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Authors

Rick, Torben C
Erlandson, Jon M

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Late Holocene Subsistence Strategies on the South Coast of Santa Barbara Island, California

TORBEN C. RICK and
JON M. ERLANDSON

Department of Anthropology, University of
Oregon, Eugene, Oregon 97403-1218

CA-SBI-12, a small archaeological site occupied between about A.D. 1180 and 1390, is one of only two recorded archaeological sites on the south coast of Santa Barbara Island. A relatively limited faunal and artifact assemblage, consisting primarily of black abalone and owl limpet, with small amounts of fish, bird, and mammal remains, suggests that the site was a temporary or seasonal camp. Occupation of CA-SBI-12 was brief and specialized, but data from other Santa Barbara Island sites suggest that the island was used for a variety of activities, including shellfish collecting, sea mammal hunting, fishing, and the production of ground and chipped stone tools for at least the last 4,400 years.

For over a century, California's Channel Islands have stimulated research on the history and evolution of maritime peoples. While archaeological research has quickly progressed on most of the islands, several key gaps persist in the archaeology of the region. Among the more significant gaps is a near absence of information from Santa Barbara Island, which consequently has been neglected in many

cultural models and syntheses. Much of the problem stems from the fact that the island is small (about 1 sq. mi) and relatively remote, contains primarily shallow and discrete midden deposits, and had no documented historic Native American occupation (see Glassow 1977; Rick n.d.). These factors have led numerous researchers to speculate that little or no permanent occupation occurred on the island (see Erlandson et al. 1992:91; Swartz 1960:9).

Despite its small size, Santa Barbara Island is centrally located and contains at least 19 recorded archaeological sites distributed across virtually all parts of the island (Figure 1; Erlandson et al. 1992; Glassow 1977; Rick n.d.; Rozaire 1978; Swartz 1960; Swartz and Sutton 1958). At least six of these sites have been excavated, but other than anecdotal constituent data and preliminary artifact reports we still know relatively little about Native American occupation of the island. The island is situated roughly equidistant between Santa Catalina and San Nicolas islands, suggesting that it may have functioned as a stopping point for people traveling back and forth between the two larger islands and the mainland (Erlandson et al. 1992; Swartz 1960). Research by Rozaire (1978) and Greenwood (1978) documented a bedrock mortar (CA-SBI-17), numerous additional mortars and pestles, as well as manos and metates, indicating that more sustained occupation may also have occurred. The current dearth of archaeological data from Santa Barbara Island, however, makes it difficult to determine the validity of these assertions.

Most of the archaeological sites on Santa Barbara Island are clustered on the island's northwest coast. In contrast, only two sites (CA-SBI-12 and -13) have been recorded on the southern portion of the island.¹ CA-SBI-12 is a small, moderately dense shell midden that appears to have been a temporary occupational site on the south side of the island. Radiocarbon dates and the relatively small and shallow site

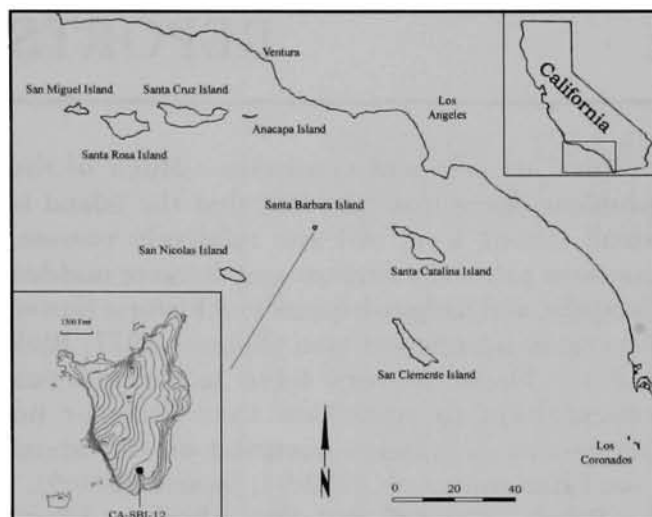


Figure 1. Santa Barbara Island and coastal southern California.

deposits suggest that it was occupied briefly during the Late Holocene. This narrow time span presents an ideal opportunity to investigate subsistence strategies over a relatively discrete interval of time. Moreover, Glassow (1985) recently illustrated the importance of investigating small archaeological sites to elucidate variability in human subsistence, settlement, and demography. In this paper, we summarize the results of a 1986 subsurface testing program at CA-SBI-12, present detailed faunal data from the site, provide a context for the site's function, and speculate on the role of Santa Barbara Island in the larger southern California interaction sphere.

Natural Setting and Previous Research

Santa Barbara Island is located 62 km offshore and covers roughly 2.6 km² in area. The island is dominated by a relatively level marine terrace, with a maximum elevation of 194 m. Formed primarily by underwater volcanic eruptions, the island is composed largely of basalt, quartz, and other igneous rocks (Kemnitzer 1933). The island has roughly 8 km of shoreline, consisting mostly of rocky beaches with steep adjacent cliffs. A few small, sandy beaches are also present on the north and east shores of the island near Webster Point and Elephant Seal Cove. Similar to other Channel

Islands, Santa Barbara contains a relatively impoverished terrestrial environment lacking permanent fresh water and many of the terrestrial plants and animals present on the mainland (Junak et al. 1993; Schoenherr et al. 1999). The island's rich marine environments include productive rocky intertidal habitats and kelp beds, a seal and sea lion rookery, a number of nesting sea birds, and a wide variety of shellfish and fish (Schoenherr et al. 1999).

CA-SBI-12 is situated on a terrace roughly 350 m from the shore. As part of a survey for the Channel Islands National Monument, Greenwood (1978) described CA-SBI-12 as a shell scatter containing mostly owl limpet and black abalone shells, covering an area of roughly 9 x 10 m. In 1986, as part of a larger National Park Service-sponsored project involving subsurface testing of several archaeological sites, a crew led by Pandora Snethkamp and Don Morris excavated a 0.5 x 1 m unit at CA-SBI-12 (Figure 2). During initial site surface observations and through later mapping, Snethkamp (1986) determined that the site was smaller than Greenwood had estimated, appearing to cover an area of roughly 5 x 5 m. Although size estimates for CA-SBI-12 have varied, we rely on Snethkamp's estimates based on subsurface testing and mapping.

Unit 1 was excavated in natural levels, with arbitrary 5 cm. levels used to subdivide thicker strata. Snethkamp defined two main cultural strata (1 and 2), but the break between strata at roughly 6 cm. was subtle and difficult to distinguish in the unit's profile. Stratum 1 (0-6 cm.) contained a relatively unconsolidated soil matrix, which was siltier than the matrix at other sites Snethkamp excavated on the island. Stratum 2 was broken into two arbitrary levels (6-11 cm. and 11-16 cm.). Snethkamp noted that the shell density increased at the beginning of Stratum 2 and gradually terminated at a depth of 16 cm. After excavating the 11-16 cm. level, Snethkamp probed with a hand mattock down 5-10 cm. deeper to make sure they had reached the bottom of the cultural deposits. A profile drawing was made and soil samples were then obtained from the southeast wall of Unit 1.

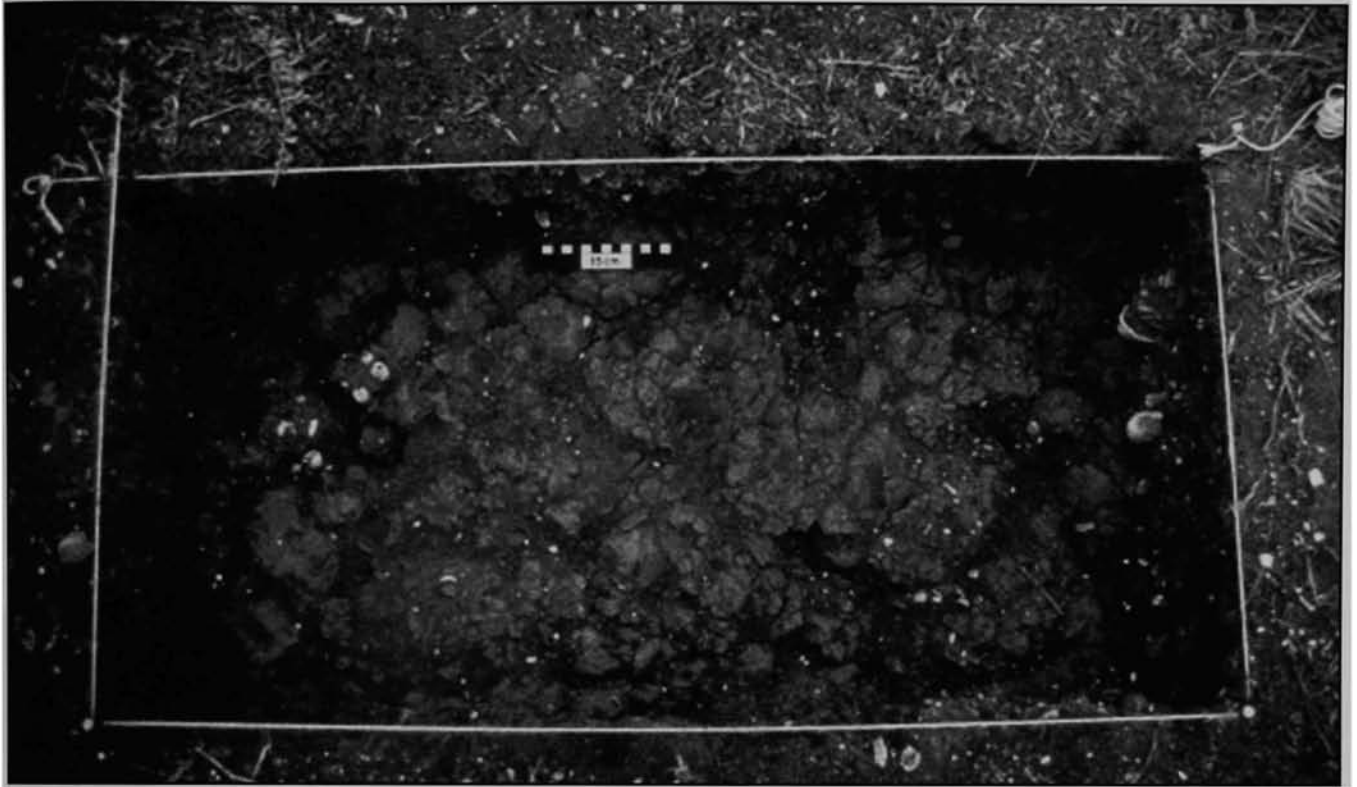


Figure 2. Overhead view of Unit 1 at the base of 11-16 cm. Note soil cracking (Courtesy of P. Snethkamp).

Munsell soil color values were similar throughout the deposit (10YR5/4, 0-6 cm.; 10YR 5/3, 6-16 cm.).

Argilliturbation, the shrinking and swelling of clay-rich soils, resulting in soil cracking and the movement of artifacts between site strata (see Erlandson and Rockwell 1987), appears to be a problem at CA-SBI-12 and many other Santa Barbara Island sites (Snethkamp 1986). In the 11-16-cm. level of CA-SBI-12, for example, two modern sheep pellets were identified that undoubtedly fell in from the site surface. Argilliturbation appears to have been moderate at CA-SBI-12, however, compared to other Santa Barbara Island sites excavated by Snethkamp. Nonetheless, Snethkamp noted cracks up to 2.5 cm. wide in the site soil. Due to the shallow nature of the midden deposits, the small size of the site, and the evidence of stratigraphic mixing in the site soils, it seems likely that CA-SBI-12 is the result of a single brief occupation. One of our objectives in analyzing the CA-SBI-12 collection was to test this proposition.

CHRONOLOGY

Two radiocarbon dates were obtained from marine shells excavated from Unit 1. The first date was obtained by Erlandson et al. (1992) from the lowest (11-16 cm) level of Unit 1. This fragment of a single black abalone shell produced an uncorrected date of 940 ± 90 RCYBP (Beta-30636). A $^{13}\text{C}/^{12}\text{C}$ adjustment yielded a conventional age of 1370 ± 90 (RCYBP), and calibration via CALIB 4.3 (Stuiver and Reimer 1993, 2000) using a ΔR of 225 ± 35 provided an intercept of 680 CYBP (A.D. 1270) and a range of 770 to 630 CYBP (A.D. 1180 to 1320) at one standard deviation. Subsequent analysis of a single black abalone shell from the uppermost (0-6 cm.) level of Unit 1 produced an uncorrected age of 860 ± 60 RCYBP (Beta-139949) and a $^{13}\text{C}/^{12}\text{C}$ adjusted age of 1290 ± 60 RCYBP. Calibration produced an intercept of 640 CYBP (A.D. 1310) and a one sigma range of 670 to 560 CYBP (A.D. 1280 to 1390).

These two dates, which overlap at one standard deviation, support the idea that CA-SBI-

12 contains a single occupational component. The dates bracket the occupation between about A.D. 1180 and 1390, roughly coinciding with Arnold's (1992) Middle-to-Late Period transition (A.D. 1150-1300). Assuming a single, brief occupation, averaging these two dates may provide the most precise estimate of the site age. Averaging the two dates, using CALIB 4.3, suggests that the site was occupied between about 720 to 560 CYBP (A.D. 1230-1390), with a most likely age falling near the end of the Middle-to-Late Period Transition.

FAUNAL REMAINS FROM CA-SBI-12

All the materials from Unit 1 were screened over 1/8 and 1/16-inch mesh. All residuals captured in 1/8-inch mesh were analyzed using comparative collections housed at the University of Oregon. The 1/16-inch residuals, consisting of 574.8 g (11% of all residuals) of shell, bone, rock, etc. were sorted for diagnostic artifacts and identifiable vertebrate bones (e.g., fish vertebrae), but none were encountered. While a comprehensive analysis of the 1/16-inch residuals may slightly alter some of the faunal percentages, the site deposits, consisting largely of two species of shellfish, are relatively well represented using 1/8-inch residuals. The faunal remains are fairly well preserved, but have undoubtedly been affected by weathering, argilliturbation, and other processes.

Roughly 4.4 kg. of shell was recovered from the 1/8-inch residuals from Unit 1, of which more than 99% are from marine taxa (Table 1). The assemblage contains at least 10 shellfish taxa, but is dominated by *Haliotis cracherodii* (black abalone) and *Lottia gigantea* (owl limpet), two species common in nearshore rocky intertidal habitats. At least 160 individual black abalones (57%) and 58 owl limpets (21%) were identified in the excavated levels. Black abalone make up approximately 80% of the total shellfish weight, while owl limpets contribute about 19%. Other shellfish such as barnacles, tube worms, and small limpets are present in minor proportions (<1% combined) and were probably introduced to the site as incidental "riders" on abalone shells

or kelp. The dominance of abalone and limpet suggest a relatively specialized economy and site function for CA-SBI-12.

Only 633 (29.0 g) bones were recovered from the 1/8-inch residuals (Table 2). Many of the bones were highly fragmented, precluding identification to genus and species. Approximately 35% of the bones by number of identified specimens (NISP) were rodent, reptile/amphibian, or small bird, most of which probably were introduced to the site naturally rather than by human activities. Roughly 5-10% of the bird bones were burned, however, suggesting that these may have been consumed or used to make tools by people occupying the site. Several small fragments (approximately 2-3 cm. in diameter) of cancellous bone with a thin cortical layer were recovered from the deposits and probably represent sea mammal bone. A juvenile pinniped rib recovered in the 6-11 cm. level substantiates the presence of sea mammal in the site deposits.

Over 260 fish bones were identified, including sheephead, surfperches, rockfish, sculpins, angel shark, Clupeids (sardine or herring), and Labrids (wrasse, seniorita, etc.), most of which reside in nearshore kelp bed or rocky environments and could have been caught with nets, hook and line, spears, etc. Interestingly, most (69%) of the fish bones came from the uppermost stratum where other faunal remains are considerably less dense. While some of the fish remains may have been introduced to the site as stomach contents of birds or sea mammals, the burning noted on roughly 10-15% of the specimens suggest that many of these were consumed by people living at CA-SBI-12.

ARTIFACTS

Very few formal artifacts were identified at CA-SBI-12. Snethkamp (1986) noted the presence of a basalt cobble tool and hammerstone, and Greenwood (1978:28) also documented a broken basalt cobble on the site surface (Figure 3). No formal tools were recovered in Unit 1, however, and only four pieces of basalt and quartz debitage were identified. Swartz (1960) suggested that Santa

Barbara Island may have been used for quarrying crystalline rock for the production of stone tools. The limited amount of debitage from CA-SBI-12 suggests that this is not true for all Santa Barbara Island sites. The most comprehensive assemblage of artifacts from Santa Barbara Island was collected by Rozaire (1978) at CA-SBI-9, a 2,300 year old site on the island's northwest coast (Erlandson et al. 1992). Artifacts recovered by Rozaire include shell fishhooks, projectile points, mortars and pestles, and harpoon heads. The dearth of such artifacts in the CA-SBI-12 assemblage illustrates the relatively specialized nature of site occupation.

DISCUSSION

The relatively limited faunal and artifact assemblage from CA-SBI-12 attests to the fact that the site was occupied for a relatively brief interval of time. People appear to have visited the site primarily to obtain abalones and limpets, but also caught fish, and hunted or scavenged sea mammals and birds. Minimum number of individuals (MNI) and weight values from the CA-SBI-12 assemblage suggest that together abalone and owl limpet make up roughly 75% of the MNI and 98% of the weight of all faunal categories. Recognizing that raw shell weights and MNI measures do not necessarily reflect the edible meat consumed by people, we converted the raw shell and bone weights into edible meat yields using meat yield conversions and methods outlined by Erlandson (1994:57-58) and Vellanoweth et al. (2000). For shellfish, the results were virtually identical to the raw weight percentages, with abalone providing roughly 66% of the edible meat and owl limpet about 23%. Vertebrates appear to have been supplemental dietary resources, with sea mammal contributing about 6% of the edible meat, fish approximately 4%, and bird about 1%. All lines of evidence suggest that shellfish collecting was the focus of the CA-SBI-12 occupation.

While occupation of CA-SBI-12 was relatively brief and specialized, other periods of time or portions of Santa Barbara Island were occupied more intensively. Analysis of Middle and Late



Figure 3. Basalt cobble tool found on surface of CA-SBI-12 (Courtesy of P. Snethkamp).

Holocene materials from CA-SBI-2, currently underway at the University of Oregon, indicate that substantial occupation of the island occurred around 3,800 CYBP (Rick et al. n.d.). The CA-SBI-2 deposits are comparatively dense and appear to cover an area roughly 120 m. wide x 240 m. long (Greenwood 1978), terminating at a depth of roughly 40 cm. The CA-SBI-2 assemblage contains an array of fish, shellfish, and limited mammal remains. A relatively abundant assemblage of quartz and basalt debitage also is present at CA-SBI-2, indicating the production of stone tools.

Excavation of CA-SBI-9 by Rozaire (1978) suggests that the island was also used for a variety of activities at roughly 2,300 CYBP. Along with a diverse artifact assemblage, the CA-SBI-9 faunal assemblage contains a variety of fish and marine mammals, including both resident and migratory breeders (Walker 1978). People occupying Santa Barbara Island collected shellfish, fished, hunted or collected sea mammals and birds, and produced ground and chipped stone artifacts. It now appears that the use of Santa Barbara Island varied considerably across the last 4,000 years, and it may have served as more than a stopover or weigh station during certain periods. (see Glassow 1977)

Other than CA-SBI-12, -2, and -9, only four sites have been radiocarbon dated on the island (Erlandson et al. 1992; Rick n.d.). Unfortunately, virtually no constituent data are available for the four sites. These sites include: CA-SBI-19 dated

to 4,260 to 4,060 CYBP (2310 - 2110 B.C.); CA-SBI-1 dated to roughly 3,830 to 3,640 CYBP (1880 to 1690 B.C.); CA-SBI-3 dated to 1350 to 1160 CYBP (A.D. 600-790); and CA-SBI-16 dated to roughly 670 to 550 CYBP (A.D. 1280-1400). Interestingly, only CA-SBI-16 and CA-SBI-12 currently have age ranges that extend into the Late Period, suggesting that much of the occupation of Santa Barbara Island occurred during the Middle Period (600 B.C.- A.D. 1300) and earlier. CA-SBI-16 was excavated by Swartz and Sutton (1958), but much of it was subsequently destroyed or heavily disturbed by historical land use (Erlandson et al. 1992; Greenwood 1978:34). Only limited data are available from the Swartz and Sutton (1958) excavation, precluding any direct comparison with CA-SBI-12.

CA-SBI-12 and -16 also appear to date partially to the Middle-to-Late Period transition (A.D. 1150-1300). Overlapping with the Medieval Climatic Anomaly, the Middle-to-Late Period Transition was a period when a number of unique cultural developments seem to have occurred on the southern California Coast (Arnold 1992; Colten 1993; Erlandson and Gerber 1993; Jones et al. 1999; Raab and Larson 1997; and others). The presence of at least two sites on small Santa Barbara Island dated to this interval raises questions about native uses of the island. Arnold (1991, 1992; Arnold and Tissot 1993; Arnold et al. 1997) and Colten (1993) argue that a period of drought and elevated sea surface temperatures during the Middle-to-Late Period Transition forced a number of changes in human demography and social organization. Recent paleoenvironmental data obtained by Kennett and Kennett (2000) suggest that sea surface temperatures, and by association marine resource productivity, were highly variable during the Middle-to-Late Period Transition and it does not appear to have been a period of serious marine decline. Raab and Larson (1997) and Yatsko (2000), in contrast, focused on the role of an intense and prolonged drought, which they argue spurred cultural changes. Virtually all authors agree, however, that the Middle-to-Late Period Transition was a period of significant

demographic and social change. Research by Arnold (1992:76) and Peterson (1994) on Santa Cruz Island, and from a variety of other areas in western North America (see Jones et al. 1999), demonstrate that a number of sites appear to have been abandoned during this interval. The presence of at least two Middle-to-Late Period Transition sites on little Santa Barbara Island, along with five more documented for San Nicolas Island (Vellanoweth, Martz, and Schwartz n.d.) suggests that demographic responses to environmental changes on these islands may have differed from those of the island and Barbareño Chumash. This suggests that human responses to environmental perturbations of the Middle-to-Late Period Transition may have been more spatially variable than previously recognized.

CONCLUSIONS

CA-SBI-12 appears to have functioned as a temporary camp occupied roughly 600-800 years ago. Due to the scarcity of permanent water and current lack of evidence for water storage (e.g., asphaltum), it seems likely that the site was occupied after storms when water could have been collected in areas near the site, or by people who brought water with them. Interestingly, it is one of only two recorded shell middens on the entire south coast of Santa Barbara Island, suggesting that this portion of the island was used more sporadically than the north coast. While occupation of CA-SBI-12 was brief and specialized, it should be emphasized that small, limited-activity sites like CA-SBI-12 were fundamental to the larger seasonal rounds and activities of people living throughout California. Too often researchers have focused on large village sites, often neglecting ephemeral middens, lithic scatters, and other less visible site types (Glassow 1985). The data from CA-SBI-12 indicate that these small sites are crucial for documenting broader cultural patterns and developments.

Santa Barbara Island remains one of the most understudied of California's Channel Islands, largely due to its small size, remote location, and

apparent absence of historical occupation. Similarly, the archaeology of Anacapa Island, which is probably the most easily accessed of all the Channel Islands (~12 miles offshore) has also largely been neglected, again due primarily to its small size and limited fresh water. If we are to more fully understand human occupation of the southern California Coast we must begin to fill these gaps. This paper represents an initial step in this direction, but research is needed in a variety of sites before we can more fully understand the human use of Santa Barbara Island.

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NOTES

1. CA-SBI-13 was a buried shell and rock scatter eroding out of a gully south of CA-SBI-12 (Greenwood 1977). Subsequent attempts to relocate the site by Snethkamp (1986) were unsuccessful, and it is possible that the site has been lost to erosion.

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Table 1
Weight (g) and MNI of Shellfish from CA-SBI-12

Taxon	Surface		0-6 cm		6-11 cm		11-16 cm		Total			
	Wt	MNI	Wt.	MNI	Wt.	MNI	Wt.	MNI	Wt.	%Wt.	MNI	%MNI
<i>Acmaea sp.</i> (limpet)	—	—	—	—	—	—	0.2	1	0.2	<0.1	1	0.4
<i>Balanus sp.</i> (barnacle)	—	—	0.5	1	0.7	1	0.5	1	1.7	<0.1	3	1.1
<i>Collisella scabra</i> (roughed limpet)	—	—	1.3	4	1.4	6	0.5	3	3.2	<0.1	13	4.6
Gastropod	—	—	—	—	0.1	1	—	—	0.1	<0.1	1	0.4
<i>Haliotis cracherodii</i> (black abalone)	536.7	20	547.0	32	1440.5	59	992.2	49	3516.4	79.8	160	57.1
<i>Haliotis rufescens</i> (red abalone)	—	—	16.1	1	—	—	—	—	16.1	0.4	1	0.4
<i>Helminthoglypta ayresiana</i> (land snail)	2.4	1	5.5	21	7.5	18	6.7	1	22.1	0.5	41	14.6
<i>Lottia gigantea</i> (owl limpet)	29.5	2	187.7	10	376.3	32	254.0	14	847.5	19.2	58	20.7
<i>Pollicipes polymerus</i> (gooseneck barnacle)	—	—	<0.1	1	—	—	—	—	<0.1	<0.1	1	0.4
<i>Serpulorbis squamigerus</i> (tube worm)	—	—	—	—	—	—	<0.1	1	<0.1	<0.1	1	0.4
Total	568.6	23	758.2	70	1826.5	117	1254.2	70	4407.5	—	280	—

* All specimens are from 1/8-inch screen residuals. Any specimen that weighed less than 0.1 g was rounded to 0.1.

Table 2
Weight (g), NISP, and MNI for Vertebrate Remains from CA-SBI-12

Taxa	0-6 cm		6-11 cm		11-16 cm				Total			
	Wt	NISP	Wt.	NISP	Wt.	NISP	Wt.	%Wt.	NISP	%NISP	MNI	%MNI
Bird	0.6	11	1.0	15	1.4	25	3.0	10.3	51	8.1	1	8.3
Reptile/Amphibian	0.1	6	0.5	28	0.5	26	1.1	3.8	60	9.5	1	8.3
Rodent	0.3	10	0.5	46	0.8	52	1.6	5.5	108	17.1	1	8.3
Sea Mammal	7.7	21	2.7	14	1.0	9	11.4	39.3	44	7.0	1	8.3
Teleost (Bony Fishes)	3.2	153	1.2	48	0.4	15	4.8	16.6	216	34.1	—	—
Atherinidae (silversides)	0.1	4	—	—	—	—	0.1	0.3	4	0.6	1	8.3
Clupeidae (herrings)	<0.1	4	<0.1	4	0.1	5	0.3	1.0	13	2.1	1	8.3
Cottidae (sculpins)	0.1	5	0.1	1	—	—	0.2	0.7	6	0.9	1	8.3
Embiotocidae (surfperch)	—	—	0.1	2	—	—	0.1	0.3	2	0.3	1	8.3
Labridae (wrasses)	0.8	12	0.3	3	0.1	3	1.2	4.1	18	2.8	1	8.3
<i>Sebastes</i> sp. (rockfish)	—	—	<0.1	1	—	—	0.1	0.3	1	0.2	1	8.3
<i>Semicossyphus pulcher</i> (California sheephead)	0.2	1	—	—	—	—	0.2	0.7	1	0.2	1	8.3
<i>Squatina californica</i> (angel shark)	<0.1	1	—	—	—	—	0.1	0.3	1	0.2	1	8.3
Fish subtotal	4.6	180	1.9	59	0.6	23	7.1	24.5	262	41.4	8	66.7
Bone undifferentiated	3.7	46	0.8	38	0.3	24	4.8	16.6	108	17.1	—	—
Total	17.0	274	7.4	200	4.6	159	29.0	—	633	—	12	—

* All specimens are from 1/8-inch screen residuals. Any specimen that weighed less than 0.1 g was rounded to 0.1.

