EARLY PERIOD RESOURCE USE ON EASTERN SANTA CRUZ ISLAND

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ABSTRACT—Considerable archaeological research has been conducted on Santa Cruz Island, especially with respect to environmental, demographic, and technological transitions from the late Middle to Late Periods (1,500–200 BP). Much less is known about the Early Period (9,500–2,700 BP), with most interpretations based on data from individual sites rather than derived from a regional approach. From 2000–2002, archaeological surveys, site testing, and data analyses were conducted on eastern Santa Cruz Island, focusing on regional site distribution and manifestations of shifting resource priorities through prehistory. Of the 66 sites included in this study, 18 have components radiocarbon dated to the Early Period, of which 14 are dated between 5,000 and 2,700 cal BP, providing sufficient data with which to assess regional patterns in settlement and subsistence within this time frame. These data indicate that Early Period inhabitants were seasonal foragers moving between the coast and interior to rely on abundant, easy-to-procure resources, namely shellfish and plants. Along with the prevalence of California mussel (*Mytilus californianus*), the abundance of stone bowl mortars and related artifacts as well as the significant number of shell middens situated on coastal terraces and elevated landforms correlate well with Early Period subsistence patterns documented elsewhere. People appear to have moved seasonally based on the prioritization of terrestrial and marine variables, with fresh water, plants, chert, and viewshed being potentially attractive resources at higher elevations. In sum, this research highlights the coastal-interior emphasis of the Early Period and contrasts it with specialized maritime-oriented activities later in time, when exploitation of fish, chert, and exchange opportunities were intensified and the role of shellfish and island plants diminished.

Keywords: bowl mortars, chert, Early Period, Santa Cruz Island, settlement-subsistence

INTRODUCTION

By the Late Period (650–168 BP), major shifts in settlement-subsistence strategies in response to population-resource imbalances are presumed to have led to the development of complex socioeconomic and political organization in the Santa Barbara Channel region (Arnold 1992, Kennett 1998, Johnson 2000, Kennett and Kennett 2000, Arnold 2001). To understand such complexity, it is necessary to evaluate the archaeological manifestations of responses to changing environmental and cultural conditions in the context of earlier transformations on the islands and mainland. Early Period (9,500–2,700 BP) adaptations are characterized by complementary emphases on terrestrial and marine resources, with reliance on plant foods as carbohydrate sources supplementing protein and fat from shellfish as well as fish and sea mammals to lesser, but more variable degree (Erlandson 1988, Glassow 1993, Walker 1996). However, due to their limited availability and diversity on the Channel Islands relative to the mainland, reliable access to plant resources and thereby regional trade was essential to sustaining dense island populations later in prehistory, including on Santa Cruz Island (Arnold 1987, King 1990, Timbrook 1993). As such, the importance of plant resources, and the groundstone with which to process them, cannot be underestimated in regard to shaping later exchange activities, as growing island populations became increasingly invested in trade opportunities, and dependent on mainland products to buffer local shortfalls (Arnold 1987, 1992, and 2001, King 1990, Timbrook 1993). Significantly, the focus on terrestrial resources, as represented by site distribution and artifact assemblages on eastern

Santa Cruz Island and elsewhere, stands in contrast to the settlement-subsistence strategies employed during the late Middle Period (1,500–650 BP) and beyond when intensive fishing and maritime exchange networks formed the basis of island subsistence and socioeconomic activities (Arnold 1987, 1992, and 2001, Glassow 1993, Kennett 1998, Jones and Kennett 1999).

Our current understanding of the prehistory of the Channel Islands prior to such transformations is limited primarily to excavations of individual sites along coastlines. Significant insights have been gained from archaeological research conducted at locales such as Daisy Cave and Cave of the Chimneys on San Miguel Island (Vellanoweth et al. 2000, Rick et al. 2001), Punta Arena on western Santa Cruz Island (Glassow 2000), and Eel Point on San Clemente Island (Salls 1988, Raab et al. 1995, Garlinghouse 2000). On Santa Cruz Island, interpretations of the Early Period have been derived from data obtained from Punta Arena and other red abalone middens along the southwestern and western extremes of the island. Notably absent have been comparable studies in areas and at sites not situated directly on the coast, or from anywhere on the eastern end of the island in general (see Yatsko 2000). Furthermore, regional assessments of prehistoric land and resource use have been limited to individual drainages such as Coches Prietos (Peterson 1994). Finally, these studies have tended to be concentrated on more recent periods, particularly the emphasis on settlement, subsistence, and exchange intensification (i.e., microdrill and shell bead production) during the late Middle and Late Periods (Arnold 1987, 1992, 2001, Arnold and Munns 1994).

In response to the limitations of previous approaches, eastern Santa Cruz Island (East End) was selected for a stratified, judgmental survey and site testing to evaluate regional settlement and subsistence patterns through time. The broader goals of this study centered on temporal changes in resource prioritization, with emphasis on how they relate to and reflect exchange intensification commencing in the Middle Period, particularly in the form of intensive chert quarrying and microdrill production from the late Middle to Late Periods (Arnold 1987). Early Period land and resource use were evaluated with respect to how they differ from such strategies as well as how they influenced technological and socioeconomic trajectories later in time by providing the cultural context in which they presumably emerged (Perry 2003). On the East End, there are 66 sites with chronological data, of which 18 date to the Early Period, based on a compilation of data yielded from this study as well as those of Arnold (1987), Kennett (1998), and Clifford (2001). Nine of the Early Period sites were tested as part of this research and their general results presented here, with two (SCRI-393 and SCRI-406) discussed in more detail as specific examples of regional settlement and subsistence trends.

METHODS

The East End is defined as the region east of El Montañon, the prominent northwest-southeast trending ridge that serves as a major natural barrier between this area and the rest of the island (Fig. 1). The East End encompasses about 2,590 hectares of land composed geologically of Santa Cruz Island Volcanics and the Monterey Formation, with intersection of these formations having resulted in El Montañon ridgeline. In areas where the contact zone between these two formations is exposed, chert outcroppings are easy to find, easy to access, and typically are easy to work with a few simple tools. Their importance in prehistory is evident in the intensive quarrying activities manifested at most chert outcroppings. Because chert quarries and other resources are easily accessible from both sides of El Montañon, the western flanks and nearby ridges are included in the sample. The total area addressed in this study includes about 3,108 hectares, with 15% of that, or 466 hectares, surveyed systematically at 10-m intervals during fieldwork conducted between February 2001 and July 2002 (Perry 2003).

Based on models of optimal foraging theory and evolutionary ecology (Bettinger 1991, Winterhalder and Smith 1992), it was assumed that site placement on the landscape indirectly reflects decision-making strategies through which particular habitats and/or resources were given priority at the expense of others at different times. Compartmentalizing the landscape as different landforms was determined to be an effective means of assessing spatial and temporal variability, given

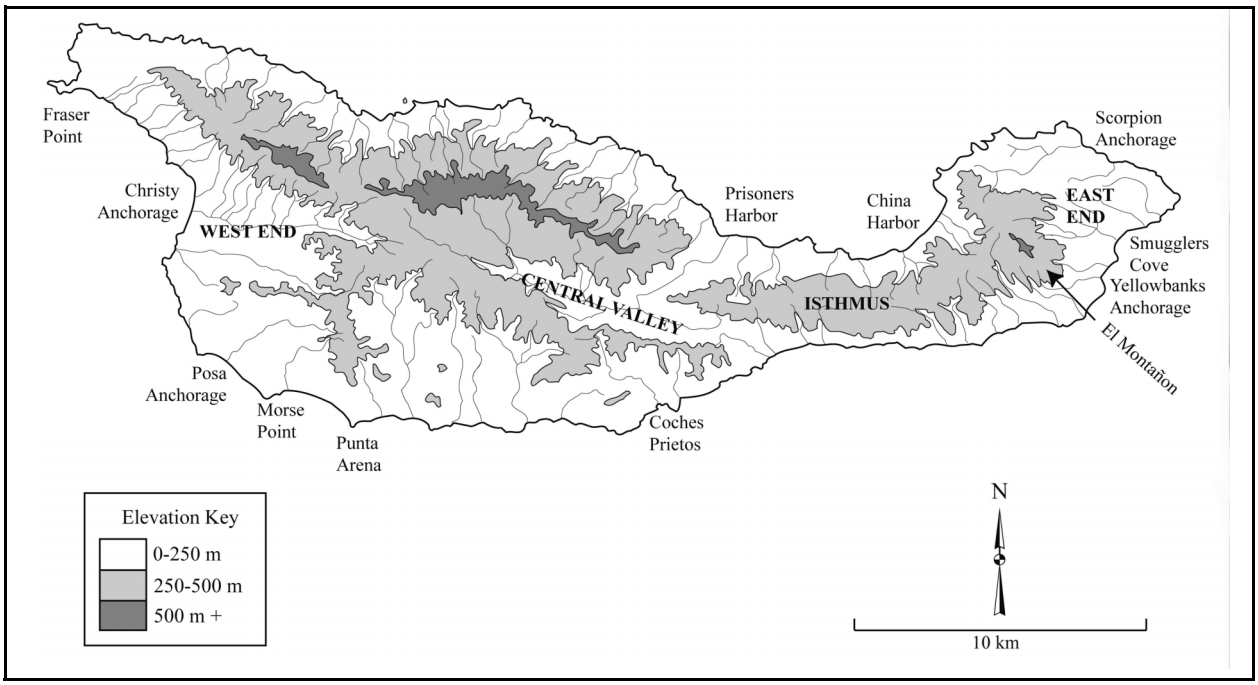

Figure 1. Santa Cruz Island and the Channel Islands (adapted from D. Lawson and M. Glassow pers. comm.).

that their definitions are based on variables that are presumed to not have varied dramatically after about 7,000 years ago, notably geological substrate and topography. The East End was divided into five major environmental zones based primarily on variation in topography and elevation: beaches (0–30 m), canyons (0–150 m), coastal bluffs and terraces (30–215 m), upland plateaus or elevated landforms (215–370 m) (see Kennett 1998, Clifford 2001), and El Montañon and adjacent interior ridges (250–550 m) (Perry 2003; Table 1). Each landform was considered with respect to relative access to six variables: freshwater sources, plant communities, marine resources, chert, protection from the elements, and viewshed, meaning everything visible from a particular vantage point (Arnold 1987, Glassow 1993, Timbrook 1993, Junak et al. 1995, Kennett 1998).

Native plant communities that exist today on and near the East End include oak woodland, coastal sage scrub, coastal bluff scrub, coyote brush scrub, grasslands, bishop pine forest, and riparian habitat (Junak et al. 1995). These habitats and their resident species were important prehistorically as seasonally available food sources (e.g., acorns, island cherries, and corms), raw materials for tools (e.g., toyon, ironwood, and various riparian species), and firewood for fuel (e.g., manzanita and pine). Edible plants in these habitats, especially but not limited to grasslands and coastal sage scrub, include Santa Cruz Island buckwheat (*Eriogonum arborescens*), black sage (*Salvia mellifera*) and red maid seeds (*Calandrinia ciliata*), lemonade (*Rhus integrifolia*) and manzanita berries (*Arctostaphylos* sp.), blue dick corms (*Dichelostemma capitatum*), onion bulbs (*Allium praecox*), island cherries (*Prunus ilicifolia*), and acorns (several species of the genus *Quercus*) (Timbrook 1993, Martin and Popper 2001).

Survey areas on each of these landforms were selected to complement previous studies conducted by Arnold (1987), Kennett (1998), Clifford (2001), and Glassow (2002; Fig. 2). Furthermore, specific areas were chosen to attempt to sample observed variations between the northwestern and southeastern regions of the East End, which appear to correspond with differences in ocean temperature, wind exposure, and habitat and species distribution. In addition to a systematic pedestrian survey, field methods included site recording and mapping, intensive surface collection, auger testing to determine the density and distribution of subsurface deposits, and excavation of column samples (Perry 2003). The deepest and most shallow deposits in areas determined to have the highest density of cultural materials were selected for dating. The goal

Table 1. Land area variables for eastern Santa Cruz Island.

Variables	Beach	Canyon	Coastal Terrace	Elevated Landform	El Montañon
Elevation (m)	0–30	0–150	30–215	215–370	250–550
Plant Communities	Coastal bluff scrub	Mixed forest Riparian	Grasslands Coastal sage scrub Coastal bluff scrub	Grasslands Oak woodland Pine forest Ironwood stands	Oak woodland Ironwood stands
Edible Plants in those Communities	Seaweed Manzanita berries	Toyon berries Island cherry Acorns Manzanita berries Cattails	Black sage seeds Buckwheat Red maid seeds Blue dick corms Onion bulbs Manzanita berries	Red maid seeds Blue dick corms Onion bulbs Lemonade berries Acorns Manzanita berries	Manzanita berries Acorns
Marine Resources (One-way travel)	0–15 minutes	10–45 minutes	10–30 minutes	15–65 minutes	45–85 minutes
Freshwater	Infrequent	Seasonal	Seasonal	Seasonal	Reliable
Chert	Infrequent	Infrequent	Common	Frequent	Frequent
Protection	Some	Excellent	Some	Limited	Limited
Viewshed	Limited	None	Some	Good	Excellent

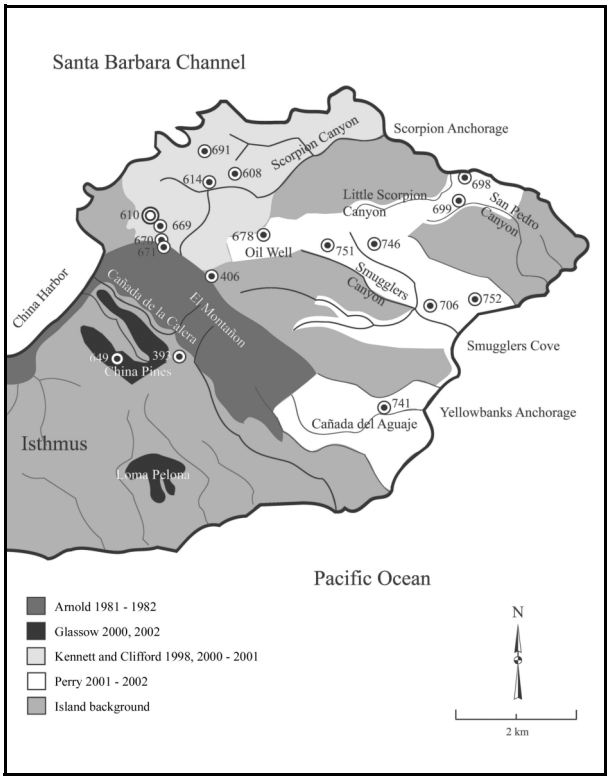

Figure 2. Survey areas and Early Period sites on eastern Santa Cruz Island.

of this strategy was to determine the temporal range of occupation as represented by the most densely occupied or used portions of these sites. Radiocarbon dates were obtained from 12 sites identified during the survey, which were combined with existing radiocarbon dates and the distribution of temporally diagnostic artifacts to formulate a regional chronology.

Of the 12 sites selected for dating, nine with Early Period deposits were subjected to the methods discussed above. Following subsurface testing, all shell midden samples were wet-screened and all retained materials were sifted through graduated metal screens of 1/4-inch (6.35-mm), 1/8-inch (3.18-mm), and 1/16-inch (1.59-mm) mesh. The 1/4-inch and 1/8-inch materials were sorted into general categories: non-cultural stone, bone, shell, flakes and debitage, charcoal, asphaltum, and other miscellaneous items. Cultural materials were sorted by material and artifact type, labeled, weighed, counted, measured when appropriate, cataloged, and the resulting data analyzed. Faunal remains were first segregated into general categories such as shellfish, bird, fish, terrestrial mammal, sea mammal, and uniden-

tifiable fragments. Shell and bone were then identified to the most specific taxonomic category possible to allow for more detailed analyses of subsistence trends, including the primary habitats exploited and relative contributions of resources within each habitat. Despite the noted limitations of such techniques (see Vellanoweth et al. 2000 for discussion), weight was used to calculate meat and protein yields based on multipliers from Erlandson (1994) and Glassow and Wilcoxon (1988).

RESULTS

Representing about one-half to one-third of all known sites on the East End, temporally diagnostic artifacts and/or radiocarbon dates pertain to 90 temporally distinct deposits within 66 sites. Eighteen of these sites have shell midden components that date to the Early Period, of which 14 date to between 5,000 and 2,700 cal BP and the remainder between 8,900 and 5,000 cal BP (Perry 2003; Table 2). The vast majority of these sites (*n* = 15; 83.3%) are located on coastal terraces and elevated landforms, in contrast to the primarily beach and canyon emphases of Late Period settlement (*n* = 25; 68%). Table 3 depicts the spatial and temporal distribution of all 90 deposits represented in this sample, illustrating the significant variation in site placement between different time periods. These Early Period shell middens are interpreted as representing short-term

Table 2. Radiocarbon dates for Early Period sites on eastern Santa Cruz Island.

Site (SCRI-)	Calibrated Age Range (CYBP)[a]	Depth (cm)	Elevation (m)	Landform
393	4,700(4,560)4,420	50	370	Elevated landform
406[b]	5,320(5,060)4,840	19–25	460	El Montañon
	6,760(6,610)6,400	32–40		
608[c]	3,686(3,595)3,478	10–20	170–180	Coastal terrace
	3,715(3,634)3,559	70–80		
	3,718(3,663)3,602	10–20		
	4,432(4,359)4,238	56		
610[c]	6,909(6,853)6,775	16	275	Elevated landform
614[c]	7,077(6,968)6,863	100	75	Canyon
649[b]	3,580(3,370)3,170	39–45	370	Elevated landform
	3,910(3,680)3,460	14–22		
669[c]	4,389(4,258)4,145	0–10	290	Elevated landform
670[c]	3,245(3,144)3,016	0–10	300	Elevated landform
671[c]	2,884(2,778)2,731	0–10	320	Elevated landform
678[c]	4,379(4,258)4,151	0–10	215	Coastal terrace
691[c]	8,883(8,769)8,622	40	120	Coastal terrace
698[b]	6,110(5,940)5,860	20–30	5–10	Beach
699[b]	3,540(3,360)3,170	28–39	90	Coastal terrace
	4,230(3,970)3,720	63–75		
706[b]	4,180(3,980)3,820	30–42	90	Coastal terrace
741[b]	3,910(3,700)3,510	24–35	110	Coastal terrace
	4,390(4,150)3,920	58–66		
746[b]	4,250(3,980)3,760	17–27	230	Elevated landform
	4,810(4,580)4,410	53–63		
751[b]	3,900(3,690)3,480	20–30	230–250	Elevated landform
	4,840(4,740)4,530	29–39		
	4,960(4,820)4,690	77–85		
752[b]	4,410(4,220)4,000	26–35	75	Coastal terrace

[a] 2 sigma results (95% probability) with intercept in parentheses.
[b] Sites excavated by and radiocarbon dates reported in Perry (2003).
[c] Compiled from Clifford (2001, pp. 62, 135–136; 138–141) and Kennett (1998, pp. 461–463).

Table 3. Temporal distribution of sites by landform on eastern Santa Cruz Island.

Landform	Early	Middle	Late Middle	Late	Total
Beach	1	3	6	13	23
Canyon	1	2	4	4	11
Coastal terrace	7	1	3	2	13
Elevated landform	8	1	10	5	24
El Montañon	1	0	17	1	19
Total	18	7	40	25	90

to seasonal occupation, with deposits tending to be shallower (about 50–100 cm in depth) than more intensively excavated sites on western Santa Cruz Island (about 200–300 cm depth) that presumably reflect more intensive and/or longer episodes of habitation (Glassow 2000, P. Paige pers. comm.). I posit that the shallower Early Period deposits of the East End reflect foraging strategies revolving around seasonally available resources, particularly plants; the faunal and artifact data from these sites are discussed below.

Faunal analyses yielded significant information about Early Period subsistence on the East End as well as changes through time. In general, shellfish were the most significant contributor to the diet, representing between 40% and 96% of the dietary protein, followed by fish and sea mammals in varying percentages (Perry 2003; Fig. 3). In terms of meat and protein yields, the most dominant shellfish species are California mussel (*Mytilus californianus*) and barnacle (*Balanus* sp.), along with variable contributions from wavy top (*Lithopoma undosum*). Early Period deposits

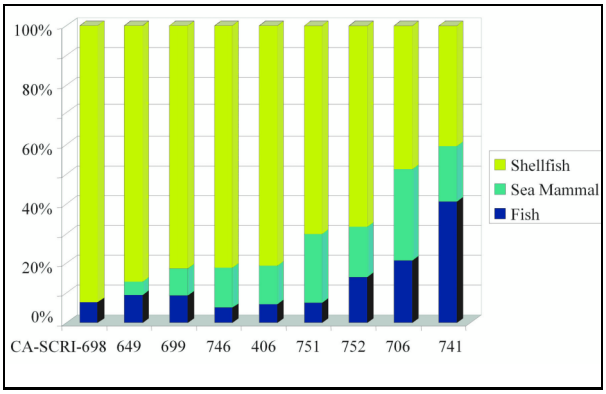

Figure 3. Relative protein contributions from Early Period deposits on eastern Santa Cruz Island.

situated closer to the rocky headlands of the northern shoreline, where California mussel tends to be more abundant, are strongly dominated by shellfish, which contribute between 71% and 96% of the dietary protein. In contrast, those located nearer to the warmer waters of the southeastern coastline have less shellfish (40–67%), comprised of less California mussel and more wavy top, with fish (15–41%) and sea mammal (16–31%) protein represented in greater proportions. In sum, the artifact and faunal assemblages from these nine sites are in accordance with findings elsewhere; the abundance of shellfish, particularly abundant and easy-to-harvest species, along with variable contributions from sea mammals and fish, appear to be common at Early Period sites on the Channel Islands (Vellanoweth et al. 2000). The strong emphasis on shellfish contrasts significantly with the intensified fishing of the Middle Period and later, an interpretation based on faunal data from the East End and from multiple sites on the western, southern, and northern shores of Santa Cruz Island and Santa Rosa Island (Glassow 1993, Colten 1995, Kennett 1998).

Along with current vegetation patterns and ethnographic data regarding edible plants, site distribution and groundstone artifacts recovered at Early Period sites highlight the potential significance of island plant resources during this time period. As discussed above, coastal terraces and elevated landforms would have been desirable due to the proximity of productive habitats and species including food plants as well as those used to make tools and for firewood. Their importance is further inferred from the complementary presence of bowl mortars (n = 67), pestles (n = 7), and digging stick weights (n = 10), as well as manos (n = 17), metates (n = 2), and undifferentiated groundstone fragments (n = 31), on the surface of the nine Early Period sites for which systematic surface collection and subsurface testing were conducted (Perry 2003; Table 4). The majority of the groundstone is composed of sandstone (n = 73; 54.5%), likely imported from southwestern Santa Cruz Island, Santa Rosa Island, or San Miguel Island (see Weaver 1969). The remainder is made of locally available volcanics, primarily basalt (n = 55; 41%), with the exception of a few artifacts of serpentine and siltstone.

The abundance of stone bowl mortars along with pestles and digging stick weights at Early

Table 4. Distribution of groundstone by material and artifact type.

Material Type	Bowl Mortars	Pestles	Digging Stick Weights	Manos	Metates	Undifferentiated Groundstone	Total
Igneous	14	3	1	17	0	20	55
Sandstone	53	2	5	0	2	11	73
Serpentine	0	0	3	0	0	0	3
Siltstone	0	2	1	0	0	0	3
Total	67	7	10	17	2	31	134

Period sites is indicative of plant procurement and processing, among other subsistence-related activities (see Glassow 1996). Digging stick weights were likely used to harvest corms and bulbs, such as blue dicks and wild onions, in grassland and coastal sage scrub habitats, given that they were attached to sticks for weight and leverage for digging purposes (Timbrook 1993). Grass and wildflower seeds, such as red maids, black sage, and others as well as corms and bulbs represent relatively low-cost plants, requiring less labor investment for the amount of carbohydrates and fat yielded than acorns, island cherry, and other plant foods (Glassow 1996). Based on ethnographic data, it appears that although islanders continued to procure and consume locally available foods such as blue dicks through historic contact, more labor-intensive ones were ignored, as more time was invested in manufacturing trade items to obtain mainland acorns and seeds (Timbrook 1993). In addition to the distribution of groundstone artifacts at habitation sites, the decline in the importance of locally available plant foods is also tentatively supported by the burial items recovered from eight cemeteries on Santa Cruz Island. Interestingly, the number of bowl mortars, pestles, and digging stick weights declines concomitantly with a significant increase in the quantity of fishhooks and bifaces through time, illustrating the shifting resource priorities and values of island residents (Hollimon 1990).

DISCUSSION AND CONCLUSION

Based on these data, I suggest that in the Early Period the East End was occupied by foraging groups who shifted between coastal and higher elevation locales depending on the seasonal availability of terrestrial plants and marine species, particularly shellfish. Of the areas inhabited, sites on El Montañon and elevated landforms suggest that protection from the elements and convenient access to marine resources were not always important considerations for Early Period settlement. Instead, it appears that East End residents utilized the landscape and its resources by prioritizing among multiple variables, including fresh water, chert, plants, marine resources, land-based travel routes, and possibly viewshed. The interior-coastal emphasis of this period contrasts with specialized maritime-oriented activities later in time, when exploitation of marine resources, such as offshore fishes, and the manufacture of trade items, such as chert microdrills, was presumably intensified at the expense of local terrestrial resources.

Despite the exposed and windy conditions, El Montañon and elevations above 200 m in general may have been attractive due to the presence of freshwater, woodland and forest habitats, and chert outcroppings in the immediate vicinity. Fresh water is present in multiple springs and seeps at the heads of several unnamed drainages on both sides of El Montañon, ranging between 10 m and 1 km from at least 20 shell middens and quarries dating primarily to the Early and late Middle Periods. Sites such as SCRI-406 (3,200 m^2) stand out among Early Period shell middens on the East End because of its exposed location at 460 m on top of El Montañon ridgeline. Fresh water has been observed in at least three drainages within 200–400 m west and south of this site (S. Spaulding pers. comm., J. Arnold unpubl. site records); also, artifacts extend into the prominent oak stand immediately to the east. Four small chert quarries are located within 1,000 m of SCRI-406 to the west and south, and extensive views of the East End and Isthmus are afforded

from this site, with travel in these areas being easy to monitor. This site provides just one example of how the attraction of multiple resources at higher elevations was a strong influence with respect to site placement, at least seasonally overriding concerns for protection from the elements as well as the time and labor to procure and transport marine resources to this location.

Another Early Period site whose location appears to reflect a balance between different terrestrial and marine variables is SCRI-393, an extensive, multi-loci site (6,600 m^2) situated at an elevation of 370 m on a wide, relatively flat saddle on the western flanks of El Montañon. Quarried chert outcroppings are 200 m upslope to the northeast (SCRI-93), along with several others on adjacent ridgelines to the northwest and southeast. Episodic freshwater seeps are a few hundred meters to the north in La Cañada de la Calera. Significantly, China Pines is easily accessible from SCRI-393, located 1,400 m to the west-northwest and consisting of an extensive, dense area of mixed bishop pine (*Pinus muricata*) forest and oak (*Quercus* sp.) woodland interspersed with toyon (*Heteromeles arbutifolia*) and manzanita (*Arctostaphylos* sp.). In addition to the variety of seasonally available plants in grassland and coastal sage scrub habitats, clustered stands of oak, pine, and ironwood at higher elevations would have provided additional raw materials for food, tools, and fuel.

However, what makes SCRI-393 relatively unique among Early Period sites on the East End is that it is situated at the base of the only viable route to traverse El Montañon. The western flanks of El Montañon are steep and rugged, making the landform on which SCRI-393 is situated the most obvious path for ascending El Montañon and then descending to the East End. Therefore, it is possible that this location was significant not only because of access to resources such as freshwater, chert, and a variety of plants, but also due to the ability to regulate this route to the East End. If signaling of territories and/or resource use was important as argued by Kennett (1998) and Clifford (2001), then such sites such as SCRI-393 and SCRI-406 were ideal locations to be visible to others as well as regulate movement on and around El Montañon, including access to chert quarries.

Chert was quarried around and on El Montañon from the earliest occupation of the East End, and perhaps may have been one of the resources initially attracting people to this area. Among the best evidence for chert exploitation at this time is a small shell midden on the southeast edge of SCRI-610 (Kennett 1998). Situated at 275 m in elevation about 1,000 m north-northwest of the northern extreme of El Montañon, SCRI-610 is an extensive and intensively used quarry site (56,000 m^2), the surface of which is marked by large chert quarry pits and littered with tested nodules and debitage (Clifford 2001). Evidence surrounding the quarry indicates that it was probably utilized throughout prehistory, likely because of the incredible abundance of high-quality nodules as well as its accessibility relative to some of the smaller, higher-elevation quarries of El Montañon. Significantly, chert obtained from El Montañon and the immediate vicinity has been identified in Early Period deposits at Punta Arena and other sites on the western end of the island (Glassow 2000). Conversely, the majority of groundstone is made of non-local material for which the closest likely source is southwestern Santa Cruz Island. Arguably, chert tools and sandstone groundstone may be among the earliest indicators of exchange between populations on the eastern and western extremes of the island; at the very least this implies some combination of travel and trade across the island to obtain desirable raw materials and perhaps finished products.

In conclusion, the data presented in this paper highlight the foraging strategies of Early Period inhabitants on eastern Santa Cruz Island, which appear to have consisted of movements between the coast and higher elevations based on the seasonal exploitation of shellfish and plant resources, supplemented with varied contributions from fish and sea mammals. The temporal and spatial distribution of Early Period sites may be further interpreted in the context of expanded opportunities for plant exploitation due to technological innovations after 6,000 BP (i.e., mortars and pestles; Glassow 1997), and climatic conditions favorable for terrestrial habitats after 4,000 BP (Kennett 1998). Significantly, the majority (n = 13; 72%) of these East End sites have deposits that date between 4,500 and 3,300 years ago within a period of presumably favorable climate conditions and terrestrial abundance (Perry 2003). Based on the temporal distribution of

radiocarbon dates from the Channel Islands, used as a proxy measure for population density, it appears that human populations began to increase at this time, which is at least tentatively supported by the East End data (Glassow 1999; see Table 2).

The terrestrial-marine emphasis of the subsistence-settlement system during the Early Period on eastern Santa Cruz Island in many ways stands in stark contrast to later times, primarily with respect to the intensification of fishing and regional exchange, as well as an increase in more permanent settlement directly on the coast, commencing in the Middle Period (Arnold 1987 and 1992, King 1990, Glassow 1993, Colten 1995, Kennett 1998). Nevertheless, it is important to consider that subsistence strategies of earlier periods may have stimulated island inhabitants to pursue intensified regional exchange in the manners that they did by providing the specific socioeconomic context for its eventual emergence. The demand for spatially discrete raw materials such as chert on the eastern end and sandstone on the western end, as well as reliance on local terrestrial resources that could be easily overtaxed with increased population density due to their limited availability compared to the mainland, must be considered as possibly setting the stage for the development of intra-island exchange and intensified island-mainland interaction.

ACKNOWLEDGMENTS

I would like to thank the National Park Service and the staff of Channel Islands National Park for supporting this research monetarily in the form of two grants as well as logistically. I am especially indebted to G. Hawley, A. Huston, D. Morris, and S. Spaulding, as well as many other park employees for all of the assistance and insights they provided. I would also like to thank wholeheartedly the 40 people who volunteered and worked in the field and lab at various times between 2001 and 2002, who made the dissertation research possible. Along with M. Glassow, others who have generously shared their time, data, and perspectives on the prehistory of the Channel Islands include S. Andrews, J. Arnold, J. Johnson, T. Joslin, D. Kennett, P. Paige, M. Raab, T. Rick, and A. Yatsko. In particular, I appreciate the insights of P. Paige, SWCA Environmental Consultants, and S. Spaulding, Channel Islands National Park, who permitted me to integrate aspects of our conversations into this paper. I would also like to specifically thank D. Lawson and M. Glassow for providing me with one of the figures. Finally, I would like to express my gratitude to the editor and two anonymous reviewers, whose comments aided in improving this paper tremendously.

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