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Site Chronology on San Clemente Island, California

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Introduction

This study reports 48 radiocarbon dates, 56 obsidian hydration dates, and archaeological evidence from six major archaeological sites on San Clemente Island. These data provide a preliminary chronological framework for cultural development on the island, which was occupied for 10,000 years, one of the longest documented cultural sequences on the West Coast.

In any archaeological investigation, reliable dating of the site and its contents is critical. Without such information, it would be impossible to formulate hypotheses concerning temporal placement or culture change. This is particularly true of San Clemente Island due to the considerable time depth of occupation, the heavy reliance of its inhabitants on the surrounding maritime resources, and the complexity of its culture transitions.

At present, there is excellent evidence for extremely early occupation of San Clemente Island. There are, for instance, many radiocarbon dates for the Eel Point B site (SCLI-43B) which suggest that the island was occupied as early as 10,000 years ago. While this date is not the earliest date for the human occupation of southern California's Channel Islands (Snethcamp, 1986, as cited by Salls, 1988), it is of great significance as it documents the widespread presence of maritime oriented populations at a previously unsuspected early date.

In addition to the simple documentation of the early occupation of southern California's Channel Islands, these dates also provide indirect evidence of sea-faring craft as early as 10,000 years ago. Although no archaeological evidence for boat making technology is known from such early sites, their presence must be inferred as it would be impossible to traverse the roughly 50 mile distance between San Clemente Island and the mainland without sea-worthy craft, even when the ocean level was lower (San Clemente has never been connected to the mainland and is separated from it by very deep water).

Reliable dating is also needed to tie the cultural chronology of San Clemente Island into those developed for the adjacent islands and mainland. As noted above, the Eel Point B site contains radiocarbon dates which suggest an extremely early occupation. This site would appear to be contemporaneous with other sites in the southern California region that have been classified as Early Millingstone Cultures. This culture is characterized partially by an artifact assemblage that suggests a subsistence pattern based primarily upon seeds. Coastal groups of the Early Millingstone Culture were known to exploit a number of littoral molluscan species, but there was no significant consumption of either fish or marine mammals (Moratto 1984:127-133).

In contrast, studies of the stable isotopic composition of carbon and nitrogen in human bone collagen suggest that San Clemente Island's earliest populations were heavily reliant on marine resources (Goldberg 1993a, b). Furthermore, nitrogen isotope analysis, which can be used to discern trophic level differences in feeding regimes (Schoeninger and DeNiro, 1984), indicates that marine mammals composed a tremendous percentage of the diet. Other analyses of early coastal populations reveal similar information, suggesting that a different adaptive pattern may have been present at an early date in southern California (Masters et al. n.d.).

Accurate control over specific site chronologies is also important as there may have been occupations by more than one human population on San Clemente Island. Recent studies of osteological material by Titus and Walker (1986) indicate that there were two morphologically distinct populations occupying the island. One of these, as represented by burials excavated at Eel Point C (SCLI-43C), is morphologically similar to the Chumash Indians from the northern Channel Islands and the adjacent mainland. The second group, from the Nursery Site (SCLI-1215), is more similar to the Shoshonean groups that inhabited Santa Catalina Island and the adjacent coastal regions around Los Angeles County. Early evidence suggested that there might be some contemporaneity of occupation for these two groups.

As various radiocarbon and obsidian hydration dates began to accumulate for San Clemente Island sites, a confusing and sometimes contradictory picture of occupation on the island emerged. This study will summarize the original dates for the island and present new radiocarbon dates in an attempt to reconstruct the complex occupation history of San Clemente. Although all available dates for the various sites are documented, discussion is directed toward Ledge (SCLI-126), Old Air Field (SCLI-1487), Xantusia Cave (SCLI-1178), Eel Point B (SCLI-43-B), Eel Point C (SCLI-43C), and the Nursery Site (SCLI-1215). Special attention is paid to Eel Point B, Eel Point C, and the Nursery Site as they are critical to an understanding of human occupation on the island and have been the subject of serious confusion in the past.

Site Chronology

A chronology for the various sites on San Clemente Island has been established using three different methods; artifact typology, obsidian hydration dating, and radiocarbon dating. Although this paper is primarily concerned with the radiocarbon data, a brief discussion of the other methods and their respective contributions is also included.

Typological Evidence

With the exception of the historic sites on San Clemente Island, the use of artifacts as temporal markers is at best imprecise and at other times inconclusive. An excellent example of the successful use of artifact typology for dating is found in the historic component of the Ledge Site (SCLI-126). Here, various European artifacts (ceramics, textiles, metal, and glass) accurately date the site to the historic period with the latest occupation ending during the late 18th century or early 19th century (Rechtman 1985). In this instance, the dating is so precise that the use of other methods, such as radiocarbon, would be redundant and possibly less accurate. A similar situation was encountered at the historic period Old Airfield Site (SCLI-1487; Meighan 1986).

At Eel Point C and Nursery the presence of shell fishhooks, steatite effigies, diagnostic shell beads and other artifacts places these sites temporally with other Canaliño cultures as defined by Salls (1988). While this is important information, specific temporal placement of these sites based upon artifact typology alone could place them anywhere in a 2000 year span.

However, it is important to document as specifically as possible the actual span of occupation at each site so it can be determined if the morphologically distinct populations were contemporaries. Additional dating techniques are thus helpful.

At other San Clemente Island sites, the use of artifact typologies is useless. An example of this is seen at the Xantusia Cave Site (SCLI-1178), (Foley 1987) where virtually no diagnostic artifacts have been found. Under such conditions, other dating methods need to be employed.

Obsidian Hydration Dates

Due to the presence of obsidian artifacts and chipping waste on San Clemente Island, obsidian hydration has also been used to date archaeological sites. Obsidian is known to absorb small quantities of water at a rate determined by a number of complex variables, the two most significant of which are the chemical composition of the obsidian and temperature. If the rate of hydration can be calibrated for a particular obsidian source and its depositional regime, the depth of hydration on a given artifact can be translated into an age.

Preliminary analysis of 17 obsidian flakes from Eel Point C suggests that most of the obsidian found on San Clemente Island can be traced back to the obsidian flow at Coso Hot Springs (see Scalise, Chapter 5). Until recently, only two hydration rates had been calibrated for this source. One lineal value of 220 ± 44 years per micron is based on data from the Malibu site (Meighan 1978), while the other value of 344 ± 69 years per micron is based on data from the Coso Hot Springs area (Ericson 1977). The range of uncertainty for each rate assumes an 0.2 micron uncertainty from laboratory procedures. Recently, Scalise proposed a third hydration rate of 458 ± 92 years per micron for San Clemente Island. This rate was calibrated from obsidian samples originating from the West Sugarloaf subsource at Coso.

At present, this new San Clemente Island hydration rate must be considered tentative. On one hand, the comparatively old dates it produces might be solely the result of sampling errors in correlating obsidian hydration readings and radiocarbon dates. As will be discussed later, there is some difficulty in distinguishing between occupation layers at Eel Point.

Alternatively, the Coso and Malibu rates may be inappropriate for San Clemente Island. It has been suggested that either the climate is significantly different, or that the majority of the obsidian found on San Clemente originated from a different subsource than the obsidian used for the other two calibrations. Although most of the obsidian from San Clemente Island appears to derive from the Coso Hot Springs location, there is some chance that a local source exists as veins of a poor grade obsidian have been found on the island. These particular samples were of too poor quality to be easily worked, but the possibility exists that other, better quality veins might have been exploited (Salls, personal observation).

Regardless of the difficulties surrounding the application of the new San Clemente obsidian hydration rate, it certainly cannot be used *a priori* for dating the original Eel Point C obsidian samples as they were used for the calibration itself. Any application of the new hydration rate to other sites on the island must also be interpreted with caution until the source of all obsidian samples can be determined.

There are four sites on San Clemente Island for which meaningful obsidian dates are available. They are the Ledge Site, the Old Airfield Site, the Nursery Site, and Eel Point C. The results of the obsidian hydration measurements appear in Table 4.1.

Table 4.1. San Clemente Island obsidian hydration readings.

Site	Sample	Lab No.	Unit	Depth (cm)	Microns ±0.2	Malibu m x220	Coso m x344	SCLI m x458
Nursery	455	11454	K-3/4 63/64	0-40	0.6	1320	2064	2748
Nursery	661	11455	W. cor. hse.	10-20	6.6	1452	2270	3023
Nursery	962	11456	NW. cor. hse.	0-65	6.3	1386	2167	2885
Nursery	445	11475	W. cor. hse.	20-30	6.3	1386	2167	2885
Nursery	1014	12051	18N-12W	0-10	7.0	1540	2408	3206
Nursery	1943	10252	19N-11W	20-30	6.2	1364	2133	2840
Nursery	2110	12053	18N-11W	30-40	2.0	440	688	916
Nursery	438*	13255	W. cor. hse.	20-30	6.6	1452	2270	3023
Nursery	438*	13256	W. cor. hse.	20-30	6.5	1430	2236	2977
Nursery	4080*	13257	28N-15W	10-20	2.8	616	963	1282
Nursery	4683*	13258	29N-15W	40-72	3.0	660	1032	1374
Nursery	4682*	13260	29N-15W	40-72	3.4	748	1170	1557
Nursery	4543*	13261	69/70N-13W	20-30	6.3	1386	2167	2885
Nursery	4860*	13262	47/48N-13W	10-20	6.2	1364	2133	2840
Nursery	457*	13263	K unit S pit	10-20	6.2	1364	2133	2840
Nursery	389*	13264	W. cor hse.	20-30	6.7	1474	2305	3069
Nursery	409*	13265	19/20-65/66	45-60	7.5	1650	2580	3435
Ledge	1756	10227	Q-30	30-45	1.8	396	619	824
Ledge	602	10228	X-30	0-20	6.1	1342	2098	2794
Ledge	839	10229	P-31	0-15	5.6	1232	1926	2565
Ledge	181	10239	E-30	0-15	5.3	1166	1823	2427
Ledge	342	10240	K-28	0-15	6.3	1386	2167	2885
Ledge		10241	Q-31	48	1.8	396	619	824
Old Airfld	733*	13050	N2-E4	20-30	2.0	440	688	916
Old Airfld	56*	13082	N0-E15	10-20	1.2	264	413	550
Eel B	1453	11446	Q-22	15-30	2.2	484	757	1008
Eel B	1870	13049	Unit 2	30-40	3.6	792	1238	1649
Eel C	158	10242	Burial 5B	190-200	5.4	1188	1858	2473
Eel C	158	10243	Burial 5B	190-200	5	1100	1720	2290
Eel C	155	10244	Unit 3	190-205	6.9	1518	2374	3160
Eel C	908	10247	Burial 5		5.6	1232	1926	2565
Eel C	237	10248	Unit 2A/F.2		5.3	1166	1823	2427
Eel C	841	10249	Unit 2C	190-205	5.8	1276	1995	2656
Eel C	157	10256	Unit 3	160-175	7	1540	2408	3206
Eel C	763	10257	Unit 2/F.1		5.5	1210	1892	2519

Table 4.1, cont. San Clemente Island obsidian hydration readings.

Site	Sample	Lab No.	Unit	Depth (cm)	Microns ±0.2	Malibu m x220	Coso m x344	SCLI m x458
Eel C	755	10258	Unit 2	205-220	5.4	1188	1858	2473
Eel C	194	10300	Unit 2A		5.9	1298	2030	2702
Eel C	870	10301	Unit 4A	180-215	5.2	1144	1789	2382
Eel C	596	10315	Burial 5A	165-200	5.8	1276	1995	2656
Eel C	868	10316	Unit 2A	180-200	6.4	1408	2202	2933
Eel C	910	10317	Burial 5		5.4	1188	1858	2473
Eel C	156	10318	Unit 2A	210	6.2	1364	2133	2840
Eel C	202	10319	Burial 5		5.2	1144	1789	2382
Eel C	154	10336	Burials 2 + 4		6	1320	2064	2748
Eel C	154	10337	Burials 2 + 4		6.2	1364	2133	2840
Eel C	154	10338	Burials 2 + 4		6.2	1364	2133	2840
Eel C	154	10393	Burials 2 + 4		5.8	1276	1995	2656
Eel C	594	11445	H-15	190-205	2	440	688	916
Eel C	318	11447	H-13	140-155	7	1540	2408	3206
Eel C	299a	11448	H-13	155-170	6	1320	2064	2748
Eel C	299b	11449	H-13	155-170	6.1	1342	2098	2794
Eel C	299c	11450	H-13	155-170	6.3	1386	2167	2885
Eel C	299d	11451	H-13	155-170	6.2	1364	2133	2840
Eel C	299e	11452	H-13	155-170	6.4	1408	2202	2931
Eel C	299f	11453	H-13	155-170	6.4	1408	2202	2931
Eel C	1107*	13048	Trch I Str III	84	5.4	1188	1858	2473

* Previously unpublished hydration readings prepared by Janet Scalise and used in her accompanying article (Chapter 5). All other readings in this table are published by Meighan and Scalise 1988.

The six obsidian hydration readings available for Ledge are extremely informative. Although there is solid evidence that the site was occupied during the historic period, the obsidian dates indicate the presence of a prehistoric component dating anywhere from about 400 years BP to 3000 years BP, depending upon which hydration rate is considered. The two hydration readings available for the Old Airfield Site, the second historic site in question, do not suggest as much prehistoric use as was found at Ledge. Indeed, the smaller reading may fall comfortably within the historic period.

The numerous obsidian dates for both Nursery and Eel Point C are also of great interest as they provide strong evidence that both sites were occupied contemporaneously for at least some of their occupational history (see discussion of these dates by Scalise, Chapter 5 and Meighan, introduction to Nursery Site). Although the actual dates may be as early as 3000 years BP, the similarity in hydration readings indicates some contemporaneity for the two sites. This is of extreme importance considering the morphological differences between the Nursery and Eel Point C populations described by Titus and Walker (1986).

There are also two hydration readings reported from Eel Point B. Both yielded ages similar to those found at Eel Point C. It is suspected that both samples came from later occupations capping Eel Point B deposits.

It must be noted that obsidian hydration dates do not necessarily reflect the total temporal span of occupation at these sites, but rather the period during which the obsidian was imported and used. Throughout Southern California, there were periods when the obsidian trade was not active and periods when other stone materials were used for artifacts with little or no obsidian use. Therefore, radiocarbon dates are still necessary for an accurate assessment of the temporal span of occupation at each of the sites. An effort is made in other papers in this volume to relate the obsidian hydration dates to the collections recovered, rather than to the midden itself.

Radiocarbon Dates

Numerous radiocarbon dates have been collected for San Clemente Island. The first series was run at the La Jolla laboratory, as part of a field project under the direction of L. Michael Axford. All subsequent analyses were performed at the UCLA Isotope Laboratory. For the purposes of this study, only those dates from Nursery, Eel Point B, Eel Point C and Xantusia Cave will be discussed. All dates reported in the following text have been calibrated where possible (no calibration is available for samples from the 9th millennium BP or older). A list of all raw dates and calibrated dates can be found in Table 4.2. Note that these dates and those in the text may not correspond with previous reports such as Axford (1977) and Meighan (1983), Ghiradelli (1984) and Salls (1988). The dates reported here represent the most recent calibrations based on data from Pearson et al. (1986) for terrestrial 14 C samples and Stuiver et al. (1986) for marine 14 C samples.

There are four dates available for the Nursery Site, three of which remain problematic. The most reliable date was obtained from human bone collagen from Burial 2 (UCLA-2592). This yielded an age of 1330-1400 years BP, which generally conforms with both the Canaliño cultural assemblage and the obsidian hydration readings. Another radiocarbon date was derived from a sample of eel grass that was associated with the same burial (UCLA-2583). The result was a date of 8900 years BP. This aberrant date was most likely caused by localized fumarole activity, although upwelling effects or diagenetic change may have contributed to the problem.

San Clemente Island is formed by an actively uplifting fault block (Olmsted 1958). Such regions are known for their high levels of volcanic activity and it has been suggested that the eel grass may have grown next to gas fumaroles releasing significant quantities of radioactively dead CO2 (Johnson et al. 1983; Goldberg 1993). Upwelling of older ocean waters also may have contributed slightly to the problem.

A recent study by DeNiro and Hastorf (1985) has demonstrated that uncarbonized plant materials in archaeological sites do not retain their original stable carbon or nitrogen isotope signatures. If this is true for stable isotopes, then radiocarbon may also be affected by diagenetic change.

A third date of 6290-6400 years BP was derived from charcoal in the grave fill of Burial 3 (UCLA-2585). Since this burial is thought to be contemporaneous with Burial 2, it should have yielded a date no older than about 1500 BP. This date can be rejected as representative for the burial as there is no way to document association between a burial and a piece of charcoal found within its fill. It is most likely that this charcoal came from an earlier midden deposit and was intrusive in the fill of the burial pit.

The fourth date from Nursery (UCLA-2586) was based on a wood sample from a hearth (Feature 27). This wood yielded a date of 4090-4200 years BP. If this feature was indeed a hearth, then the date would appear to be reliable, though much earlier than expected for this site.

The last two relatively early dates may indicate a longer period of occupation at the Nursery Site than either the artifactual evidence or obsidian hydration readings would suggest. Due to such a possibility, it is suggested that additional human bone collagen samples be analyzed in order to measure the temporal span of the associated cemetery.

The Eel Point archaeological sites are undoubtedly the most complex and misunderstood midden deposits under consideration. Early researchers divided the deposits into 3 distinct units labelled Eel Point A, Eel Point B and Eel Point C (SCLI-43A-C). Eel Point A is the most recent deposit as judged by artifactual evidence. Eel Point B is the oldest deposit while Eel Point C falls temporally between A and B (only the A portion of the site was tested by McKusick and Warren 1959).

Before field work was initiated by UCLA, four radiocarbon dates for Eel Point B were available from earlier research by Axford and Axford and Meighan (1983). These dates indicated a span of occupation from 5940 years BP to 8770 years BP.

During the first two field seasons of UCLA's project (1983 and 1984), samples were collected from Eel Point B for six radiocarbon dates. These samples yielded results similar to the four dates reported by Axford. For example, a shell sample (UCLA-2532A), which dated 7770-7920 BP was collected at the same level as Axford's 8500-8770 (LJ-4130) and 8370-8510 (LJ-3961) BP dates (Axford and Meighan, 1983). The rest of the UCLA dates ranged from 2850 years BP to 5030 years BP (UCLA-2532B, 2532E, 2532G, 2573 and 2578) and represent either later time periods or intrusive burials.

Subsequent radiocarbon dates have clarified the above chronology and added additional time depth to the occupation of the area B component. The first date, suggestive of extreme antiquity of occupation on San Clemente Island, came from a *Mytilus* shell found in association with an extremely deteriorated burial from Eel Point B. This sample (UCLA-2735B) yielded a date of 9310 ± 140 years BP.

Additional samples were obtained for analysis during the 1986 field season on San Clemente. Samples were collected from an excavation unit placed in an area where Eel Point C deposits were suspected to overlay Eel Point B deposits. Results confirmed these expectations. Only one date of 3210-3470 years BP (UCLA-2758A) was found to derive from the later deposits. All of the other four dates (UCLA-2758B-E) which ranged from 8850 years BP to 9870 years BP confirm the early occupation of the site (Salls, 1988).

At Eel Point C, initial estimations of site age were uncertain due to insufficient radiocarbon dates. Until recently, the only date available was a 4230-5200 year BP date run on a shell fishhook (UCLA-2574). This date is incongruent with the ages suggested by the obsidian hydration readings (1500 to 3000 year BP) and our general perception of the Canaliño artifact assemblage. Although this particular date is not representative of the entire occupation history at Eel Point C, it is extremely important as it is the earliest known directly dated shell fishhook from the southern California region.

Subsequent radiocarbon dates for Eel Point C confirm a long history of habitation at the area C component. The last nine radiocarbon dates (UCLA-2735A and UCLA-2757A-H) span from 950 years BP to 3720 years BP. Both the obsidian hydration dates and the earlier fishhook date fit comfortably in this time span.

Table 4.2. Calibrated age of radiocarbon determinations, San Clemente Island.

Site No.	Lab No.	Material	Provenience	C14 Age	Years B.P. **
Nursery	UCLA-2592	collagen	Burial 2	1490±30	1330-1400
Nursery	UCLA-2583	eel grass	Burial 2	8900±105	-
Nursery	UCLA-2585	charcoal	Burial 3	5495±45	6290-6400
Nursery	UCLA-2586	wood	Feature 2	3750±35	4090-4200
Eel Pt. B	LJ-4130	shell		8180±110	8500-8770
Eel Pt. B	LJ-3961	shell		8000±80	8370-8510
Eel Pt. B	LJ-4131	shell		5810±90	6150-6310
Eel Pt. B	LJ-4132	*Haliotis*		5650±90	5940-6170
Eel Pt. B	UCLA-2532A	*Mytilus*	90-120cm	7420±50	7770-7920
Eel Pt. B	UCLA-2532E	collagen	Burial 1	4365±55	4870-5030
Eel Pt. B	UCLA-2573	fishhook, *Haliotis*		3950±330	3530-4410
Eel Pt. B	UCLA-2578	fishhook, *Norrisia*		3380±280	2850-3570
Eel Pt. B	UCLA-2532B	charcoal	Feature 1	2430±75	3350-2750
Eel Pt. B	UCLA-2532G	*Haliotis*	185-200cm	560±50	3390-3510
*Eel Pt. B	UCLA-2758A	charcoal	unit 3, 30-40cm	125±85	3210-3470
*Eel Pt. B	UCLA-2758B	charcoal	unit 3, 130-140cm	8850±125	
*Eel Pt. B	UCLA-2758C	charcoal	unit 3, 140-160cm	9775±1	
*Eel Pt. B	UCLA-2758D	charcoal	unit 3, 180-190cm	9870±770	
*Eel Pt. B	UCLA-2758E	charcoal	unit 3, 250-260cm	9655±32	
Eel Pt. B	UCLA-2735B	*Mytilus*	Burial 3	9310±140	-
Eel Pt. C	UCLA-2574	fishhook	215-230cm	4500±350	4230-5200
Eel Pt. C	UCLA-2735A	collagen	Burial 3	3040±70	3100-3360
*Eel Pt. C	UCLA-2757A	urchin	tp1, 80-86cm	1420±15	950
*Eel Pt. C	UCLA-2757B	charcoal	tp, 80-90cm	1090±25	970-1050
*Eel Pt. C	UCLA-2757C	charcoal	tp, 90-100cm	2685±70	2750-2850
*Eel Pt. C	UCLA-2757D	charcoal	tp1, 120cm	2695±120	2750-2940
*Eel Pt. C	UCLA-2757E	charcoal	tp2, 60-80cm	2820±65	2850-3070
*Eel Pt. C	UCLA-2757F	urchin	tp2, 90-100cm	3600±195	3300-3720
*Eel Pt. C	UCLA-2757G	urchin	trch 1, 120cm	3205±180	2770-3250
*Eel Pt. C	UCLA-2757H	charcoal	A-1, 172-177cm	2585±65	2730-2770
Xantusia C.	LJ-4168	shell		6300±90	6670-6870
Xantusia C.	LJ-4169	shell		4950±90	5220-5400
Xantusia C.	UCLA-2551	collagen	Burial 1	5130±55	5770-5940
21	LJ-3959	shell		2000±50	1500-1600
21	LJ-3962	shell		1630±240	920-1390

Table 4.2, cont. Calibrated age of radiocarbon determinations, San Clemente Island.

Site No.	Lab No.	Material	Provenience	C14 Age	Years B.P. **
259	LJ-3960	shell		960±30	520-550
516	LJ-4224	charcoal		350±70	300-490
1174	LJ-4173	shell		3300±360	2730-3550
1174	LJ-4170	charcoal		3110±110	3180-3470
1251	LJ-4219	charcoal		430±70	470-550
139	LJ-4536	*Haliotis*		36000±4000	-
139	LJ-4533	charcoal		1400±100	1270-1400
1295	LJ-4532	charcoal		910±50	730-920
?	LJ-3995	shell		2360±70	1890-2060
?	LJ-4074	shell		2190±70	1690-1850
Seal Pt	UCLA-2577	*Mytilus*		modern	-
	UCLA-2547	limpet		modern	-
	UCLA-2720	eel grass		modern	-

After Ghiradelli (1984)
* after Salls (1988). Unmarked dates are the La Jolla series reported by Ghiradelli (1984)
Permanent site numbers for La Jolla samples provided by Andrew Yatsko
** Calibrated dates using Pearson et al. 1986, for terrestrial, and Stuiver et al. 1986, for marine samples

Of the radiocarbon dates collected for Eel Point C, only one was obtained from bone collagen. The 3100-3360 years BP date for burial 3 (UCLA-2735A) suggests that the burial population from the site dates to the earlier portion of the deposit. This finding is extremely important as it tentatively places the burial population from Eel Point C in a time period almost 2000 years earlier than the burial population at the Nursery Site. This does not suggest contemporaneity for the two populations as do the obsidian hydration readings. It is suggested that additional radiocarbon dates be gathered for individuals from both populations in order to clarify this issue.

One burial of particular interest from Eel Point C is Burial 7, the cremated remains of a young female. This cremation is unique if one considers the morphological population with which the individual is associated. Of all of the native Southern Californian peoples, only the Shoshonean groups are known to cremate their dead (Kroeber 1976:556). Although the southern Channel Islands were inhabited historically by Shoshonean linguistic groups, cremations are rarely encountered (Meighan and Eberhart 1953). It has been suggested that this may be due to a shortage of firewood on the islands. It is not anomalous that a cremation should occur on San Clemente Island, but it is unusual that it should occur in a cemetery containing individuals of a “Chumash” morphology. A precise date for this cremation is critical to our understanding of when this event took place relative to the Shoshonean habitation of the Nursery Site.

Finally, there are three radiocarbon dates available for the Xantusia Cave Site (SCLI-1178). A sample of human bone collagen from Burial 1 was analyzed at UCLA and yielded a date of 5770-5940 years BP (UCLA-2551). This agrees well with Axford’s dates of 6670-6870 years BP (LJ-4168) and 5220-5400 years BP (LJ-4169). While the artifact assemblage for this site is almost entirely non-diagnostic, there seems to be close agreement between all three radiocarbon dates suggesting that they are all quite reliable.

Conclusion

Radiocarbon dates, obsidian hydration dates, and artifactual evidence from various archaeological sites on San Clemente Island, have been presented. The data suggest that the island was occupied for a span of some 10,000 years. During this time, there is evidence of a maritime oriented sea-faring tradition. Specific attention has been directed to six sites: the Ledge Site, the Old Airfield Site, Eel Point B, Eel Point C, the Nursery Site and Xantusia Cave.

Based upon the presence of European artifacts, both the Ledge Site and the Old Airfield Site were found to extend into the historic period. Additional obsidian hydration readings indicate that both sites had intermittent occupation extending back 1-3000 years.

An extremely complex occupation was found at the two site components of Eel Point. At Eel Point C, the later component, obsidian hydration readings can be consistently fitted to the radiocarbon dates. Occupation may have started as early as 5200 years ago and have persisted until about 950 years ago. The earliest component of this site overlaps the range of dates available for Eel Point B. This occurrence emphasizes the difficulty of separating the two components from one another.

A single human bone collagen date of 3100-3360 years BP is available for the burial population at Eel Point C. While the obsidian hydration evidence demonstrates that both this site and Nursery were occupied at the same time, it is impossible to determine if the later occupations at Eel Point C were by Chumash-like populations or Shoshonean-like populations. Additional bone collagen dates for other individuals from Eel Point C are needed to determine the occupation span of the Chumash-like occupants relative to the habitation sequence.

At Eel Point B, radiocarbon dates suggest an occupation span from as early as 9870 years ago to 2750 years ago. As mentioned above, some of the dates that are later than about 4000 years ago may represent the later Eel Point C occupation.

With the exception of one 6290-6400 years BP date, there is close agreement between radiocarbon dates, obsidian hydration readings, and artifactual evidence from the Nursery Site. Although the site may have been occupied from as early as 4200 years BP, most of the burial population is assumed to date to approximately 1500 years BP. Further testing is necessary to confirm this hypothesis and to secure the temporal relationship of the Nursery population to the morphologically distinct Eel Point C population.

The three radiocarbon dates for the Xantusia Cave Site range from 5220 to 6870 years BP. Although the artifact assemblage for this site is undiagnostic and no obsidian hydration readings are available, the close agreement of these dates suggests that they reliably date the occupation of the site.