California’s Channel Islands
The Archaeology of Human-Environment Interactions
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Introduction

Christopher S. Jazwa and Jennifer E. Perry

This volume grew out of a symposium that we organized at the 76th Annual Meeting of the Society for American Archaeology in Sacramento, California, in April of 2011. In March of 2010, at the 44th Annual Meeting of the Society for California Archaeology in Riverside, we were lamenting the fact that there were no symposia at that local meeting that were devoted to any or all of Southern California's eight Channel Islands. Rather, papers that were focused geographically on the islands were dispersed among symposia oriented around different theoretical topics and general sessions tied together by other themes.

After some thought, we realized that the reason that there was no Channel Islands session at the 2010 SCA meeting was that island researchers work on such diverse topics that they could fit easily into many different theoretical, methodological, ecological, or even geographical realms. Put simply, there is not really a single topic that the majority of the people working on the islands are addressing (e.g., reasons for the collapse of the Classic Maya in Mesoamerica). Rather, the islands represent the opportunity to address a diverse range of questions, and the people who currently work there are doing so in innovative and interesting ways. The 2011 SAA meeting in Sacramento provided us with a perfect opportunity to showcase one of California's greatest natural and cultural treasures. Our goals in organizing the symposium, titled Small Islands, Big Implications: California's Channel Islands and Their Archaeological Contributions, were first to present a broad range of interesting and relevant research done by the people working on the islands, and second, to initiate collaborations between participants in the session. By all accounts, this symposium was a great success, and this volume continues along the same course.

This volume includes ten chapters, each of which addresses the archaeology of the California Channel Islands in a unique and timely way. In Chapter 1, we present a summary of the most recent literature on the biogeography and culture history of the islands. Such a compilation for all eight islands did not exist previously. The remaining chapters explore a variety of topics and are written by a combination of “big names” in Channel Islands archaeology and promising up-and-coming scholars in this field. These chapters encompass work that has been done on all of the islands, covering the entire history of their human occupation, and offer a combination of different theoretical and methodological approaches that are relevant throughout archaeology.

Binding the chapters together is an emphasis on reconstructing the dynamic cultural and natural environments that native islanders encountered and interacted with from the end of the Pleistocene through depopulation during the nineteenth century. Hunter-gatherer settlement is a recurring theme throughout the volume, in which factors associated with the natural (e.g., freshwater) and cultural (e.g., ceremonialism, technological developments) environments have been incorporated into models of settlement, travel, and abandonment. In particular, the Channel Islands are ideal bounded contexts
in which to evaluate models derived from evolutionary ecology and landscape archaeology, as is evident from previous studies (e.g., Kennett 2005; Braje et al. 2007; Winterhalder et al. 2010; Perry and Delaney-Rivera 2011; Jazwa et al. 2012) and this volume.

The authors of this volume have focused on archaeological, ethnographic, and environmental data at different temporal and spatial scales, from intrasite to inter-island, and from seasons to thousands of years. The scope of this volume also extends beyond subsistence resources to include ritual ones, such as ceremonial items and sacred landscapes (e.g., Bradley 2000; Perry 2007; Perry and Delaney-Rivera 2011; Perry, Chapter 8), thus incorporating different aspects of the cultural environment.

The archaeological literature of the Channel Islands is filled with research on marine resources and transportation, including extensive debates about the role of watercraft (e.g., Arnold 1995; Gamble 2002, 2008). Ames (2002) and others emphasized the importance of watercraft for maritime hunter-gatherer societies throughout the world, with the Chumash and Tongva being no exceptions with respect to boat use for fishing and transportation. The Channel Islands are well suited for evaluating the costs of material conveyance in hunter-gatherer systems because it is possible to identify nonlocal items and to correlate settlement locations with potential travel routes. Evident in this volume is the acknowledgment of transportation, trails, and viewsheds, both maritime and land-based (Perry, Chapter 8; Teeter et al., Chapter 9). Resources and peoples traveled along a combination of routes that had different costs and levels of access (see Perry and Delaney-Rivera 2011; Snead et al. 2009).

In contrast to the emphasis on the maritime aspects of living on the Channel Islands, comparatively little attention has been given to the terrestrial environment. Chapters in this volume address this by explicitly acknowledging the importance to island inhabitants of footpaths, fresh water, plants, tool stone, and other terrestrial resources. Furthermore, it is worth noting that the most complex hunter-gatherer maritime societies in the world, including those encountered historically on the Channel Islands, depended on a combination of both marine and terrestrial resources (Fitzhugh and Habu 2002). Paleoethno-
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ments. Braje, Erlandson, and Rick (Chapter 2) follow up their recent article in Science by discussing the earliest known human occupation of the Channel Islands, which is among the earliest in the Americas, dating between about 13,000 and 11,300 cal BP (Erlandson et al. 2011). They focus in particular on early chipped stone technologies from the Channel Islands and their relationships with mainland Paleoindian traditions. Gusick (Chapter 3) looks at mobility and settlement patterns during the early Holocene, the period immediately following the one discussed by Braje et al. She highlights a series of early sites on Santa Cruz Island, the largest of the Channel Islands, and the conditions unique to different aspects of this environment that influenced early settlement patterns. In Chapter 4, Glassow addresses middle Holocene settlement on the same island, expanding his work on distinctive red abalone middens. Importantly, he lays out a framework for how to test competing settlement models, which has broad implications. Jazwa, Kennett, and Winterhalder (Chapter 5) offer another perspective on settlement in which they use the “ideal free distribution,” a promising model borrowed from population ecology that has recently been applied to human populations for the first time. They make a first attempt to apply this model to an archaeological assemblage collected in the field, using excavation data from several sites in a single high-ranked drainage on Santa Rosa Island.

The next three chapters present novel methodological and synthetic approaches to understanding the Channel Islands’ prehistory, relating to intrasite activity areas, plants, and evidence of ritual. Guttenberg et al. (Chapter 6) look at the spatial distribution of cultural resources on a smaller scale, using geographic information systems (GIS) software to evaluate artifact distribution at a village site on San Nicolas Island in an interesting and sophisticated way. The use of GIS has become ubiquitous in archaeology, but the use of this technology to look at different activity areas within a single site is less common in hunter-gatherer archaeology. In Chapter 7, Gill assesses the paleoethnobotanical research that has been done on the islands, providing an especially needed and valuable contribution to this volume. Paleoethnobotany is a hot topic in archaeology, and this work adds a new dimension to understanding subsistence, especially on the Channel Islands, with their long tradition of research on maritime resources. Similarly, in Chapter 8, Perry presents a synthesis of the archaeology of ceremonialism on the islands, a unique and sorely needed contribution to this volume. A pan-island discussion such as this addresses a prominent hole in the existing literature.

In contrast to Santa Cruz, Santa Rosa, and San Miguel Islands, which have been written about extensively, Catalina Island has received less attention in the archaeological literature, despite its significance to the Gabrieleno (Tongva), including the availability of steatite (soapstone). In Chapter 9, Teeter, Martinez, and Kennedy Richardson take a landscape approach to precontact settlement on Santa Catalina Island, incorporating site distribution, resource availability, and trail locations. Finally, Strudwick (Chapter 10) looks at the depopulation of Catalina Island using historical records to trace the reasons for depopulation, its timing, and what happened to former Catalina Islanders and their descendants. He incorporates a vast range of data to understand an event that is often relegated to a footnote in the archaeology of the islands.

In the final chapter, Jochim (Chapter 11), who has been at the forefront of hunter-gatherer archaeology for decades (e.g., Jochim 1976), provides a more global perspective. He comments on the research presented in this volume and then addresses current and future directions of Channel Islands archaeology and how the islands fit into hunter-gatherer studies as a whole.

In its far-reaching scope, this volume reveals some of the complex and layered ways in which people have interacted with their environments on the Channel Islands through time, highlighting commonalities that are found not just on the northern and southern island chains, but in coastal societies throughout the world. This volume demonstrates the significance of California’s Channel Islands as an archaeological resource and highlights the innovative work that is being done there. Consequently, it has been written not only for Channel Islands or hunter-gatherer archaeologists, but also those who work in other areas but are interested in any of the authors’ far-ranging approaches and perspectives.

We would like to thank all of the authors for participating in this project, providing their time and expertise both at the SAA meeting and for
this volume. We also appreciate the thoughts and comments of Michael Jochim and Terry Hunt as discussants at the SAA symposium. We would also like to thank Reba Rauch for guiding us through the process of preparing this volume, and Mark Raab and an anonymous reviewer for their helpful comments about the individual chapters and the volume as a whole.

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California’s Channel Islands, a group of eight islands distributed off the coast from Point Conception to the Mexican border, provide a rich abundance and diversity of environmental resources that allowed human populations to live there for at least the past 13,000 years (Figure 1.1; Erlandson et al. 2011). Archaeologists have focused on the role of these resources in human subsistence on the islands in the past. A long-standing debate during much of the twentieth century centered on whether aquatic resources provided lower nutritional returns than terrestrial resources. This raised the question as to whether coastlines would have been settled first by initial colonizers or only after the carrying capacity of the local terrestrial environment had been exceeded (see Erlandson 1994:273 for a discussion). The Channel Islands were one of the case studies used by Erlandson (1988, 1994, 2001; Erlandson et al. 2008) to argue that marine resources were not second-rate food sources, but provided viable dietary staples. Questions about the desirability of coastal environments are no longer in debate. This is especially true when paired with terrestrial plants available on the islands and mainland. Raab et al. (2009) argue that any model in which coastlines are a last resort for human settlement is outdated and a poor fit for the available data. Many researchers working on the Channel Islands are interested in the decisions that people made regarding the resources available on the islands and in surrounding marine ecosystems. These decisions influenced the landscapes and seascapes that we interact with today.

The long history of human settlement on the Channel Islands, which is among the earliest in the Americas, supports the model that the natural resources there were highly regarded. In this chapter we outline the biogeography of the Channel Islands, discussing the environmental conditions and resources that people encountered while living there. We then present a condensed culture history of the islands’ human populations. We highlight the similarities between the northern and southern islands to tell a cohesive story of the Channel Islands as a whole, from the terminal Pleistocene through historic contact, while also acknowledging the environmental and historical circumstances unique to the different islands.

Island Biogeography
As one follows the coastline of California from north to south, one of its most prominent features is its eastward trend, starting south of Point Conception near Santa Barbara. This eastward trend defines the northern edge of the California Bight, which extends southward from Point Conception to Baja California (Figure 1.1). On the Channel Islands and in the surrounding ocean waters of the California Bight are a variety of habitats, resources, and opportunities that have attracted people since the terminal Pleistocene. At the northern end of the bight, Point Conception marks the transition between coastal and near-coastal floral and faunal species of Northern and Southern California, their ranges shifting and at times overlapping, depending on sea surface temperature fluctuations and other environmental
and climatic factors. In this area the confluence of the warm California Countercurrent and the cold California Current fluctuates geographically, causing shifts in the distribution of marine species over different time scales (Johnson 2001).

The Santa Barbara Channel region is defined as the area south of Point Conception, including the mainland coastline of Santa Barbara and Ventura, the northern Channel Islands, and the channel waters in between. Prior to European contact and colonization, the Chumash inhabited the Santa Barbara Channel region, whereas the Gabrilino (Tongva) occupied the Los Angeles Basin and southern Channel Islands (McCawley 1996; Figure 1.1). At the time of contact, both populations lived in permanent villages of hunters, gatherers, fishers, and craft specialists who shared aspects of material culture but differed in other important ways. Although not all of the similarities and differences between these societies can be attributed to environmental variation, landscapes and resource distribution played important roles in coloring the cultural expressions of coastal peoples in Southern California.

Several attributes of the islands have fostered local variation in ecosystems and, consequently, have influenced the nature of human settlement and subsistence through time. On the Channel Islands these include island location relative to the coast and other islands, island size, topography, and geologic substrate (Keegan and Diamond 1987). Island characteristics that are shaped by these variables include climate, freshwater availability, vegetation communities, terrestrial animals, and marine resources. Smaller islands, such as San Miguel, tend to have less terrestrial diversity and abundance (see Keegan and Diamond 1987), whereas larger islands, such as Santa Cruz and Santa Rosa, have the most abundant and diverse species (Kennett 2005). All of the Channel Islands, however, lack the terrestrial diversity of the adjacent mainland and have been further re-
stricted by the effects of wind, erosion, and significant disturbance by humans and introduced animals (Rick, Erlandson et al. 2005).

The northern and southern Channel Islands differ in their latitude, proximity to the mainland and other islands, freshwater availability, and terrestrial resources. From west to east, the northern island chain includes San Miguel, Santa Rosa, Santa Cruz, and Anacapa; all are located within 21 to 43 km of the mainland and share attributes of the mainland coastal ecosystem (Junak et al. 1995; Figure 1.1). Environmental similarities exist among adjacent northern islands because of their proximity to each other, ranging from 5 to 10 km (Emerson 1982), and the fact that they formed one large island (Santarosae) during a period of lower sea levels in the late Pleistocene (Kennett et al. 2008; Watts et al. 2010; Erlandson et al. 2011; Braje, Erlandson, and Rick, Chapter 2; Gusick, Chapter 3; Jazwa, Kennett, and Winterhalder, Chapter 5). Prior to approximately 10,000 years ago, sea levels were lower than at present (~70–75 m at 13,000 years ago). The subsequent rise in sea level caused a 65 percent decrease in land area. This has important implications for understanding early settlement of the islands because it also potentially submerged, and perhaps destroyed, evidence of early occupation and changed the geographic relationship of different land areas to the ocean. For example, areas that are now on the coast may previously have been further inland (Kennett et al. 2008).

The habitats and species of the southern Channel Islands are more isolated and were never connected to the mainland or each other. Santa Catalina, San Clemente, Santa Barbara, and San Nicolas Islands range from 32 and 97 km from the mainland and 34 to 45 km apart from each other (Junak et al. 1995). San Clemente and Santa Catalina, the largest and closest to the mainland of the southern islands, are 39 km apart and are each oriented on a roughly northwest-southeast axis. Important to understanding cultural variation, transportation costs between the southern islands would have been considerably greater than among the northern island chain throughout prehistory because of greater distances and potentially dangerous ocean conditions (Raab et al. 2009).

Today island size varies dramatically from the less than 2.6 km² of Santa Barbara Island to the 250 km² of Santa Cruz Island. Among the northern islands, Santa Cruz has the greatest variety of terrestrial resources because of its proximity to the coast, comparatively large size, and topographic variability (Junak et al. 1995; Perry and Delaney-Rivera 2011). The maximum elevation of all of the islands is found on Santa Cruz Island, where the formidable North Ridge reaches nearly 750 m (see Gill, Chapter 7); the only other island with an elevation of more than 600 m is Catalina. In contrast, San Miguel Island is situated farther from the mainland, tops out at about 250 m, and is less than one-sixth the size of Santa Cruz Island. It has limited terrestrial diversity, but a greater abundance of marine resources, including sea mammals (Braje 2010; Kennett 2005); however, on smaller islands, people could reach any location on the island by foot in a day.

**Terrestrial Resources**

The Mediterranean climate that characterizes Southern California is reflected in mild temperatures on the islands, although there are important geographic differences between them. Drastic changes in the weather can be caused by strong winds, fog, and offshore storm systems. As one travels westward along the northern islands, temperatures are generally cooler and precipitation higher on average. Anacapa Island is the driest; Santa Cruz Island is intermediate; and San Miguel Island is the coldest, wettest, and most windswept of the Channel Islands (Kennett 2005). The southern islands are generally warmer and more arid than the northern chain, with rainfall on San Clemente Island averaging less than 6 inches per year. Because of these climatic differences, cactus and coastal sage scrub are among the dominant vegetation types on San Clemente and Santa Catalina Islands. In contrast, oak woodlands, pine forests, and ironwood stands are present on Santa Cruz and Santa Rosa Islands (Emerson 1982).

Common plant communities found on most of the islands include coastal sage scrub, grasslands, dune vegetation, coastal bluff scrub, coyote brush scrub, riparian habitat, and oak woodland (Junak et al. 1995).

Of the factors influencing plant distribution, local variations in temperature, precipitation, and geological substrate are among the most significant. Modern precipitation levels vary considerably on the Channel Islands as a whole, but
generally speaking, higher elevations receive higher amounts of precipitation (Junak et al. 1995). In addition to rainfall, the marine fog layer provides substantial moisture for higher-elevation plants, the ceiling of which tends to fluctuate between 200 and 400 m. On Santa Cruz Island, marine fog and moisture-laden air are pushed onto north-facing slopes by the prevailing northwest winds, resulting in overcast conditions along the northern coastline about 50 percent of the time (Junak et al. 1995:4). These conditions support mixed conifer forests at China Pines, on the more arid east end of the island; at Christy Pines, near the head of Cañada Christy on the west end; and along the northern slope of the island’s North Ridge.

Although less prolific and diverse than their mainland counterparts, island plant resources were used prehistorically for food, raw materials for making tools and structures (e.g., housing), and sources of firewood (Timbrook 1993). Among the most significant plant communities exploited for these purposes were pine forest, oak woodland, coastal sage scrub, chaparral, and grasslands (Martin and Popper 2001:245). Plants consumed by prehistoric inhabitants include chia (sage seeds) and other seeds; acorns (Quercus agrifolia, among others); pine nuts (Pinus spp.); islay (island cherry [Prunus ilicifolia]); toyon (Heteromeles arbutifolia) and manzanita berries (Arctostaphylos spp.); as well as a variety of roots, bulbs, and tubers (Timbrook 1993; Glassow 1996:17; Erlandson 1994:28). Aside from food and tool resources, pine, oak, Santa Cruz Island ironwood (Lyonothamnus floribundus), and chaparral would also have served as sources of firewood.

California archaeologists have had a tendency to emphasize the role of oak and acorns in subsistence economies (Anderson 2006). It is possible, however, that other habitats, such as coastal sage scrub and grasslands, were more valuable to island occupants because of the variety of seeds, roots, and tubers available (Timbrook 1993, 2007). Of the species dispersed throughout coastal sage scrub and grasslands, blue dicks bulbs (Dichelostemma capitatum) and seeds from red maids (Calandrinia ciliata) were harvested in large quantities according to ethnographic accounts (Timbrook 1993:51). Blue dicks, onion (Allium praecox), and other bulbs are significant sources of carbohydrates and are easy to identify, collect, and prepare in large quantities, making them attractive plant resources (see Gill, Chapter 7).

Of the resources available on the islands, terrestrial animals are limited not only in diversity and abundance, but also in size. The largest indigenous land mammal is the island fox (Urocyon littoralis), which is similar in size to the domestic cat. Other native species are the spotted skunk (Spilogale putorius), deer mice (Peromyscus spp.), birds, and a variety of reptiles and amphibians, such as frogs, salamanders, lizards, and snakes (Emerson 1982; Colten 2001). Although terrestrial animals did not comprise a substantial amount of the prehistoric diet, people were able to rely upon a combination of marine animals and terrestrial plants. Marine species provide sufficient amounts of protein and fat but are generally lacking in carbohydrates. Therefore, reliance on plant foods, which were consistently available and obtainable with low costs, would have been important to maintain a balanced diet (Erlandson 1988).

Lithic Sources

In addition to its influence on plant communities, geologic substrate is important with respect to the kinds of lithic materials available on the islands. Obsidian is not present in the Santa Barbara Channel region or the Los Angeles Basin, but it was imported from the Coso Mountains in eastern California, hundreds of kilometers to the northeast (Rick, Skinner et al. 2001). Islanders relied primarily on locally available materials such as Monterey and Franciscan cherts, basalts and other igneous stone, fused shale, sandstone, and quartz (Arnold 1987, 2011; Conlee 2000; Perry and Jazwa 2010; Pletka 2001). On San Clemente, San Miguel, and San Nicolas Islands, people used sandstone and volcanic materials to manufacture bowl mortars at a large enough scale that some were exported to other islands. Other resources are more geographically circumscribed, such as soapstone, or steatite, which is found only on Catalina Island. Soapstone was exported to other islands and the mainland in the form of bowls, comals (heating stones), and effigies (see Perry, Chapter 8; Strudwick, Chapter 10; Teeter, Martinez, and Richardson, Chapter 9; McCawley 1996).
The lithic material that receives the most attention in the archaeological literature is chert, which was used to manufacture drills (for shell beads) and other tools (Arnold 1987; Perry and Jazwa 2010). Like soapstone, it was used to make a variety of exchange items but is limited in its geographic distribution. Although chert occurs on Santa Rosa and San Miguel Islands, it is most abundant on eastern Santa Cruz Island. Known as Santa Cruz Island blonde chert because of its usual color range from tan to brown, it is well suited for flint-knapping because of its high silica content (Arnold et al. 2001:115). In all, there are at least 30 known chert outcrops on Santa Cruz Island that have evidence of prehistoric quarrying activities, although smaller chert outcrops are present elsewhere, such as Cico and Tuqan chert on San Miguel Island and Wima chert on Santa Rosa Island (Erlandson et al. 1997; Erlandson et al. 2012; Perry and Jazwa 2010). Given the abundance of chert in multiple accessible locations, it seems plausible that these outcrops were quarried throughout the occupation of the islands. Supporting this hypothesis are the recent attempts to generate a chronology for human use of chert quarries. Some of the oldest and most recent radiocarbon dates on Santa Cruz Island are associated with these outcrops (see Gusick, Chapter 3; Arnold 1987; Kennett 2005; Perry and Jazwa 2010). This suggests the strong influence of terrestrial resources such as tool stone on human decisions about site location on the islands through time.

**Freshwater Availability**

Among all of these vital resources, the most important factor influencing and constraining island occupation was freshwater availability (see Jazwa, Kennett, and Winterhalder, Chapter 5; Kennett 2005; Kennett et al. 2009; Raab and Yatsko 1990; Winterhalder et al. 2010). On an inter-island scale, accessibility to freshwater influenced the population size and length of habitation of a particular island. An island may have been occupied permanently, or visitors from other islands may have exploited its resources temporarily, whether seasonally or during stopovers. Freshwater sources on Santa Cruz Island consist of abundant perennial streams and springs. This contrasts with the lack of surface freshwater on Anacapa and Santa Barbara Islands (Emerson 1982; Junak et al. 1995). Between these extremes are natural freshwater catchments and seasonal springs on San Clemente Island (Raab et al. 2009), as well as springs and seeps on San Miguel Island. With their large size, resource abundance, and reliable freshwater sources, Santa Cruz, Santa Rosa, and Catalina were able to support large and/or long-term human occupations. Yatsko (2000) has argued that San Clemente Island, where freshwater is more limited, was partially abandoned during periods of droughts during the Medieval Climatic Anomaly. Furthermore, Anacapa and Santa Barbara could not support permanent settlements because of their small size and limited freshwater; however, it appears that temporary camps were established on these islands to exploit marine resources such as sea mammals and sea birds, and as stopovers along travel routes, among other possibilities (Arnold 1992a; Erlandson et al. 1992; Rick 2001, 2006; Rick and Erlandson 2001; Rick et al. 2009; Rozaire 1978).

Although freshwater was a significant limiting factor with respect to site location, people were able to range farther afield by carrying water in baskets. Archaeological evidence for this on the islands is primarily in the form of asphaltum tarring pebbles, which were used to seal basketry to make it watertight (Hudson and Blackburn 1983). Given such observations, it is important to consider the location of all potential freshwater sources—large and small alike, and at different times in the past—as one of the most significant variables in shaping how people used the landscape, whether directly or indirectly.

**Marine Resources**

Because of the limited availability of terrestrial resources and relative abundance of marine ones, the ocean environment was the primary focus of prehistoric subsistence activities on the Channel Islands. Although plant resources, whether local or imported, were important sources of carbohydrates, most protein requirements were satisfied through exploitation of shellfish, fish, and sea mammals. Resources were obtained from several marine habitats, including rocky intertidal, nearshore sandy bottom, rocky bottom, kelp bed, and pelagic waters (see Jazwa, Kennett, and Winterhalder, Chapter 5; Kennett 2005; Kennett et al.