column sample analysis. Conversion factors used to convert bone weights in to meat weights are the following: fish x 27.7, sea mammal x 24.2, shellfish x 0.332, bird x 15.

SMI-528, Unit 1

Depth	Fish	Sea Mammal	Shellfish	Bird
0-10	165.62	198.88	28.89	8.06
10-20	570.27	3231.41	144.97	0
20-30	231.22	454.08	100.01	5.12
30-40	142.71	616.43	73.91	7.54
40-50	48.04	1314.29	488.98	0
50-60	243.67	437.74	42.69	0.57
Average	233.59	1042.14	146.58	3.55

SMI-602, Unit 5

Depth	Fish	Sea Mammal	Shellfish	Bird
0-10	250.72	32.68	8.11	5.16
10-20	1218.09	209.01	19.65	0
20-30	1335.67	220.44	33.62	9.26
30-40	770.64	238.75	21.39	0
40-50	607.23	612.51	34.7	14.66
Average	836.47	262.68	23.49	5.82

mammal (1042.1 kg meat/m^3) than we found at SMI-602. Shellfish remains (146.6 kg meat/m^3) are also more common at SMI-528 than at SMI-602.

At present, the San Miguel Island pinniped community is dominated by California sea lions (*Zalophus californianus*), northern elephant seals (*Mirounga angustirostris*), and northern fur seals (*Callorhinus ursinus*). This modern situation contrasts markedly with the relative proportions of these species in most Northern Channel Island archaeological middens. In Channel Island archaeological sites, Guadalupe fur seals (*Arctocephalus townsendi*) are by far the most common pinniped species, and northern fur seal, California sea lion, and northern elephant seal remains range from infrequent to rare (Walker and Snethkamp 1984; Walker and Craig 1979).

Our identifications of pinniped bones from these sites suggest that the species hunted by the Native American who lived at SMI-528 were very similar to those available to the protohistoric period hunters who lived at SMI-602. About half of the sea mammal bones identified to species in both collections are those of Guadalupe fur seal (Table 3). Next in abundance are sea otter bones and northern fur seal remains. The only notable difference between the two sites is the greater abundance of northern elephant seal bones at SMI-602 (8.4%) than at SMI-528 (0.6%). Most of the northern elephant seal bones at SMI-602 are from pups or juvenile individuals.

To obtain information on conditions in the marine environment at the time each site was occupied, we determined the ^{18}O concentrations of California mussel (*Mytilus californianus*) shells from each deposit (Kennett 1998). The oxygen isotopic content of shell carbonate is determined by the isotopic composition of the water in which it precipitates (Epstein et al. 1951). Since the isotopic composition of seawater is temperature dependent, these values provide a basis for sea surface temperature estimates. These isotopic studies suggest that water temperatures were significantly ($F=24.65$, $p<0.00005$) higher and showed more annual variability ($F=2.9$, $p=0.0013$) during the occupation of SMI-528 (mean =16.1°C, standard deviation = 2.62) than they were during the occupation of SMI-602 (mean=12.3°C, standard deviation = 1.54).

DISCUSSION

Our archaeological data clearly show that the structure of the San Miguel Island pinniped community has undergone significant changes during the past 5,000 years. The California sea lions and northern fur seals that dominate the modern community are comparatively uncommon in Stratum I of SMI-528, a deposit that dates from the second half of the first millenium AD. Most of the Stratum I assemblage consists of the remains of Guadalupe fur seals, a species that was hunted to near extinction in the nineteenth

Table 3. Species identifications for sea mammal remains from San Miguel Island Sites. NISP=Number of identifiable specimens.

	SMI-528		SMI-602	
Species	**NISP**	**%**	**NISP**	**%**
Guadalupe fur seal (*Arctocephalus townsendi*)	85	49.1	56	42.7
Northern fur seal (*Callorhinus ursinus*)	28	16.2	19	14.5
Steller sea lion (*Eumetopias jubatus*)	4	2.3	2	1.5
Northern elephant seal (*Mirounga angustirostris*)	1	0.6	11	8.4
Sea otter (*Enhydra lutris*)	32	18.5	23	17.6
Harbor seal (*Phoca vitulina*)	3	1.7	9	6.9
California sea lion (*Zalophus californianus*)	20	11.6	11	8.4

century by commercial sealers. The abundance of Guadalupe fur seals in the SMI-528 midden is similar to that seen 500 years or so later in the protohistoric period deposit from SMI-602. At this site, which dates to just before the arrival of Europeans in the Santa Barbara Channel area, the only notable change is an increase in northern elephant seal remains so that they are nearly as common as those of northern fur seals.

Based on archaeological data, it appears that San Miguel Island is near the northern boundary of the historical distribution of Guadalupe fur seals and there is little evidence that they were ever present in significant numbers north of Point Conception (Scheffer 1958; King 1964; Repenning et al. 1971). San Miguel Island, on the other hand, hosts the southernmost breeding colony of northern fur seals and is near the southern boundary of this cold-adapted species.

Because of these different zoogeographic affinities, we might expect the apparent shift to cooler ocean temperatures indicated by our isotopic studies to give northern fur seals a competitive advantage that would allow them to displace Guadalupe fur seals as the dominant species in the San Miguel Island pinniped community. Our paleotemperature data show that average water temperatures were about 4°C lower during the occupation of SMI-602 than during the occupation of SMI-528. This would, in theory, increase the competitive advantage of northern fur seals relative to southern fur seals at SMI-602. However, our faunal data do not support the hypothesis that cooler water temperatures allowed northern fur seals to increase in abundance relative to Guadalupe fur seals during the cold water conditions of the SMI-602 occupation. Perhaps the change in temperature was insufficient in magnitude or duration to shift the ecological balance between the two species.

A puzzling aspect of the SMI-602 site is the presence of this large residential area with house pits, a cemetery, and other evidence of permanent occupation in the middle of the modern Point Bennett pinniped breeding area. Although some pinnipeds can tolerate a moderate amount of disturbance by humans (Wilkinson and Bester, 1988), behavioral observations suggest that such a major human intrusion of hunters into the middle of a fur seal rookery would be inimical to its continued use as a breeding site (Allen et al. 1971; Gerrodette and Gilmartin 1990; Riedman 1990).

This has an important implication since it suggests that: 1) a large rookery like the modern one was not present on the west end of San Miguel Island at the time SMI-602 was occupied, and 2) the abandonment of Point Bennett as one of the principal fur seal breeding sites in the north Pacific occurred before Europeans arrived in the Santa Barbara Channel area.

The rarity of California sea lion remains in both SMI-528 and SMI-602 also suggests that hunting pressure played a significant role in structuring the San Miguel Island pinniped community. California sea lions are today the most abundant otariid seal species at San Miguel Island. They have long periods (up to 11 months) of close female-neonate association, which would have made them vulnerable to hunters. California sea lions are a species with a southern zoogeographic affinity and, therefore, should have been favored by the warm marine conditions that predominated during the several thousand years people lived at SMI-528. The current behavior of California sea lions is characterized by profound fright-flight reaction to encounters with people, and the presence of humans causes them to abandon rookery beaches (DeLong, unpublished observations). Thus, it is reasonable to believe that human hunting pressure on the Channel Islands had reduced California sea lion numbers to very low levels during the prehistoric period.

This interpretation is consistent with the faunal evidence we have presented. SMI-528 is strategically located above the Point Bennett pinniped rookery. It contains immense quantities of pinniped bone and comparatively little fish. This is what we would expect if SMI-528 served as a staging area for hunters who made periodic forays onto the rookery below the site to hunt pinnipeds. SMI-602, in contrast, shows every indication of being a permanently occupied village used by fishermen and sea otter hunters. The SMI-602 midden contains one of the highest concentrations of fishbone so far reported for a Channel Island area site (Colten 1993; Glassow 1980; Kennett 1998; Walker and Snethkamp 1984). A heavy emphasis on fishing is also

indicated by the presence in the site of large quantities of abalone shell detritus associated with fishhook manufacture. Sea mammal remains, in contrast, are comparatively rare (Table 2).

These faunal data suggest that a major transformation occurred in the San Miguel Island pinniped community between the end of the first millenium AD (when SMI-528 was abandoned) and the beginning of the fifteenth century (when the SMI-602 village was established in the Point Bennett pinniped rookery). The incompatibility between the presence of a village at SMI-602 and the use of the site as a pinniped breeding ground strongly suggests that, sometime during this interval, sea lions and fur seals effectively abandoned Point Bennett as a breeding site.

Based on this evidence, it seems clear that by around 1460 AD, when Native Americans first began to live on the current site of the Point Bennett rookery, fur seals had relocated their breeding grounds from San Miguel Island to another, more isolated location, that was free from human disturbance. The most likely locations for such a refuge area would be Guadalupe Island 200-km off the coast of Baja California and the Farallon Islands situated 45 km west of San Francisco. Historical records indicate that European sealers harvested thousands of fur seals from both of these locations during the first half of the nineteenth century (Peterson et al.1969; Starks 1922).

It has been generally assumed that Guadalupe fur seals were present on the northern Channel Islands at the beginning of the nineteenth century and that their decline from prehistoric superabundance was a result of overexploitation by Europeans (Bartholomew 1967). Although the activities of commercial sea otter hunters in the Channel Island area are well-documented (Ogden 1933; Woodward 1938), references to fur seal hunting are conspicuously absent. Our data suggest that Native Americans and not Europeans were responsible for the destruction of the fur seal breeding area that once existed on San Miguel Island.

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