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8000 YEARS OF HUMAN SETTLEMENT AND LAND USE IN OLD RANCH CANYON, SANTA ROSA ISLAND, CALIFORNIA

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Abstract—Located on Santa Rosa Island's northeast coast, Old Ranch Canyon contains abundant freshwater, and diverse marine and terrestrial ecosystems, including the nearby Skunk Point dune complex, adjacent Torrey Pine Grove, and Abalone Rocks estuary/marsh near the canyon mouth. These and other factors have made the area an attractive location for human settlement for much of the Holocene. Archaeological survey, ^{14}C dating, and small-scale testing in the canyon and adjacent Skunk Point identified 67 archaeological sites, including shell middens, lithic scatters, and a large Chumash village complex. Radiocarbon dates demonstrate that the canyon and surrounding area were occupied for over 8000 years, with Early, Middle, and Late Holocene occupation of the canyon mouth and hilltops/ridgelines. These data underscore the importance of continued archaeological survey on the Channel Islands to help identify ancient human settlement patterns and land use strategies, as well as the distribution, diversity, and preservation of island cultural resources.

INTRODUCTION

With one of the longest coastal archaeological records in North America (ca. 13,000 calendar years), Santa Rosa Island provides a remarkable setting for investigating human land use, settlement, and subsistence with great time depth. The generally good preservation of Santa Rosa's archaeological sites also allows for relatively high-resolution analyses of cultural and environmental developments. Consequently, Santa Rosa has long attracted the attention of archaeologists, including excavations in the late nineteenth and early twentieth centuries (e.g., Rogers 1929; Heizer and Elsasser 1956), extensive research by Orr (1968) during the 1940s to 1960s, and more recent work by scholars from Channel Islands National Park and a variety of other institutions (Kennett 1998; Erlandson et al. 1999; Johnson et al. 2002; Rick et al. 2005b; Rick et al. 2006; Braje et al. 2007; Rick 2007; Morris n.d.). Despite these research projects, much remains to be learned about the archaeology of Santa Rosa Island, including the island's northeast coast, which is the location of the most intensive National Park Service (NPS) activities and public visitation.

In this paper, I report the results of a recent survey and ^{14}C dating project in the Old Ranch Canyon region of Santa Rosa's northeast coast. Previous research on the east coast has largely been limited to small-scale testing, survey around the coastline, and brief site reports (Kennett 1998; Rick et al. 2005b; Rick et al. 2006; Wolff et al. 2007; Rick 2008). In 2005–2006, all of Old Ranch Canyon was systematically surveyed for cultural resources. The survey results provide insight into the nature of human and environmental dynamics that span over 8000 years. When placed in the context of research elsewhere on the Channel Islands, these data help refine our interpretations of long-term trends in human settlement and land use, providing important context for future research.

CONTEXT AND BACKGROUND

With an area roughly 217 km^2, Santa Rosa Island is the second largest of the northern Channel Islands. It is situated 44 km off the mainland coast, about 5 km east of San Miguel Island and 9 km west of Santa Cruz Island. Santa Rosa contains some of the greatest biological and environmental diversity on the Channel Islands, including a number of relatively well-watered streams, mountain peaks around 475 m high, and several unique vegetation communities. Distinct coastal beach and dune

vegetation, island chaparral, oak and riparian woodland, and an island endemic species of Torrey pine (*Pinus torreyana insularis*) are among the native vegetation on the island.

Native American settlement on Santa Rosa Island spans roughly 13,000 calendar years (Johnson et al. 2002). The number of sites on the island increases considerably after about 10,000 cal BP, with the most dense human occupation of the island occurring during the Late Holocene, especially after about 1500 years ago (Kennett 2005; Rick et al. 2005a). During the last 1500 years, Chumash peoples lived in villages scattered around the northern islands, engaged in extensive exchange networks, and were among the most populous and complex hunter-gatherers known (Arnold 2001; Kennett 2005; Rick et al. 2005a). Although questions remain about some of the locations of these villages, archaeological and ethnohistoric research suggests that there were about 22 Chumash villages on Santa Cruz, San Miguel, and Santa Rosa islands (Johnson 1999; Kennett 2005), including 9 on Santa Rosa.

Old Ranch Canyon is positioned on the east coast between Skunk and East Points and near the Torrey Pine Grove at its western extremity (Fig. 1). Unlike most canyons on Santa Rosa Island, it trends northwest to southeast, has a strategic location close to Bechers Bay and adjacent Santa Cruz Island, and has a fairly broad and flat canyon bottom (Fig. 2). Old Ranch Canyon has a small marsh at its mouth that is adjacent to a similar system at the mouth of Old Ranch House Canyon (Abalone Rocks). Together the drainages at Old Ranch and Old Ranch House Canyon appear to have formed a paleoestuary during the Early to Middle Holocene. The adjacent Abalone Rocks marsh was cored for a paleoecological study, providing one of the few records of ancient landscape changes for the Channel Islands (Cole and Liu 1994; Anderson 2002). Several archaeological sites in and around the canyon contain the remains of estuarine and rocky intertidal shellfish, demonstrating that people used all available habitats and environments. However, we are just beginning to understand the nature of such strategies (Rick et al. 2005b; Rick et al. 2006; Wolff et al. 2007).

Previous archaeological survey in Old Ranch Canyon has been sporadic and includes sites recorded on the northern canyon rim and the canyon mouth (P. Orr, unpublished site records), and along the coast (Morris n.d.). The status and condition of

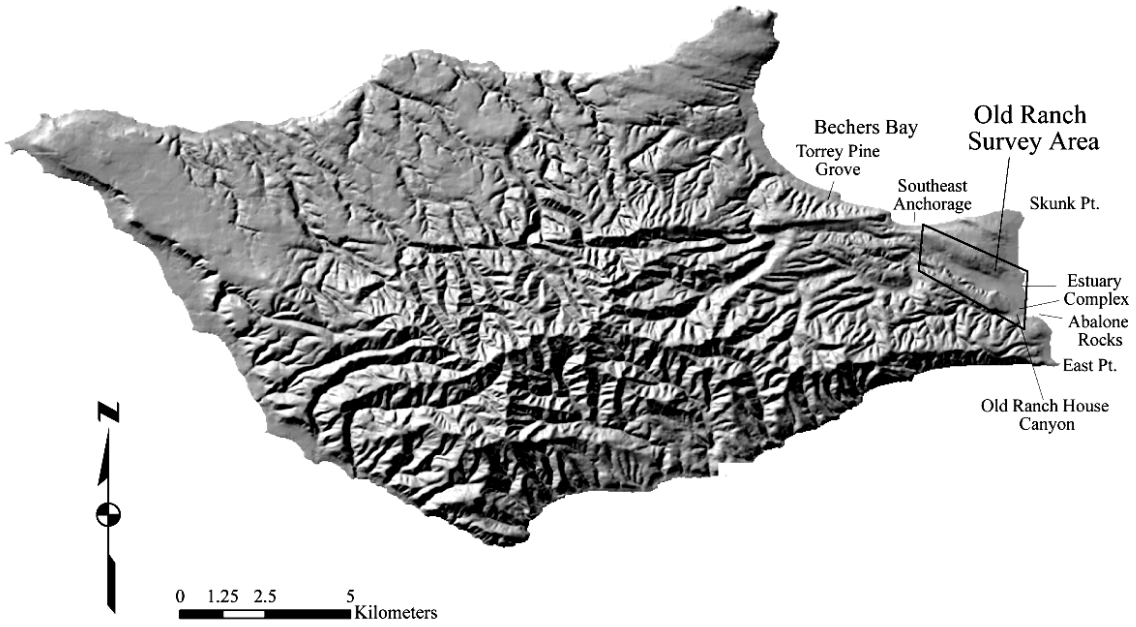

Figure 1. Santa Rosa Island, Old Ranch Canyon survey area, and major areas discussed in the text.

Figure 2. Old Ranch Canyon looking east towards the canyon mouth, showing the broad, flat valley floor and canyon slopes.

the sites at the canyon mouth were also recorded and updated by Rick and Erlandson (2004). The goals of the survey reported here were to identify the nature, extent, and chronology of human use of Old Ranch Canyon, including the importance of a variety of habitats, environments, and landforms in human settlement and subsistence systems.

METHODS

All field and laboratory work was performed by researchers from Southern Methodist University and Channel Islands National Park. These research teams conducted a systematic pedestrian survey for cultural resources in Old Ranch Canyon and adjacent areas of eastern Santa Rosa Island (i.e., Skunk Point, Torrey Pine Grove, and Southeastern Anchorage) from 2005–2006. The Old Ranch Survey area was roughly 4.5 km^2, with additional reconnaissance and sampling in the adjacent Torrey Pine Grove and Skunk Point. We employed standard survey techniques comparable to Kennett (1996), Perry (2004, 2005), and Peterson (1994) with four to five people systematically walking across the landscape and spaced about 3–5 m apart depending on the terrain. Archaeological sites were identified primarily by the presence of artifacts (e.g., chipped stone tools and debitage) and/or ecofacts (shell and bone). Since portions of the Old Ranch Canyon floor are covered with thick deposits of sediment, augers were excavated in some areas of the canyon floor to determine the possibility of buried archaeological deposits, but none were encountered. Archaeological sites were recorded on California State primary and archaeological site records and attachments. The condition, status, and potential of any threats to the cultural resources were also documented using standard NPS criteria (see Rick and Erlandson 2004). All site locations were plotted on topographic maps with the aid of handheld GPS units.

To determine site chronologies, ^{14}C samples (mostly shellfish) were collected *in situ* from trowel probes at all sites with organic materials. Only well-preserved fragments of single shells were selected for dating. All radiocarbon dates presented here were run by the National Ocean Sciences AMS Facility at the Woods Hole Oceanographic Institution or by Beta Analytic Inc., following procedures available at http://nosams.whoi.edu/clients/data.html and http://www.radiocarbon.com/labmethods.htm. All dates were calibrated with CALIB 5.0.2 (Stuiver and Reimer 1993; Stuiver et al. 2005), applying a ΔR of 225 ± 35. We also visited several previously recorded sites in the vicinity of Old Ranch Canyon, Skunk Point, and the Torrey Pine Grove to collect specimens for ^{14}C dating and

Table 1. Archaeological sites in Old Ranch Canyon (newly recorded sites noted with an *).

Site Number	Description	Age (cal BP)
SRI-81	Large shell midden with estuarine and rocky shore taxa	7530–7240
SRI-82	Shell midden with mostly California mussel	2290–1990
SRI-85	Large site with house depressions	920–300
SRI-86	Sparse shell midden near canyon mouth	n/a
SRI-87	Probable village site with glass beads	Historic
SRI-89	Hilltop shell midden with estuarine and rocky shore taxa	6370–6130
SRI-90	Hilltop shell midden with mostly California mussel	3860–3590
SRI-91	Hilltop shell midden with mostly California mussel	3880–3620
SRI-92	Lithic scatter on hilltop	n/a
SRI-93	Hilltop shell midden with mostly California mussel	4370–4040
SRI-189	Small shell midden near beach	n/a
SRI-190	Small shell midden near beach	2640–2320
SRI-191	Dune site with red abalone midden, estuarine shell, and California mussel	6170–4150
SRI-192	Multicomponent site with estuarine shell	6860–2280
SRI-196	Small shell midden near beach	2570–2210
SRI-671*	Small lithic scatter on hilltop	n/a
SRI-672*	Small lithic scatter on hilltop	n/a
SRI-673*	Hilltop shell midden with estuarine and rocky shore taxa	6210–5920
SRI-674*	Small lithic scatter on hilltop	n/a
SRI-675*	Eroding shell midden and lithic scatter on hilltop	1460–1260
SRI-676*	Hilltop shell midden with mostly California mussel	4060–3760
SRI-677*	Small lithic scatter on hilltop	n/a
SRI-678*	Hilltop shell midden with mostly California mussel	2650–2330
SRI-679*	Hilltop shell midden with estuarine/rocky shore taxa and lithic scatter	6400–6130
SRI-680*	Large lithic scatter on hilltop	n/a
SRI-681*	Shell midden on hillside with mostly California mussel	n/a
SRI-682*	Small lithic scatter on hillside	n/a
SRI-683*	Lithic scatter on hillside with two microdrills	Late Holocene
SRI-684*	Large lithic scatter on hilltop with crescent fragment	Early Holocene
SRI-685*	Small lithic scatter on hillside	n/a
SRI-686*	Small lithic scatter on hilltop	n/a
SRI-687*	Shell midden and lithic scatter with estuarine/rocky shore taxa	7690–7500
SRI-688*	Small lithic scatter on hillside	n/a
SRI-689*	Shell midden on hillside with mostly California mussel	n/a
SRI-690*	Deeply buried shell midden exposed in Old Ranch Creek	4800–4520
SRI-691*	Small lithic scatter on hilltop	n/a
SRI-692*	Shell midden just above creek in valley floor with small cave	2000–1730
SRI-693*	Shell midden on hillside with mostly California mussel	n/a
SRI-694*	Shell midden and lithic scatter with estuarine/rocky shore taxa	6400–6160
SRI-695*	Lithic scatter on hillside	n/a
SRI-696*	Small lithic scatter on hillside	n/a
SRI-697*	Shell midden near canyon mouth with mostly California mussel	n/a
SRI-698*	Shell midden near canyon mouth with mostly California mussel	n/a
SRI-699*	Shell midden on hilltop with mostly California mussel	1370–1180
SRI-700*	Large cave with shell midden	1780-1500/Historic
SRI-701*	Small shell midden on valley floor near creek	n/a

bulk midden samples. However, the focus here is on the results of the Old Ranch Canyon Survey, with some of the results of the surrounding research available elsewhere (Rick et al. 2005b; Rick et al. 2006; Wolff et al. 2007).

RESULTS

A total of 46 archaeological sites have been recorded in Old Ranch Canyon, including 31 new sites and 15 previously recorded sites (Table 1). Twenty-one additional sites have been recorded in the adjacent Skunk Point area bringing the total to 67 sites for the Old Ranch/Skunk Point vicinity. For Old Ranch Canyon, this includes 23 shell middens, 15 lithic scatters, 4 shell middens/lithic scatters, 2 caves/rockshelters, and 2 village sites near the canyon mouth. Of the 46 sites identified in the canyon, 29 (63%) were found on the canyon hilltops or higher elevations, including 15 lithic scatters, 13 shell middens, and a cave/rockshelter site. Only one buried site was found in the creek exposures and this was a deeply buried component covered by Late Holocene alluvium. Other than the sites at the canyon mouth, only three sites (CA-SRI-690, -692, and -701) were identified on the interior valley floor. The total number of recorded sites indicates about 10 sites per km^2, a fairly high amount given the fact that vegetation cover was thick and sediments made finding sites on the canyon bottom very difficult.

The contents of the sites were highly variable, including a red abalone midden; numerous sites with estuarine shell; lithic scatters with microdrills, crescents, and other artifacts; and dense middens with a variety of vertebrate and invertebrate faunal remains. In addition to the sites noted here, seven isolates including two Early Holocene crescents and other chipped stone artifacts were identified. Several badly weathered and eroded chert outcrops were also identified. These outcrops consist of fragments of a poor quality, granular chert that is generally an opaque tan or yellowish color. None of these small outcrops were definitive quarries, but lithics from sites in the area suggest that this chert was a source of toolstone (Wolff et al. 2007).

Fifty-one radiocarbon dates were obtained from sites in Old Ranch Canyon and Skunk Point, with a number of other dates available from adjacent areas to the south and west (see Kennett 1998, 2005; Rick et al. 2005b). Radiocarbon dates from Old Ranch range in age from ca. 8180 to 300 cal BP, with glass and/or needle drilled beads at SRI-87 and SRI-700 also demonstrating Historic period occupation (Table 2). Three crescents and an Arena point recovered from the area also indicate an Early Holocene occupation (Rick 2008). These ^{14}C dates and artifacts document a more or less continuous sequence of human occupation through most of the Holocene, including settlement on the canyon mouth, interior, and ridgelines/hilltops (Fig. 3). There are currently two gaps in the distribution of radiocarbon dates in the Old Ranch area with only one site dated between about 3600 to 2700 cal BP and none between a brief period around 7200 to 7000 cal BP. Marine climate records suggest a period of generally cold marine conditions and high marine productivity between about 3600 to 2700 years ago, following a period of generally warm marine conditions and low productivity for most of the Middle Holocene (Kennett et al. 2007). The brief interval between 7200 to 7000 years ago is a time of generally warm marine conditions and low marine productivity that persisted for most of the period from about 7500 to 3800 cal BP (Kennett et al. 2007). These chronological gaps, however, do not correlate strongly with climatic developments and several sites falling in these intervals have been found elsewhere on the northern Channel Islands (see Kennett 2005; Rick et al. 2005a), suggesting that further dating of sites on the east coast of Santa Rosa Island would reveal components dating to these intervals.

DISCUSSION AND CONCLUSIONS

The Old Ranch Canyon survey provides an 8000-year record of human settlement and land use, indicating human use of virtually all available habitats and environments, including the coastline, interior, canyon bottom, hilltops/ridgelines, and two caves/rockshelters. The most substantial sites appear to be Late Holocene village sites located at the canyon mouth, but several other sites also supported human occupation along the coast and/or hilltops throughout much of the Holocene. In contrast to the large numbers of sites along the coast and at higher elevations, only three sites were found

Table 2 . Radiocarbon dates from Old Ranch Canyon and Skunk Point.[1]

Site number	Provenience	Lab #[2]	Material	$^{13}C/^{12}C$ adjusted age	Calibrated age (cal BP, 2 sigma)
SRI-61	Mussel midden, stratum 2	OS-61785	M. californianus	3390 ± 35	3130–2820
SRI-61	Red abalone midden, stratum	OS-61786	M. californianus	5330 ± 35	5570–5330
SRI-61	Deflated estuary midden	OS-59390	O. lurida	6580 ± 40	6960–6680
SRI-76	Auger 1, ca. 55-60 cmbs in situ	OS-61787	M. californianus	4670 ± 35	4800–4480
SRI-77	Unit 2: 50-60 cm	OS-32098	Shell bead	1700 ± 40	1160–920
SRI-77	Col. 1: 40-50 cm	OS-32376	Marine shell	1800 ± 30	1250–1020
SRI-77	Basal midden paleosol, sea cliff	B-180926	C. undatella	7220 ± 90	7660–7310
SRI-81	A3, 40-60 cm	B-109770	Chione sp.	7090 ± 70	7530–7240
SRI-82	Auger 2, 180-20 cmbs in situ	OS-54917	M. californianus	2700 ± 35	2290–1990
SRI-85	Unit 1, 0-10cm	B-96870	H. cracherodii	1060 ± 60	560-300
SRI-85	Unit 3, 0-10 cm	OS-34575	S. bifurcatus	1160 ± 30	630–480
SRI-85	Unit 2, 0-10 cm	OS-34576	S. bifurcatus	1260 ± 70	730–490
SRI-85	Sample A3, Unit 1, 70-80cmbs	B-107044	M. californianus	1270 ± 60	720–510
SRI-85	Sea cliff profile, 120 cmbs	B-100513	M. californianus	1300 ± 80	780–500
SRI-85	Unit 2, 50-72 cm	OS-34574	M. californianus	1500 ± 30	920–710
SRI-89	^{14}C probe 20 cmbs	OS-56420	C. fluctifraga	6050 ± 40	6370–6130
SRI-90	Surface scrape 0-2 cmbs	OS-61788	P. staminea	4010 ± 35	3860–3590
SRI-91	^{14}C probe 0-4 cmbs	OS-60413	M. californianus	4030 ± 30	3880–3620
SRI-93	Midden exposure 0-3 cmbs	OS-60634	M. californianus	4350 ± 35	4370–4040
SRI-155	Deflated estuarine midden	OS-56418	C. californiensis	7660 ± 40	8010–7780
SRI-190	Sea cliff, 50-60 cmbs	OS-54918	M. californianus	2950 ± 30	2640–2320
SRI-191	Mussel/Urchin midden	OS-41895	M. californianus	4450 ± 35	4470–4150
SRI-191	Red abalone midden	OS-37594	C. undatella	5740 ± 45	6050–5730
SRI-191	Red abalone midden	OS-46941	H. rufescens	5870 ± 30	6170–5930
SRI-192	Auger 2, 58-60 cmbs in situ	OS-51720	M. californianus	2920 ± 40	2610–2280
SRI-192	Unit 1 top 10-12 cmbs	OS-54919	S. nuttalli	5670 ± 35	5930–5690
SRI-192	Unit 1, base ca. 60 cmbs	OS-51578	O. lurida	5990 ± 40	6290–6020
SRI-192	South site probe	B-183138	O. lurida	6440 ± 70	6860–6460
SRI-196	Sea cliff 50 cmbs	OS-54920	M. californianus	2900 ± 35	2570–2210
SRI-209	Mound 2, unit 2	B-232734	T. stultorum	4540 ± 60	4650–4230
SRI-209	Mound 1, unit 1	B-232733	T. stultorum	4720 ± 50	4830–4520
SRI-209	Unit 3, mussel midden	B-232735	M. californianus	4950 ± 80	5260–4800
SRI-210	Deflated Pismo clam midden	B-232736	T. stultorum	4630 ± 70	4800–4380
SRI-666	Sample A	B-47626	S. nuttalli	7780 ± 70	8180–7850
SRI-667	Dune 1: Stratum 1	OS-41892	M. californianus	4410 ± 40	4410–4110
SRI-667	Dune 2: Stratum 1	OS-48510	M. californianus	4510 ± 30	4530–4250
SRI-667	Dune 2: Stratum 2	OS-48515	M. californianus	4600 ± 35	4700–4390
SRI-667	Dune 1: Stratum 2	OS-41893	M. californianus	4730 ± 40	4830–4540
SRI-667	Dune 2: Stratum 3	OS-41894	C. undatella	5990 ± 45	6290–6010
SRI-673	^{14}C probe 15-25cmbs	OS-51547	O. lurida	5890 ± 50	6210–5920
SRI-675	^{14}C probe 10-15 cmbs	OS-61782	M. californianus	2020 ± 30	1460–1260
SRI-676	^{14}C probe 15 cmbs	OS-61783	M. californianus	4140 ± 30	4060–3760
SRI-678	^{14}C probe 20-25 cmbs	OS-51548	M. californianus	2970 ± 35	2650–2330
SRI-679	^{14}C probe 10-12 cmbs	OS-51549	C. californiensis	6070 ± 50	6400–6130

Table 2 (continued). Radiocarbon dates from Old Ranch Canyon and Skunk Point.[1]

Site number	Provenience	Lab #[2]	Material	$^{13}C/^{12}C$ adjusted age	Calibrated age (cal BP, 2 sigma)
SRI-687	Deflated estuarine midden	OS-56415	C. californiensis	7350 ± 35	7690–7500
SRI-690	Lowest buried creek deposit	OS-60410	M. californianus	4700 ± 30	4800–4520
SRI-692	^{14}C probe 58-60 cmbs	OS-60633	M. californianus	2490 ± 35	2000–1730
SRI-694	Midden exposure 0-2 cmbs	OS-60411	S. nuttalli	6080 ± 45	6400–6160
SRI-699	^{14}C probe 22-25 cmbs	OS-60417	M. californianus	1950 ± 30	1370–1180
SRI-700	Midden below cave, 40-42 cmbs	OS-51550	M. californianus	2280 ± 40	1780–1500
SRI-702	Sea cliff exposure 50 cmbs	OS-59387	M. californianus	2320 ± 30	1800–1550

[1]All dates were calibrated with CALIB 5.0.2 (Stuiver and Reimer 1993; Stuiver et al. 2005) applying a ΔR of 225 ± 35.

[2]OS=NOSAMS and B=Beta.

on the canyon bottom. The dearth of sites in the canyon bottom is probably largely a result of sediment and dense grass cover obscuring site visibility, but a survey of Wreck Canyon on the south coast of Santa Rosa also noted few sites on the valley bottom (Morris 1993). Early Holocene dates from sites in the adjacent area (SRI-84, -155, and -666) provide further evidence of a ca. 8000 cal BP occupation. It is likely that other early sites have yet to be found, as they may be deeply buried, are badly eroded (this is the case for CA-SRI-666 and -155, both of which are partially deflated), or are submerged offshore.

Other archaeological surveys have indicated that prehistoric human land use and settlement on the northern Channel Islands were highly variable and influenced by the availability of resources in the local environment. On Santa Rosa Island, for

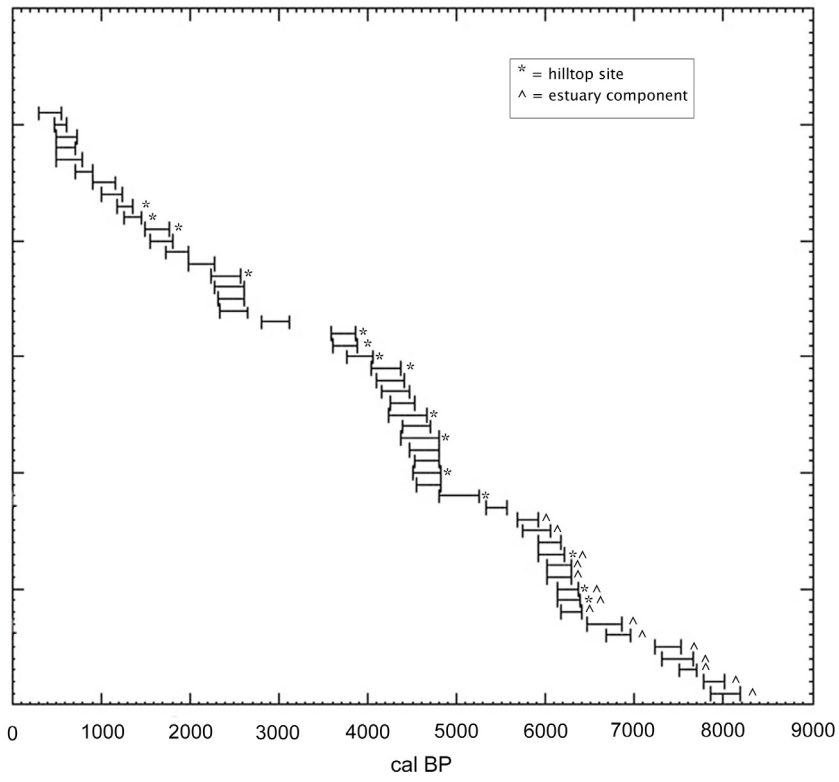

Figure 3. Plot of the 51 calibrated radiocarbon dates (2 sigma) from the Old Ranch Canyon and Skunk Point vicinity, showing the distribution of dated hilltop sites and dates for sites with estuarine shellfish.

example, Morris (1993) identified 34 sites in a 4 km^2 area in Wreck Canyon, with 79% of these associated with a rockshelter and just six sites on the valley floor. In adjacent Jolla Vieja Canyon, York (1996) found that most of the 45 sites identified in the nearly 10 km^2 survey were midden or habitation sites found on stream terraces, although 11 rockshelter sites and numerous lithic scatters were found on ridgetops. Kennett's (1996) survey of lower CanadaVerde on the north coast identified 34 archaeological sites in a 6.5 km^2 area, including a number of hilltop shell middens and lithic scatters and large shell middens at the canyon mouth. Morris's (n.d.) survey of the entire Santa Rosa coastline found a wide variety of site types on the coast, including rockshelters, village sites, shell middens, and lithic scatters. On the south coast of adjacent San Miguel Island, sites dating from 9500 years ago through the Historic period include small rockshelters, large midden deposits, shellfish processing camps, and other site types found on the coast and at the base of the southern escarpment where people may have been getting shelter from northwesterly winds and had better access to freshwater (Braje 2007). On eastern Santa Cruz Island, trans-Holocene settlement data demonstrate substantial movement between the coast and interior and use of hilltops/ridgelines, rockshelters, and chert quarries (Perry 2004). The Old Ranch survey augments these earlier studies by also documenting diverse settlement strategies and occupation of a variety of site types and landforms, including numerous hilltop middens and lithic scatters, and a large Chumash village complex.

Compared to a few other areas surveyed on Santa Rosa, San Miguel, and Santa Cruz islands, Old Ranch Canyon had few natural shelters (e.g., caves, rockshelters). It also lacked high quality chert quarries like those identified on eastern Santa Cruz Island (Arnold 1987; Perry 2004). Only a few low quality chert exposures were found in Old Ranch Canyon, and none were associated with a site. This local chert was used to make expedient tools, which were found at a few sites. However, none of it appears to have been used to make microdrills. Despite the low availability of natural shelters and source materials for making tools, Old Ranch Canyon was heavily used throughout the Holocene. The density of sites (10 sites/km^2) is the highest recorded of the five canyons surveyed on Santa Rosa Island. Furthermore, ethnohistoric data suggest that CA-SRI-85 and -87 are most likely associated with *Qshiwqshiw* (bird droppings), a Chumash village that was located at the canyon mouth (Johnson 1999; Kennett 2005). This village contains the highest number of baptisms (n=120) recorded for any village on Santa Rosa Island, suggesting that occupation of the canyon was relatively substantial.

A unique aspect of the northeast coast that potentially attracted a large number of people to Old Ranch Canyon was the marsh and paleoestuary system located at the mouths of Old Ranch and adjacent Old Ranch House Canyon (Abalone Rocks). Previous work has demonstrated that this system, currently a marsh, was an estuary during the Early and Middle Holocene (Cole and Liu 1994; Anderson 2002; Rick et al. 2005b). Estuaries—calm sheltered embayments that are rich and productive homes to shellfish, finfish, and other animals—were relatively common on the Santa Barbara mainland coast during the Early and Middle Holocene where they were a focus of human settlement (Erlandson 1994). However, the paleoestuary at Old Ranch Canyon is the only estuary currently documented on the Channel Islands (Rick et al. 2005b). Of the 46 sites recorded at Old Ranch Canyon, over half were shell middens and 8 sites (CA-SRI-81, -89, -191, -192, -673, -679, -687, -694) contained estuarine shellfish, including 5 sites around the canyon mouth and 3 on the ridgetops. In addition to these 8 sites, 6 others (SRI-61, -77, -84, -155, -666, and -667) in the adjacent area also contained estuarine shell, bringing the total known sites with estuarine shellfish to 14. Since Old Ranch House Canyon has never been surveyed, other sites probably exist. The presence of both rocky intertidal and estuarine taxa in the shell middens of this area demonstrate that the people who used and occupied Old Ranch Canyon were able to exploit a wider range of shellfish species than most other locations on the Channel Islands (Rick et al. 2005b; Wolff et al. 2007), making this location a valuable source of food. All of the known estuary sites have been ^{14}C dated, producing a detailed chronology for the use and demise of shellfish habitats in the estuary. Sixteen ^{14}C dates from all 14 sites range from 8180 to 5690 cal BP (see Fig. 3; Rick et al. 2005b), suggesting that, like many estuaries on the mainland, this estuary formed as sea levels rose following the last

glacial period and transitioned to a more freshwater system as sea levels stabilized after 6000–5000 cal BP (Cole and Liu 1994; Anderson 2002; Rick et al. 2005b).

While Early and Middle Holocene sites showed heavy use of the estuary, many sites dating between 7000 and 3500 cal BP were found on hilltops or ridgelines (Fig. 3), reflecting greater use of the interior as well as the coast during this period. Old Ranch trends east–west and consequently is closer to the coast than most other canyons (the maximum distance from the coast is about 2 km), suggesting the definitions of interior in this canyon are slightly different from other areas. However, patterns are consistent with other studies that suggest use of island interiors may have been greatest during the Middle Holocene, with perhaps seasonal movement between the coast and interior to exploit plants (Perry 2004, 2005; Kennett and Clifford 2004; Kennett et al. 2007). For example, during the Early Holocene through the early parts of the Late Holocene (ca. 9500 to 2500 BP), Perry (2004, 2005) noted substantial movement of people on eastern Santa Cruz Island between the coast and interior, with people taking advantage of the diverse resources found in inland and coastal habitats. After about 2500 years ago, people appear to have focused much of their settlement on the coast with the establishment of large villages during the late Middle and Late periods (Perry 2004). A survey of the Coches Prietos drainage on the south coast of Santa Cruz Island suggests that people still continued to venture out into smaller, outlying sites, including rockshelters during the Late period (Peterson 1994). This is consistent with the Old Ranch settlement strategy, which, after about AD 500, focused on large village sites situated adjacent to the modern shoreline. However, a small number of sites dated after about 2500 years ago, including two rockshelters, hilltop sites, and other locations on the interior of the canyon indicate that people continued to use these outlying areas throughout the Late Holocene (see also Peterson 1994).

Old Ranch Canyon is adjacent to the most heavily visited public area on Santa Rosa, including the Torrey Pine Grove, Bechers Bay, and campground. This underscores the need for protection, monitoring, and further research in the area. Now that the basic framework of site location, human settlement, and chronology is in place, continued excavation of sites in the area is needed to build a comprehensive trans-Holocene sequence of human cultural developments on Santa Rosa Island. Because just about 40% of Santa Rosa Island has been surveyed (Morris n.d.), it is also clear that additional surveys are needed to identify the scores of unrecorded sites on the island. Ultimately, these surveys are vital for the management and protection of island cultural resources, as well as enhancing knowledge on ancient human occupation of the Channel Islands.

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