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Household and Community Organization at *Nimatlala*, an Island Chumash Village on *Limuw* (Santa Cruz Island), California

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Anthropology

by

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DEDICATION

I dedicate this work to:

The memory of my father, Paul Sutton (1947-1999), a NASA engineer who taught me how solar cells work and how space travel to Mars is possible. Because he looked up at the sky and wondered, I now look down at the ground and wonder. Thank you for the curiosity gene.

The Chumash, with all my gratitude. Thank you for sharing your culture and history. Yours is one of the great stories of survival and persistence.

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ABSTRACT

Household and Community Organization at *Nimatlala*, a Chumash Village on *Limuw* (Santa Cruz Island), California

by

Elizabeth Anne Sutton

The Chumash living in the Santa Barbara Channel region at the time of European contact in AD 1542, and into the Early Historic period (AD 1782-1834), are described in historic documents as living a sedentary lifestyle settled in large, permanent villages. Although archaeologists working in the region today have a number of historical sources and ethnographic records to contextualize their work, little archaeological research using modern excavation and laboratory techniques has been undertaken, and much remains unknown about how the Chumash organized their households and communities and constructed economic, political, and social relationships.

Recently, a few late prehistoric and historic sites on the Northern Channel Islands have been identified and recorded away from permanent village sites. Three of these small sites (SCRI-324, -384, -801) located in the interior of Santa Cruz

Island are believed to represent the Early Historic period village of *Nimatlala*. These sites appear to be very different from other Early Historic period villages in that they contain smaller house depressions and shallow midden deposits. Excavation of houses and deposits at SCRI-324 and SCRI-384 was undertaken in an effort to discern the chronology of occupation, the organization of households and the community as a whole, and the nature of activities undertaken at the site.

Results indicate that the houses were occupied by fewer individuals than was typical, although residents of the village did invest substantial labor at the sites, constructing houses and possibly a small sweat lodge. This suggests that while occupation may not have been permanent, it was significant. Residents were involved in a number of activities including the production of shell beads and ornaments, the production and maintenance of stone tools, and the collection and processing of plant and animal foods. Additionally, an analysis of the activities in which the community was engaged reveals how residents created and maintained their identity through daily practice against the backdrop of significant social, political, and economic transformation in colonial-era California.

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CHAPTER ONE

The Archaeology of Colonial Encounters and the Diverse Landscape of Colonial-Era California

1.1 Archaeology and Colonial Encounters

Colonial encounters continue to be widely studied by archaeologists seeking to understand the economic, political, and cultural transformations provoked when outside entities enter the lands of others and establish new settlements. Archaeologists struggle, however, when it comes to developing a cohesive comparative approach to the study of colonial encounters. This is, in part, due to the highly variable nature of these encounters in which individual actors and unique communities are engaged. Colonial encounters occur in both New and Old World contexts, and between both prehistoric and historically documented societies.

The two approaches to colonialism that have been most influential to archaeologists are world systems theory and post-colonial theory (Gosden 2004:7; Stein 2005:7-9). World systems theory (Wallerstein 1974) focuses on the study of long-term economic development across the world, and the advent of core-periphery systems. World systems theory takes a broad and generalized understanding of modern economic systems and applies these principals to labor relations and production methods in the past. What is lacking in this approach is the distinct possibility that over the past 5000 years of human history not all people have viewed work, labor, and production in the same way. Post-colonial theory has stressed human agency and sought to move away from written history to embrace the narrative of resistance and subversion of the colonized. While written historical documents also provide valuable insight into colonial interactions, they inevitably reflect the view of the author. In instances of encounters between societies with written records and societies without written documentation, accounts of the colonial encounter clearly favor the views of the literate society over that of the preliterate. As they are predominantly written by men, historical accounts also tend to be gender biased. Although the gap is narrowing, even today world-wide literacy rates continue to be higher for men than women. The exploration of new lands was also historically delegated to males, as the activity was often considered too dangerous for women. Particularly in the study of the New World, there is a tendency to assume a single mode or model of European colonialism; however, colonies are founded for a variety of reasons, motivations of different colonial powers are not always similar, and native communities do not react uniformly to aggressors (Lightfoot 2005:209). Human agency also ensures that each colonial encounter will be distinctive. What post-colonial theory generally lacks, however, is material evidence independent of both historical documents and the discourse of the colonized.

Archaeology is extremely valuable to the study of colonial interactions because it generates new data sets that are independent from the written record and reveals the unconscious processes of daily life (Stein 2005:6). Archaeology moves the discussion of colonial encounters past biased accounts and considers the activities of all actors within hybridized colonial communities. This is not to say that historical records and post-colonial discourse are not valuable, for they indeed inform the interpretation of archaeological data. It is important to remember that material culture found in colonial-era sites cannot simply be interpreted as belonging solely to the traditional or colonial realm. Dichotomous classification in cultural-contact studies devalues the hybridity of colonial communities and ignores the power of all actors in together creating new culture through daily practice (Silliman 2009:214).

1.2 The Diverse Landscape of Colonial Encounters in Native California

California was the site of one of the most diverse colonial landscapes of the New World. By the early 19th century California had become a frontier borderland marking the easternmost limit of the Russian empire and the northernmost extent of the Spanish empire which had already engulfed much of Central and South America (Figure 1.1). Undoubtedly both empires saw potential in the natural resources of the region, but more importantly California was land that both empires believed they must conquer, if only to keep the other empire from expanding. Caught in the middle of this imperial land-grab, initiated by rulers who would never set foot in North America, were the native peoples. Most of the indigenous peoples of California called this land home long before the Spanish monarchy or Tsarist Russia came into existence. And for some of these indigenous peoples, such as the Chumash, California has been their ancestral homeland for perhaps as long as 13,000 years (Johnson et al. 2005, 2007). While indigenous Californians had experience engaging in conflicts and battles (Brown 1967:75-76; Geiger and Meighan 1976; Johnson

1988; Walker et al. 1989; Walker and Johnson 1992), they now faced new aggressors wielding different motivations, tactics, and an arsenal of diseases.

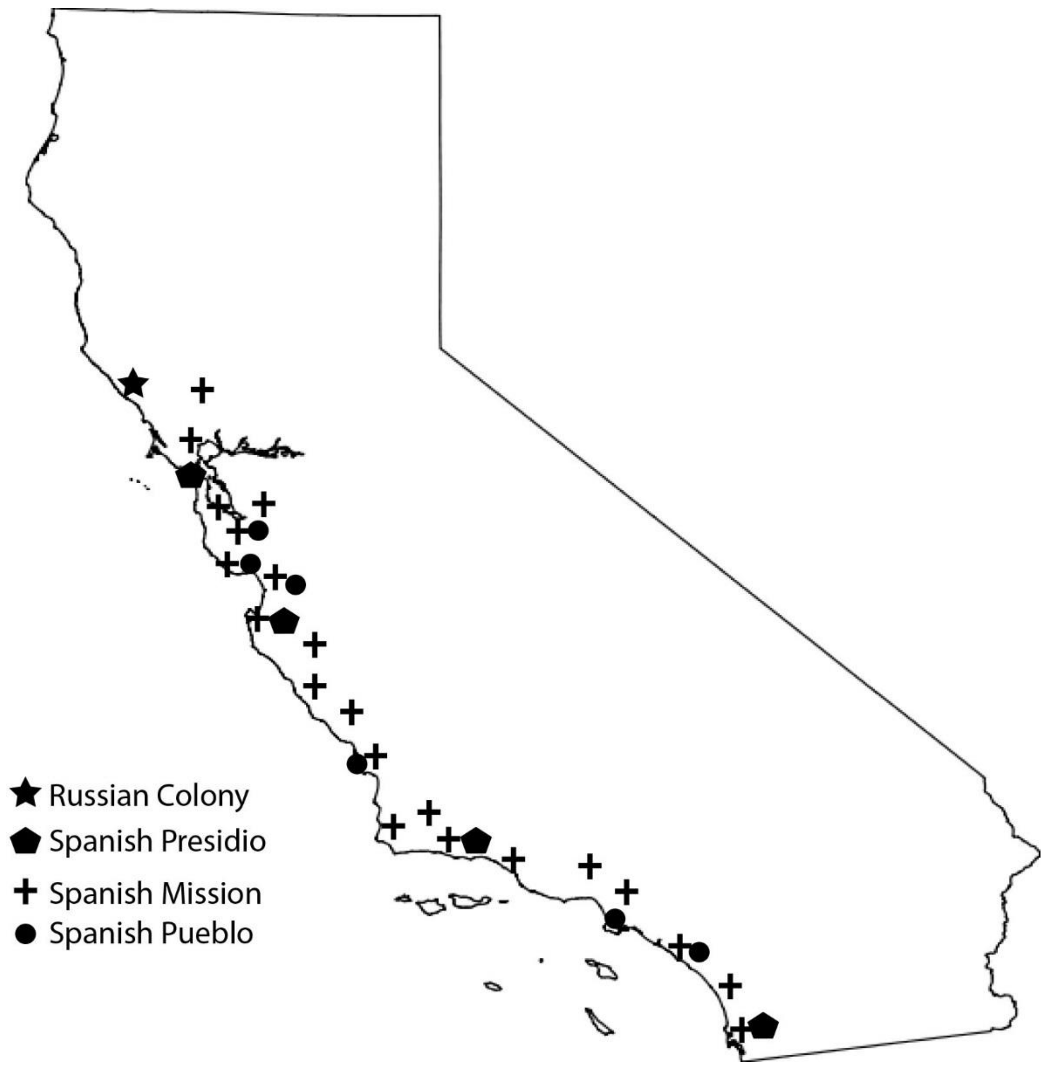

Figure 1.1. Map of colonial-era California with the locations of Spanish presidios, missions, and pueblos, as well as the Russian Colony Ross.

While the impacts of new imperial settlement were inescapable, the nature of colonial/native interactions varied significantly. The Russian settlers were merchants engaged in the maritime fur trade and sought new sources of sea otter pelts that were in high demand in Asia (Crowell 1997:33, Lightfoot 2005:115). These furs were traded to the Chinese for silks, spices, and other valuable goods. By the advent of the 19th Century, the Tsar had granted the Russian-American Company exclusive rights to the resources and colonies in North America (Lightfoot 2005:115). The Russians needed the skilled native hunters to guarantee a steady supply of sea mammal pelts, and the earliest colonies founded in North America required local natives to pay a tax in furs. In the Aleutian Islands and on Kodiak Island, military force was used to take native women and children hostage to insure that this tax was paid (Crowell 1997:11-16). After this form of taxation was banned by Catherine II in 1788, The Russian-American Company resorted to the mandatory conscription of native hunters from the Aleutians and Kodiak Island for a period of three years (Lightfoot 2005:116; Tikhmenev 1978:144).

After the Russian-American Company took control of the North American Russian colonies, they began to extend their territory south towards California in search of new populations of sea mammals to exploit. In March of 1812, Russian and Native Alaskan interlopers began building Colony Ross just north of San Francisco Bay on land occupied by the Kashaya Pomo (Lightfoot 2005:118). The new Russian colony was located on the coast, just over 100 km north of the Spanish

Presidio of San Francisco. The Spanish missions of San Rafael and San Francisco Solano would soon be founded even closer to Colony Ross. Russians came to rely on Pomo and Miwok for labor, and Russians, Native Alaskans, and Native Californians all resided at the Colony, although in separate neighborhoods (Lightfoot 2005:122). As populations of sea otters began to decline due to over-harvesting, the Russian-American Company began manufacturing and agricultural ventures to increase profits, and founded several ranches in the areas around Colony Ross (Lightfoot 2005:124-125). Native Californian labor was also required for these new industries.

In marked contrast to Spanish colonial policy, the Russian-American company made no effort to enculturate the Native Californians. The Russian-American Company was operating merchant colonies and therefore their primary motivation was to make a profit from these North American ventures. For convenience, some Natives Californians relocated to neighborhoods and settlements around the Russian Colony, but the Russians did not actively seek to resettle Native Californians into the Colony (Lightfoot 2005:133). There is very little information to evaluate the population changes that occurred during the years in which Colony Ross was in operation. At the Colony multiple outbreaks of unknown epidemics (Kostromitinov 1974:7), measles (Gibson 1976:128), and smallpox (Lightfoot 2005:149; Osborn 1997:229) were noted. Additionally, between the years of 1836 and 1840, all of the Russian-American Company's colonies in North America suffered a wave of epidemics that included measles, chickenpox, whooping cough, and smallpox (Fedorova 1973:161; Lightfoot 2005:149; Tikhmenev 1978:198).

These epidemics were observed to have significant impacts on Native California populations at Russian colonies, Spanish missions, and also populations residing away from colonial settlements.

In 1767 the Spanish monarch, King Charles III, forcibly removed Jesuits from the chain of missions they had established in Baja California. The Franciscan order was then employed to consolidate the existing mission settlements. In 1769 the Franciscans were tasked with a new charge by the Spanish crown to establish a chain of missions in Alta California. Portolá's expedition into Alta California in 1769 included a group of Franciscans led by Junípero Serra. The Franciscans sought out locations to establish new missions which would be located about a day's journey from each other and connected by a roadway (Geiger 1963).

At the Spanish missions, the padres were given the task of enculturating Native Californians, teaching them religion, language, and trades in order to create a laborer class for the new Spanish settlements. While laborers were needed at the Missions and *asistencias* (sub-missions), they were also needed at the other Spanish colonial settlements in California. The *presidios* (military forts) and *pueblos* (civilian settlements) required labor pools for building and maintaining the settlements. At the missions, neophytes were required change their language, dress, and subsistence practices. Padres typically followed the policy of *reducción* which sought to remove Native Californians from their villages and resettle them at the missions (Hoover 1989:398; Hornbeck 1983:46). In some regions Native Californians were forcibly resettled into missions, although this was expressly against Spanish laws and did not happen frequently (Cook and Marino 1988:474; Walker and Johnson 1992:131).

Once at the missions neophytes were typically confined to mission grounds and could not leave unless they were given permission by the padres. Soldiers would even be sent after any escaped neophytes and through coercion or force the escapees would be returned to the mission (Milliken 1995:96-97). Lodging at the missions was assigned based on sex, age, and marital status (Archibald 1978:174; Voss 2000). From around the age of eight, young girls were separated from their families and moved to a dormitory (Voss 2000). Sometimes young boys and single young men were also placed into a dormitory (Guest 1989:11).

Dense living conditions and the confinement of neophytes to mission grounds contributed to poor health and the spread of disease. Due to interactions with explorers and trade networks that extended into the American Southwest and into Mexico, it seems certain that introduced diseases swept through Native California in advance of colonization (Preston 1996; Reff 1992). While we will likely never know how significantly these pre-colonial epidemics affected the population, Native Californian populations are known to have suffered considerable decline in the colonial period, with some estimating a decline of 90% from 1769 to 1900 (Cook 1978).

Although drastic population loss and resettlement into colonial communities was typical for Native Californian communities, the timing and nature of enculturation varied considerably. Each community is made of unique actors, and the motivations and needs of each group (both native and colonial) are distinct. The Native Californian communities located closest to colonial settlements were the first to be targeted for enculturation. For instance, coastal Native Californians near Russian and Spanish colonial settlements were the first to have their communities reorganized and resettled. Attempts to resettle some of the interior groups such as the Yosemite Indians did not take place until the mid-1800s when colonists recognized the potential for gold extraction in the Sierra Nevada Mountains (Hull 2009). Even within a cultural group, the timing of community resettlement could be quite variable. For example, the Chumash of the Santa Barbara Channel region were relocated into five missions within their home territory over the course of 50 years (Walker and Johnson 1994:111). Most Chumash living on the mainland coast were resettled into the missions from 1787-1806, although the Inland and Island Chumash were relocated up to ten years later (Walker and Johnson 1994:111). The majority of the islanders were baptized between 1814 and 1817 (Johnson 1982b:68). These Island Chumash were removed from the Northern Channel Islands and resettled into missions that also housed coastal and interior mainland Chumash. Mission communities in this region were then sites of hybridized native culture as well. Chumash living in different geographic regions shared some cultural traditions, but also spoke different languages, relied on different subsistence strategies, and often went to war with other communities both within and outside of their home territory. Resettlement into Spanish missions involved the integration of European and multiple native traditions into daily practice.

1.3 Household Archaeology

The home and community are loci of significant human interaction in which both the public and private identities of households, groups, and communities are created and maintained. The location of households, hearths, storage facilities, food preparation, tool manufacture, and communal feasts or rituals, as well as their relationships with each other, offer a wealth of information about social interactions and organizational principles (Lightfoot and Martinez 1995, 1997). Households are particularly useful units of analysis because they represent basic, corporate social groups, and are sites of everyday social, economic, and political dialogues (Ashmore and Wilk 1988; Netting et al. 1984; Wilk and Netting 1984). Household archaeology provides an opportunity to study all residents (not just those in positions of power), and understand the daily, habitual actions of a community actively engaged in the production and maintenance of their culture. The archaeological investigation of households is important to understanding processes of colonial encounters and hybridization of cultures. Silliman (2011:191) notes that:

> households may be spaces for contestation and transformation, but they are also contexts for repetition and familiarity. More poignantly, they are the contexts for familiarization, as new material objects become incorporated, appropriated, and made meaningful in use through experience.

As primarily private space, homes are paradoxical locations in which traditions endure the longest, and where people feel most comfortable to try something new out of sight of the public gaze.

Practice theory as outlined by Bourdieu (1972) posits that the patterns of human behavior are shaped by the larger "system" and therefore both reinforce the system and can provide information as to the structure of that system:

> All of these routines and scenarios are predicated upon, and embody within themselves, the fundamental notions of temporal, spatial, and social ordering that underlie and organize the system as a whole. In enacting these routines, actors not only continue to be shaped by the underlying organizational principles involved but also continually re-endorse those principles in the world of public observation and discourse (Ortner 1984:154).

Excavations of households uncover the material remains of human activity at the family level, but the identified patterns of behavior and organization are in some ways indicative not only of societal structures at these households and at the village level, but also of general community and group-wide political and social organization.

One of the criticisms of practice theory, and a problem with modern social theory in general, is how to reconcile the relationship between agency and "system" or "structure" (Giddens 1979). Patterned, habitual behavior can be largely unconscious on the part of the actor, and some even suggest that major social change is almost always is brought about by the unintended consequences of action (Ortner 1984:157). However, de Certeau (1984) offers an alternative viewpoint that sees practice as resistance to domination by the system. The "strategies" acted out by those in power stratify and order society and also set the standard as to what actions are proper and acceptable, but at the same time the subaltern make "tactical" moves that can either reinforce or disrupt the social reality produced by the strategic practices of those in power (de Certeau 1984). Thus, although the majority can only act within the structure set up by the system, their individual and collective practices have the power to either support that system or disrupt it to the point that it can no longer function and a new system is created.

Following the historical processualism paradigm, cultural practices should be the subject of archaeological inquiry as it is misleading to study material culture without attempting to understand how the production of those artifacts shaped the history of the community (Pauketat 2001). For:

> material culture, as a dimension of practice, is itself causal. Its production—while contingent on histories of actions and representations—is an enactment or an embodiment of people's dispositions—a social negotiation—that brings about changes in meanings, dispositions, identities, and traditions (Pauketat 2001:88).

Skibo and Schiffer (2008:23) note that practices and innovations are contingent upon a set base of knowledge and experiences, the social and natural environments in which actors reside, and also unique local circumstances. Archaeological investigations at one community cannot hope to provide a clear history of how one cultural group navigated colonial encounters, but it can serve to understand how several households and unique actors embodied their traditions and how they represented themselves in the social and political realms of the larger community, therefore creating their unique history and shaping the history of other people with whom they interacted.

1.4 An Introduction to the Project

Household archaeology holds the potential to illuminate the diverse landscape of colonial encounters in California and the processes by which native and colonial groups became hybridized communities. Investigations of Spanish mission complexes, Russian forts and neighborhoods, as well as native settlements located away from these communities are all necessary to understanding the intricate mosaic of the colonial experience. For many diverse native cultural entities such the Chumash of the Santa Barbara Channel region, colonial encounters were variable and we should not seek to define a uniform colonial experience for all of the regional Chumash groups. The Island Chumash were the last of the Chumash groups to be brought into the mission settlements, and they would spend fewer than twenty years at the missions before they were secularized in 1834. To develop a better understanding of how the Island Chumash negotiated the cultural changes brought about by contact first with colonial explorers during the 16th through 18th centuries, and then by colonial settlement beginning in the 1770s, an investigation of Island Chumash households and communities is necessary.

At the time of European contact, the Island Chumash are believed to have aggregated into a number of sedentary villages along the coast, seeking most of their subsistence from maritime resources. Some archaeologists (including the author) assumed that the remains of a few small interior sites with shallow deposits and one or a few small house depressions date to earlier time periods when the Islands had fewer occupants and the population was more mobile. Recent testing at one of these small interior villages on Santa Cruz Island has led to the revelation that it was occupied by the Island Chumash during the Contact and Early Historic periods. This village site offers an exceptional opportunity for archaeologists to investigate the daily lives of the colonial-era Island Chumash for a number of reasons. First, the shallow nature of deposits allows for more of the site to be excavated during the course of a single project. Secondly, only a few house depressions are present, so significant samples can be obtained from each house to better understand the dynamics between households. Additionally, the site does not conform to our current understanding of Island Chumash patterns of settlement during the Early Historic period, and therefore unique or novel activities may be occurring in this location as a result of culture contact and colonial encounters.

Given the unique nature of the village, research needs to be designed to elucidate the occupational history of the village to understand the timing of activities and settlement in relation to both colonial contact and settlement and traditional settlement systems. Additionally, a separate set of research questions should aim to reveal the nature of household and community activities undertaken by residents in the process of shaping their history and community identity through daily practice.

1.5 Research Questions: Settlement and Mobility

Excavations at the interior village were planned to provide answers to the following questions regarding Island Chumash settlement patterns and mobility during the Contact and Early Historic periods:

- **What was the time span of occupation at the village?** In order to be considered a village, three separate sites (SCRI-324, -384, and -801) located in the same vicinity must be proven to have been occupied during the same time period(s). Radiocarbon dating can establish a general history of occupation. Artifacts, specifically time sensitive artifacts, such as shell beads, shell ornaments, projectile points, and microblades and microdrills are used to narrow the time span of occupation.
- **If occupied for more than one time period, was there a change in the intensity of occupation over time?** Many villages on the Northern Channel Islands were occupied during multiple time periods. Although deposits at the interior village are shallow, multiple time periods could be represented. An understanding of differential intensity of occupation will help to identify the motivation for occupying these sites. Environmental, social, and economic stresses vary by time period. The rate of deposition of time sensitive artifacts at the site allows for a determination of changes in the intensity of occupation.
- **Was the village occupied on a permanent or temporary basis?** If it is found to be a temporary village, this interior village would be the first non-

permanent Early Historic period village to be identified on the Northern Channel Islands. This opens the possibility that other similar sites of this type may exist on the Islands. Determining the size of the sites and structures, the depth and stratification of the deposits, and variation in the density of constituents provide data to be compared with known Early Historic period villages on the Northern Channel Islands. The number and types of artifacts discovered at the sites may offer insight into the seasons during which the village was occupied. For example, the recovery of numerous digging stick weights may suggest that the site was occupied during the late winter and spring when blue dicks (*Dichelostemma capitatum*) were known to have been harvested (Timbrook 2007).

1.6 Research Questions: Community and Household Organization

Excavations at the interior village were also planned to reveal information regarding the organization of activities within households and the community. An understanding of this organization is key to identifying both community dynamics at this village and how this one community negotiated within the broader native and colonial landscapes.

- **How was the village organized spatially?** Structures and sites were mapped, and structures were evaluated to determine construction methods and whether there is any uniformity in the orientation of structures.

Additionally, excavation was conducted in both houses and other areas of the site to determine if certain activities are confined to specific areas of the site.

- **Was the village a primary or satellite village?** Because the village is small and there are no records of baptized Chumash having come from this village, it may be a satellite of another primary village. If the village was seasonally occupied, it was likely a satellite village, whereas if it was occupied year-round, it was likely, although not necessarily, a primary village. In an effort to determine whether the village is a temporary or permanent residence, analysis of artifacts and faunal samples are conducted and may indicate the types of activities in which residents were engaged. Additionally, if activities can be identified, a gender and age profile of the residents may be assembled. For example, if an abundance of grinding stones or digging stick weights were found, the site may have been occupied predominantly by work groups of women and children, whereas if an abundance of lithic material or stone tool manufacturing debitage is found, the site may have been occupied primarily by males (Hudson and Blackburn 1979, 1983). Additionally, if residents of the sites appear to have specialized in a certain task, it may provide evidence that the village was a satellite or special purpose camp occupied by residents of another village.
- **Did households organize labor independently or communally?** Evidence of household variation and specialization can be evaluated. Test units were excavated in areas of the sites not associated with houses in an attempt to

identify communal activity areas. Additionally, the artifact manufacturing process can be investigated at each house to determine if each household was specializing in a specific type of activity or a specific step in the manufacturing process.

- **Did households have equal or differential access to resources?** The density of exotic goods and materials such as glass beads, obsidian, fused shale, and serpentine were evaluated for each household. If houses have significantly different amounts of these materials, it would suggest that households may have had differential access to resources due to status and/or wealth.

Before delving into the development of the project and the methods employed during the course of this research, the cultural, historical, and academic contexts for the project are reviewed.

CHAPTER TWO

The Chumash at the Time of European Contact

2.0 Introduction

By the time of European contact in AD 1542, it is generally assumed that the Chumash people living in the Southern California region were operating on the organizational level of a simple chiefdom. According to Service's (1962) band-tribe-chiefdom-state classificatory system, chiefdoms are characterized by organized lineages overseen by a leader (chief), permanent and ascribed leadership, inherited inequality, economic centrality, and large semi to fully sedentary populations. And while some Chumash at certain times and in certain places may have exhibited all of these traits, questions remain as to how frequently this suite of characteristics was found among the Chumash, and more importantly how permanent these characteristics were after the organizational level of chiefdom emerged (Arnold 2001; Gamble 1991; King 1990). Almost all societies exhibiting this level of political organization practiced agriculture, a subsistence strategy that frequently necessitates increased oversight to manage the labor necessary for planting, irrigation, harvesting, and distribution. As one of the few examples world-wide of complex hunter-gatherers, the Chumash have over the past two decades been the subject of much archaeological research, a great deal of which is centered around a lively debate as to the timing of the emergence of complexity in Chumash society (Arnold 1992, 1997; Arnold and Green 2002; Arnold et al. 1997b; Gamble 2005;

Gamble et al. 2001, 2002; Raab and Bradford 1997; Raab and Larson 1997; Raab et al. 1995).

The large, densely populated villages, a tradition of hereditary leadership, marked social inequality, and regional political and economic organization described in some historic documents would all attest to the high level of Chumash complexity. However, this information and the majority of evidence that has molded our view of Chumash life in the contact and historic era are derived from three types of sources: (1) the incomplete and highly conflicting reports of 16th and 17th century explorers (2) documents and records kept by 18th and 19th century Catholic missionaries, and (3) the late nineteenth and early twentieth century ethnographic accounts of Chumash consultants. While this information has proven to be extremely valuable in reconstructing certain aspects of Chumash culture, it has also created archaeological research biases. Due to the records kept by Spanish missionary priests and the work of early anthropologists, most notably John P. Harrington, Chumash researchers have diverse historic documents and ethnographic information to guide and contextualize their work. However, only limited archaeological investigation has been undertaken to assess the descriptions given in these documents. Because of this lack of archaeological evidence, archaeologists have relied too much on the direct historical approach (Lightfoot 1995), and they have based many of their reconstructions of Chumash society on the contradictory reports of Spanish explorers and the recollections of Chumash people recorded a half century or more after they had been incorporated into the Spanish mission system. This is not to discount the great utility of the ethnohistoric record but merely to recognize the “tyranny of ethnohistory” (Curet 2003), meaning that important features such as the leadership strategy or level of sociopolitical complexity have been generally assigned to a large group of people on the basis of a relatively small amount of information, and the range of variation that is likely to have existed among that group is not acknowledged (Sassaman 2004).

Further archaeological investigation of Contact and Early Historic period Chumash sites, particularly of villages and non-cemetery sites, is necessary to understand the complexities of Chumash economic, political, and social organization during the time of colonial contact and settlement. A detailed understanding of Chumash society in the Contact and Early Historic periods is still unclear. Determining the Chumash settlement, leadership, and economic strategies in place at the time of European contact and throughout Chumash territory is a necessary step before theorizing how Chumash culture may have changed over the 10,000 years preceding European contact and identifying possible impetuses for change.

The village of *Nimatlala* on Santa Cruz Island is an excellent location to evaluate the direct historical approach and learn more about Chumash lifeways, particularly the organization of household and community activities. All of the Early Historic period Chumash villages were thought to have been occupied by sedentary populations, and the majority of the villages were positioned along the coastline of the Santa Barbara mainland and Northern Channel Islands (Arnold and Bernard 2005:112). During this time period, no significant occupation was believed to have existed in the islands' interior regions (Kennett 2005:169). Given the maritime subsistence focus, a village in the interior of one of the islands seems unlikely; however, *Nimatlala* is located in the Central Valley in the very center of Santa Cruz Island (Figure 2.1).

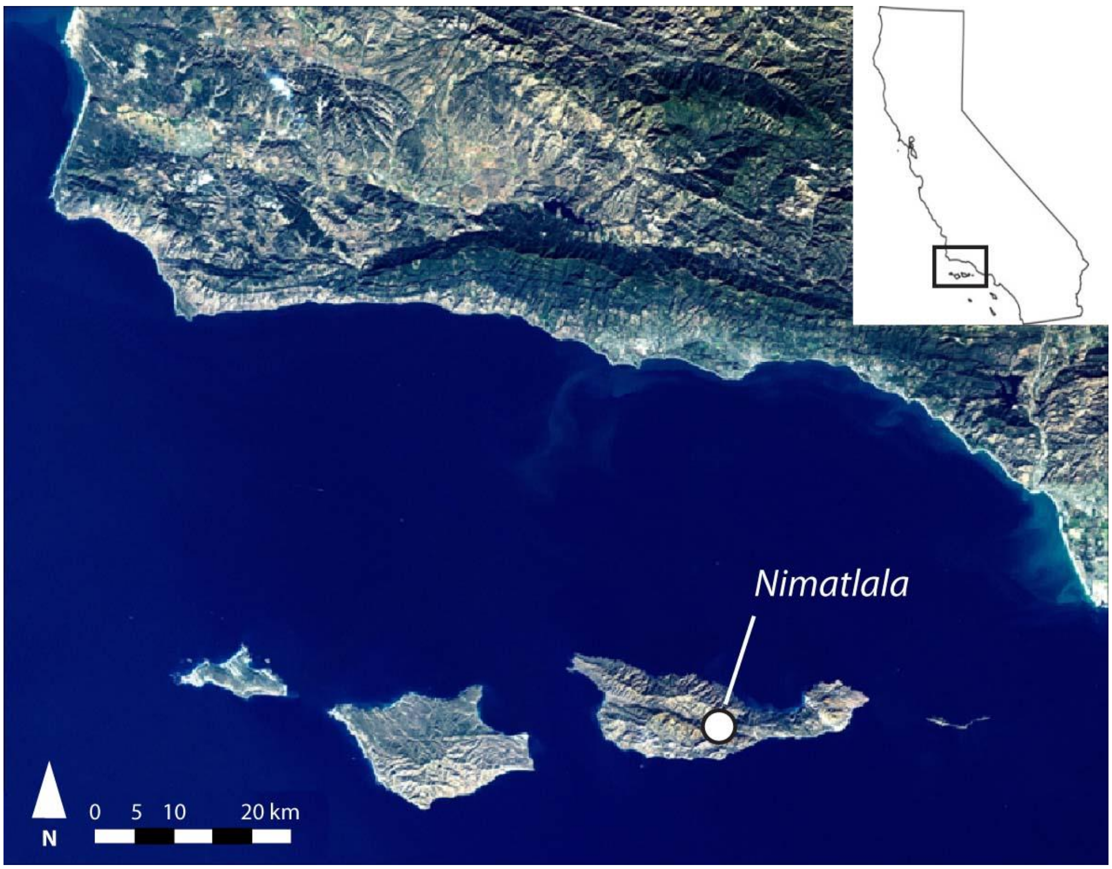

Figure 2.1. A map of the Santa Barbara Channel region with the location of the village of *Nimatlala* identified.

The village currently consists of at least three neighboring archaeological sites, two of which (SCRI-324 and SCRI-384) have evidence of several houses being built and occupied, and one (SCRI-324) containing the remnants of a possible sweat lodge. Radiocarbon dating and the presence of Historic period artifacts such as glass trade beads and needle-drilled shell beads firmly date the occupation at the sites to the Late Prehistoric and Early Historic Periods (Figure 2.2). Because archaeological deposits at *Nimatlala* are much shallower than deposits at other contemporaneous villages, excavations of large portions of three houses and one possible sweat lodge were completed, along with excavation of additional areas outside of the structures. The project detailed in the following chapters seeks to contribute a better understanding of the activities of everyday life at the village of *Nimatlala*, and in doing so also provides archaeological data to advance our understanding of Chumash lifeways, settlement patterns, and mobility during the Late Prehistoric and Early Historic periods. There are many layers of interaction within a community, and this project investigates the activities of individual households, groups of households, and the larger community. By doing so it may be possible to establish how practices in place at the household and community levels articulated with group-wide organizational and power structures, as well as how the community navigated the newly hybridized colonial landscape. This project also builds upon prior archaeological and ethnographic research in the Chumash area and is a necessary next step in understanding the complexities of Chumash economic, political, and social organization during the colonial era.

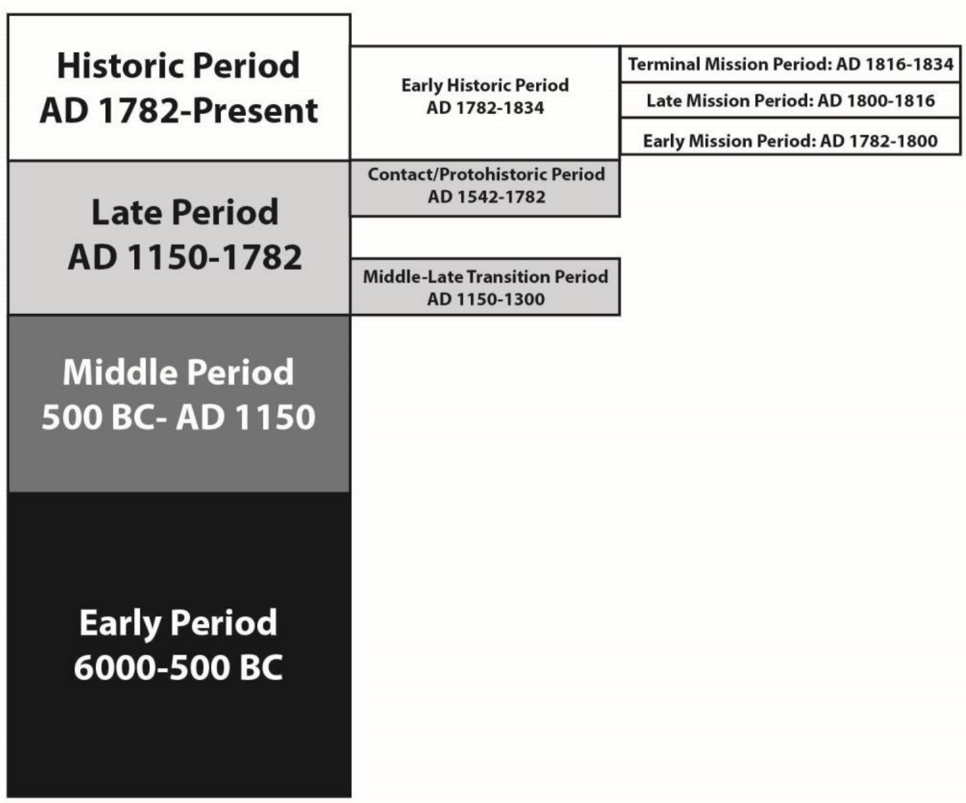

Figure 2.2. General chronology for the Santa Barbara Channel region. Sources: Arnold (1992), Kennett (2005), King (1990), Milliken and Schwitalla (2012).

2.1 A Regional Approach to the Study of the Early Historic Period Chumash

Chumash peoples have occupied the Santa Barbara Channel region for at least the past 13,000 years (Johnson et al. 2005, 2007). Within that time, they experienced profound social and environmental shifts and employed vast, deep knowledge of their world to adapt and persist. When the Spanish resettled many of the Chumash into missions during the late 18^{th} and early 19^{th} centuries, much of their traditional ways of life were abandoned. However, much of their traditional knowledge was not lost, and the Chumash survived major epidemics, forced servitude, and decades of structural violence. While neither representing the beginning or end of Chumash history, the Early Historic period is an interesting era marked by profound cultural change.

The Chumash were residing in the Santa Barbara Channel region at the time of European contact. Chumash territory at the time is believed to have extended south to include western portions of present-day Los Angeles County, north to include San Luis Obispo County, east into Kern County, and south to include the Channel Islands (Figures 2.3 and 2.4). Chumash peoples were never organized into a single political, cultural, or linguistic group (Blackburn 1975:8; Hudson et al 1977:1). The name "Chumash" is an exonym, derived from *michhumash* which was the mainlander name for Santa Cruz Island and its inhabitants (Applegate 1974:191; Heizer 1955:197). The people of Santa Cruz Island, however, referred to their island and themselves as *Limuw* (Applegate 1974:191-192). Anthropologists coined the term "Chumash" to aid research, using it to link groups of people sharing some cultural traits (Kroeber 1925). It is important to note that the Chumash did not have one overarching term for themselves. Prior to the 1960s, archaeologists working in the Santa Barbara Channel referred to the maritime peoples of the Santa Barbara Channel region as the "Canaliño" [sic] culture, as this was the name used by Spanish Californians to refer to the Chumash. David Banks Rogers (1929) developed the term, and archaeologists have used it to refer to the coastal and island Chumash and neighboring coastal and island Tongva people to the south (Orr 1968:101; Wallace 1955:224). The more specific Tongva and Chumash designations have gradually replaced the older term, and “Chumash” was applied to other non-coastally oriented groups as well.

Because of the significant differences among Chumash groups, anthropologists frequently employ a regional approach to the study of the Chumash, investigating specific groups such as the Island Chumash (Kennett 2005), or mainland Coastal Chumash (Gamble 2008). This is not to ignore the cultural similarities among Chumash regional groups or to say that research focusing on the Island Chumash cannot be applied in any way to a study of the inland mainland Chumash. Instead, it acknowledges that the Chumash were diverse linguistically, economically, and politically, and they occupied diverse environments that required different approaches to fulfilling subsistence needs. The following is a brief introduction to the Chumash of the Contact and Early Historic periods that provides a backdrop to the people, places, and time this project investigates.

2.1.1 Chumash Population Estimates at the Time of European Contact

Several have attempted to estimate the Chumash population at contact. Kroeber (1925:551) believed the whole Chumash area to be home to likely 8,000-10,000 people. Cook and Heizer (1965:21) believed Kroeber’s estimate to be very low and came up with their own estimate of between 18,000-22,000 people for the mainland area. Their estimate was calculated assuming that 15 people lived in one house. Brown (1967:79) has determined the entire Chumash region to have 15,000 individuals, while King (1969) has placed the population of the region at between

11,000 and 17,000. Population estimates are periodically revised based on newly acquired information; however, most cite Brown's (1967:79) estimate of 15,000 Chumash living in the region at the time of European contact, possibly because his population estimate is about the average of all estimates. Milliken and Johnson (Milliken 2006:21) have recently determined that the population density on the Northern Channel Islands was the highest in all of aboriginal California, and Johnson (1982b:109-114; see also Johnson in Glassow 2010) estimates the population of the Northern Channel Islands alone to be close to 3,200 at the beginning of the Early Historic period. The bounded nature of the island environment contributes to the determination of the Northern Channel Islands as having the highest population density. Not all of the land in the expansive mainland Chumash territory was frequently utilized, and therefore the population density of the Northern Channel Islands was likely similar to that of the occupied areas of the coastal mainland. It is believed that populations decreased significantly on the Northern Channel Islands beginning around the time of European Contact. Padre Tapis, a Spanish missionary, provided an estimated population of 1,800 for the Northern Channel Islands in 1805 (Tapis, in Johnson 1982b).

2.1.2 The Chumash Languages

The Chumashan family of languages (Figure 2.3) is a linguistic isolate and is divided into three branches: Northern Chumash, Central Chumash, and Island Chumash (Beeler and Klar 1977; Goddard 1996:320; Golla 2011:194; Mithun 1999).

The Northern Chumash branch consists of Obispeño and the Island Chumash branch consists of Cruzeño. Central Chumash, the largest branch, contains the most languages and includes Purisimeño, Ineseño, Barbareño, and Ventureño. An Interior Chumash dialect may also have been present and has sometimes been recorded in the literature as Emigdiaño, Castac, and Cuyama. Little is known about the Inland Chumash languages, and few speakers of each were identified. Castac may have been a dialect of Ventureño, while Emigdiaño is thought to be a dialect of Barbareño primarily spoken by fugitives from the 1824 mission rebellion who moved to the interior to avoid capture (Beeler and Klar 1977; Goddard 1996:320; Golla 2011:195-200; Grant 1978:505-506; Mithun 1999). Cuyama was another dialect reported by Kroeber, but its existence cannot be corroborated.

With the exception of Cruzeño, each of the six languages is named after the mission with which its speakers were associated: Obispeño with Mission San Luis Obispo de Tolosa in present-day San Luis Obispo; Purisimeño with Mission La Purisima Concepción near present-day Lompoc; Ineseño with Mission Santa Inés in present-day Santa Ynez; Barbareño with Mission Santa Bárbara in the present-day city of Santa Barbara; and Ventureño with Mission San Buenaventura in present-day Ventura. It should be noted that plans were developed to build a mission on Santa Cruz Island. In 1805, Fr. Estevan Tapis wrote to Governor Arrellaga, suggesting that a mission be founded near the village of *Xaxas* at Prisioner's Harbor, however, by 1807 the idea had been abandoned due to a measles epidemic that had caused the death of hundreds of Islanders and questions about the sufficiency of water and arable soil (Johnson 1982b:61-63). It is unknown whether additional Chumash languages were spoken just prior to the Early Historic period and then consolidated once the Chumash were moved into the missions. It is unlikely, however, as Cruzeño persisted after the Island Chumash were settled at five mainland missions: Mission San Buenaventura, Mission Santa Bárbara, Mission Santa Inés, Mission La Purisima Concepción, and Mission San Fernando. The majority of remaining Island Chumash were removed very late in the mission era, between 1814 and 1817 (Johnson 1982b:68), which was over 30 years after the founding of the first mission in the area (Mission San Buenaventura) in 1782. By 1822 it is believed that all Island Chumash villages were abandoned (Johnson 1982b: 75).

Figure 2.3. Regional Chumash languages.

2.1.3 Subsistence Regions

For the purpose of analysis, Landberg (1965:104-117) divided the Chumash into four "subsistence regions" based on historical observations (journals of Spanish explorers and the *interrogatorios* kept by early missionaries), population estimates, archaeological evidence, and ecological considerations (Figure 2.4). These regions are useful conceptually because divisions of labor and degree of mobility varied based on the seasonal availability of targeted species within each subsistence region. These differences in labor allocation and the degree of logistical and residential mobility may have contributed to political, economic, and cultural differences among the Chumash. Each of the four regions is briefly described below. Archaeologists working in the region today have expanded upon Landberg's (1965) research, increasing our knowledge of seasonal use of plants and animals in the Santa Barbara Channel region (Erlandson 1994; Gamble 2008; Kennett 2005; King 1967, 1976, 1990, 2000). King (1976:290) posits three environmental settings within Chumash territory: Inland, Mainland Coast, and Island. King's work describes in great detail the resources available both seasonally and year-round within each region, and this information is summarized below to provide greater insight into each region. Additionally, it is documented that subsistence strategies in the region changed over time (Arnold 1995; Erlandson 1997; Gamble 2002; Glassow 1997; Glassow et al. 1998; Rick et al. 2002; Salls 1988; Vellanoweth et al. 2000).

<u>Channel Islands</u>: Landberg (1965) was specifically referencing the Northern Channel Islands occupied by the Chumash in this first category. While the Island

Chumash were in many ways similar to the Chumash on the mainland, they overwhelmingly depended on fishing, sea mammal hunting, and shellfish collecting for subsistence. The Island environment is cooler on average than the Mainland region, and plant communities on the island are more similar to those in coastal Central California (King 1976). Compared to the mainland, fewer species of flora and fauna are found on the Northern Channel Islands. In fact, less than half the number of plant species found on the mainland are present on the islands (King 1976:291). Blue dicks corms were likely an important plant food resource for the Island Chumash (King 1976; Sutton 2014), along with acorns and wild cherry (islay).

Several hundreds of bird species can be found on or around the islands (Collins 2011); however, with the exception of cormorants, they did not make up a significant portion of the diet as determined through midden analysis. Species of land mammals available on the islands are limited to spotted skunks, island foxes, mice, and domesticated dogs, none of which appear to have been eaten frequently. Additionally, sources of fresh water were limited in some areas of the islands. Anacapa has no source of available fresh water other than small cliff seeps and is not known to have had any permanent settlements dating to the Protohistoric or Early Historic period.

Figure 2.4. Landberg's (1965) subsistence regions for the lands inhabited by the Chumash.

Channel Mainland: Landberg (1965) defines this region as stretching from Point Conception to Rincon Point, and from the Santa Ynez Mountains to the coast. Landberg (1965:110-111) points out that areas east of Rincon Point on the Channel mainland would have extended inland indeterminately as some areas of coastline are lined with steep cliffs and other areas such as between the Ventura River and Point Mugu are extensive coastal plain. Inhabitants likely used the coastline here differentially, but the Channel mainland likely did not extend more than ten miles inland. Milliken and Johnson (Milliken 2006) have determined population aggregations on the Channel Mainland to be very high. Most mainland villages were situated near reliable sources of potable water and were close to abundant fishing grounds, shellfish, land game, and a variety of plant communities. Plant resources not available on the Northern Channel Islands, such as yucca and chia, were plentiful on the mainland, along with mammals such as deer, rabbits, and squirrels that are also not found on the Islands (King 1976).

Northern Coast: Landberg (1965:104) defines the Northern Coast region as those areas occupied by the Chumash from the vicinity of Point Conception northward and extending inland five to ten miles. Generally this region is marked by lower population densities and less focus on fishing, as shorelines are often rocky, windswept, or composed of sand dunes extending several miles inland (Landberg 1965:112). Historical sources indicate deer and a variety of plant products as dietary staples in this region, although fishing and the collection of shellfish were also important (Landberg 1965:113).

Interior: Landberg (1965:104) simply defines the remainder of Chumash occupied lands not covered in the first three regions as the Interior. This region is the largest and most topographically diverse, but continues to be the least known (Horne 1981; King 1976; Landberg 1965:114). A variety of plant products including acorns and pine nuts were available along with many species of land mammals including deer, rabbits, and squirrels (Landberg 1965:115). The inhabitants of this region may have been more mobile to take advantage of seasonally available resources and sources of fresh water.

2.1.4 Political and Economic Organization

The Chumash were organized at the village level. Some have suggested, particularly for the mainland coastal Chumash, that Early Historic period Chumash villages were each led by a hereditary chief (Blackburn 1975, 1976; Gamble 2008; King 1969). John Peabody Harrington was an ethnographer who worked in the Santa Barbara area between 1912-1922 recording the recollections of Chumash people regarding their history and culture. One of Harrington's principal informants was Fernando Librado who had a wealth of knowledge regarding the Chumash during the Historic period. For Santa Cruz Island, Fernando Librado reported that only four villages had chiefs:

> In time there came to be four *wots* on Santa Cruz Island, one for each of the major villages. The chief *wot* was from the village of *Liyam*, his title being *'ayetla liyam paqwot* in Cruzeño. *Liyam*, which means "center," was not located on the coast but in the middle of the island. *Kahas* was the rancheria at what is now Prisoners Harbor. It was the port from which *Liyam* was reached by going up a canyon. *Swahil* was a village located on the east end of the island (Hudson et al. 1977:14).

Librado's location of *Liyam* in the center of Santa Cruz Island will be discussed below. Ethnohistoric information from mission records also indicates four chiefs or *capitanes*, one at each of the four largest villages (Johnson 1982b). The island chief, or *paqwot*, is documented to have resided patrilocally just like mainland Chumash chiefs, while the vast majority of Chumash followed a matrilocal pattern of post-marital residence (Johnson 1982b:117; 1988:170-174).

We may be fairly certain that larger Chumash villages housed at least one chief, while smaller villages may have operated without leadership or were led remotely by a chief from another village. Librado, recalling events that occurred prior to colonial settlement in the Chumash region, noted that the Chumash could "vote with their feet" and leave a village if they were unhappy with the actions of the chief:

> The people who did not want to be eyewitnesses to the execution or to the war which followed scattered all the way up the coast to Rincon. They settled at different *Rancherias*, some of which were established without a *wot*. (Hudson et al. 1977:13).

Most *wots* were men, but females were not expressly barred from holding the position. However, Librado reported that a woman being named *paqwot*, or big chief, of Santa Cruz Island resulted in a civil war (Hudson et al. 1977:15). Chiefly families commonly intermarried with elite families from other villages, strengthening their authority (Johnson 1988).

The economic system developed by the Chumash was complex. Elite individuals are thought to have controlled this system, enjoying some degree of economic or political authority (Johnson 2000). Shell beads were used as currency (Arnold and Munns1994; King 1976, 1990) both within and beyond Chumash territory (Bennyhoff and Hughes 1987), and lengths of beads could be used to purchase food, raw materials, craft items, and labor. Gamble (2008:243) contends that it "is probable that individuals in mainland settlements served as intermediaries in exchange interactions between the islanders and those dwelling in the interior." The centrality of the mainland coastal Chumash ideally placed this group as natural intermediaries in a Chumash exchange network (Johnson 1988, 2000; King 1976).

The development of the plank canoe was also instrumental, not only for allowing frequent movement of items and people between the mainland and islands, but also for the intensification of open-ocean fishing (Arnold 1995; Gamble 2002).

Much debate occurs among archaeologists over the timing and nature of sociopolitical evolution in Chumash society (Arnold 1992; Arnold et al. 1997b; Erlandson 2002; Gamble 2005; Gamble et al. 2001, 2002; Kennett 2005; King 1990; Raab and Bradford 1997; Raab and Larson 1997; Raab et al. 1995). Much of this debate is centered on environmental shifts that may have prompted economic and sociopolitical changes. I suggest that further archaeological research is necessary before anthropologists can have a solid understanding of the organization of Early Historic period Chumash economic and political systems within and among the different Chumash regions.

2.2 How We Know What (We Think) We Know About the Chumash

Archaeologists researching Chumash history often find interpreting the archaeological record to be a rather slippery slope. To contextualize findings, the direct historical approach is frequently employed, using what is known about Chumash culture in the Early Historic period to illuminate thousands of years of Chumash prehistory uncovered piecemeal through archaeological excavation. The dangers of this approach are obvious: first, as stated above, cultural practices of people inhabiting Chumash territory at contact were strikingly diverse in many aspects; and second our understanding of Chumash life during the Late Prehistoric and Early Historic periods is patchy at best, based upon limited and conflicting historical documents of seafaring explorers of the 16th and 17th centuries, missionaries of the late 18th and early 19th centuries, and ethnographic consultants of the 19th and 20th centuries.

2.2.1 The Direct Historical Approach

The direct historical approach employs the logical method of working from what is known about a culture in the Historic period and extrapolating backwards in time to better understand the people who occupied the same area in prehistoric times. Originally the approach called for sites dating to the Historic period to be identified and excavated, the cultural complexes at each site determined, and finally the sequences then carried back to protohistoric and prehistoric times and cultures (Steward 1942:337). However, in the 1930s the approach was broadened to include the process of interpreting prehistoric remains using ethnographic and ethnohistoric data (Marcus and Flannery 1994:36). Early examples of the approach include William Duncan Strong's (1935) *An Introduction to Nebraska Archaeology* and William A. Ritchie's works, 'The Algonkin Sequence in New York' (1932) and 'A Perspective of Northeastern Archaeology' (1938). However, the direct historical approach was formalized and denominated in Waldo Wedel's (1938) article, 'The Direct-Historical Approach in Pawnee Archaeology'. These archaeologists used the ethnographic and ethnohistoric data to supplement and enhance their interpretations and reconstructions of prehistoric and protohistoric cultures derived from archaeological excavations. They also clearly asserted that the efficacy of the approach was credible only when the same group was known to have continuously occupied an area from prehistoric times to the time when the ethnographic accounts and ethnohistoric data was gathered.

Generally speaking, archaeologists of the early 20th century were well-rounded anthropologists and experts in the ethnology, ethnohistory, and archaeology of their region. In the present era, when archaeologists are inundated with articles, books, and information easily accessible in digital format, they sometimes cite ethnographic or ethnohistoric data previously cited in other works without an understanding of: (1) the excerpt's context within the original account, (2) the informant's relationship to the people/places being described, (3) the recorder's relationship to the informant, (4) the context in which the data was collected, and (5) the original (pre-translation) uninterpreted meaning of the excerpt before it was translated from one language to another. This is not to say that ethnography and ethnohistory should be discounted completely by archaeologists (as some do for theoretical reasons elaborated upon in the next section), or should not be cited unless one is an expert, but simply that one should have a reasonable grasp of the context in which the data were collected so as to not present the information in a misleading manner. For clarification, it is not the author's opinion that archaeologists of the early 20th century were any better or worse, or more/less knowledgeable than modern archaeologists. An exponentially increasing amount of archaeological research has been conducted over the past century, of which archaeologists today are expected to be methodologically, theoretically, and interpretively knowledgeable. Additionally, today's archaeologists are now 100-400 years removed (in the case of the Chumash region) from the time when the majority of the ethnographic and ethnohistoric documents were created, and the memory of the contexts in which they were recorded has faded. Also, many currently active archaeologists have never interviewed informants or descendants, and are not intimately familiar with the complications and obstacles frequently encountered in this method of research.

2.3 Narratives of Colonial Encounters

Modern scholars often question the accuracy of historic narratives penned during colonial encounters. The concerns, as voiced by critical theorist Edward Said in his seminal work, *Orientalism* (1978), are that the colonists first judge and interpret the actions of the colonized based on their own cultural values. Said (1978) goes on to say that this relationship tends to change over time with the colonizers assuming a paternal role in the exchange, viewing the colonized as pure, but naïve and in need of Western assistance. Said's critique of European accounts of colonial encounters can easily be applied to the historic accounts of the Chumash that emanate from western colonial ideology; nonetheless, these accounts are valuable for reconstructing certain aspects of southern California native geography and history.

2.3.1 Cabrillo's Voyage

A scant thirty-six page account (Bolton 1916; Kelsey 1986; Wagner 1929) of Juan Rodriquez Cabrillo's voyage into the Santa Barbara Channel Region represents the first written account of European interaction with the Chumash. Additionally, this narrative is quite confusing in its account of the region as it is a composite of five or more journals authored by sailors on different ships that were all part of the expedition (Kelsey 1986:147-148). Although these various ships were part of the same expedition, they sometimes visited the same Chumash villages on different days and the lists of village names recorded in the main narrative of the voyage are compiled from multiple logs, and are therefore frequently repetitive (Kelsey 1986: 147-148). The crews were also in the unfortunate habit of giving the same name to multiple villages, islands, and harbors (Kelsey 1986:148-149).

Much of the main account simply relates locational information and descriptions of the landscape. However, implicit in the account is a tone of superiority and ownership over the land and people they encountered. Throughout the account the voyagers solicit and record Indian names of villages and islands, only to bestow their own names on these newly encountered places. Frequently, the Cabrillo crews named places for Catholic saints. For example, the Northern Channel Islands were christened "the Islands of San Lucas" (Kelsey 1986:147). In other instances, they named villages based on their observations, such as a Chumash village near present day Ventura being named "*Pueblo de Las Canoas*" (Bolton 1916:25) likely because there were many Chumash *tomols* (canoes) present. And when their beloved captain

Juan Rodriguez Cabrillo died while they were anchored for the winter off the coast of either *Pimu* (Santa Catalina Island) or *Tuqan* (San Miguel Island), it is believed he was buried on the island, which the crew then renamed *La Isla de Juan Rodriguez* (The Island of Juan Rodriguez) in his honor (Kelsey 1986:157-158). The place name issue becomes increasingly complicated over time as each wave of explorers and colonists renamed villages, islands, rivers, and other notable points on the landscape.

Although the lands that Cabrillo and his crew ventured into were populated by Native Americans for thousands of years before their voyage, parts of this account imply they felt a sense of ownership over the land as the first Europeans to enter the area. When the voyage reached the area of present-day Ventura or Point Mugu they encountered a village that they named Pueblo de Las Canoas, and the account of this event reads: “Here they took possession and here they remained until Friday, the 13th day of said month” (Bolton 1916:25). Additionally, the crew either designated *Tuqan* or a port of the island (or both) “*La Posesión*” (the possession) (Bolton 1916:28; Kelsey 1986:149). The author’s descriptions of the Chumash range from brief accounts such as, “The Indians dress in skins of animals; they are fishermen and eat raw fish; they were eating maguey [agave] also” (Bolton 1916:25), in which no overt derogatory intention is noted (although some may argue it is surreptitiously implied), to openly disdainful remarks:

> The Indians of these islands are very poor. They are fisherman, and they eat nothing except fish. They sleep on the ground. Their sole business and employment is fishing. They say that in each house there are fifty persons. They live very swinishly, and go about naked (Bolton 1916:34).

Clear value judgments are made in this description, relegating the Chumash to an inferior position in opposition to the superior European seafarers. Following the Cabrillo voyage account, few records of Chumash encounters with European ocean-going expeditions survive, but they include accounts of Sebastián Vizcaíno's voyage to chart the California coast in 1602 (Beebe and Senkewicz 2001:38-45; Bolton 1916:52-134; Wagner 1929) and few brief accounts during the Manila galleon trade, including a 1587 voyage led by Pedro de Unamuno and a disastrous 1595 journey captained by Sebastian Rodriguez Cermeño (Erlandson and Bartoy 1995; Gamble 2008:39; Landberg1965:11-12; Lightfoot and Simmons 1998; Wagner 1929:141-151). In his master's thesis, John Johnson (1982b:8-49) has described in detail each recorded contact between Europeans and the Island Chumash. Additionally, Lightfoot and Simmons (1998) provide a thorough account and analysis of contact between native Californians and European seafarers.

2.3.2 Enter the Missionaries

In 1769, the first land expedition made its way along the California coast under the command of Gaspar Portolá. Unsettled by growing Russian and English presence on the Pacific Coast of North America, the Spanish crown intended the expedition to assert their control over California. Father Juan Crespí, one of the Franciscan Friars on the land expedition, kept detailed notes and records of the journey's three segments: from Mexico to San Francisco Bay in 1769, from San Francisco back to San Diego in 1769-1770, and then northward again in 1770 to

Monterey (Brown 2001). Even the original title page of Crespí's journal hints at a new view of these fertile lands and the Native Americans he encountered upon his journey, promising that the account contains:

> an enumeration of the rich lands, famous rivers, founts, plains, and other particulars, their distances and latitudes; and of the fine character of all the heathens, and of how they manifest no reluctance or aversion at all to receiving the holy Gospel; for which we are required to say, *Messis quidem multa, operarii autem pauci: rogate ergo Dominum messis ut mittat operarios, etc.* (Brown 2001:153).

The Catholic church took a paternalistic attitude towards all of their faithful, but this paternalism is even more heightened in interactions with native neophytes. For example, Crespí's description of the Chumash near present-day Santa Barbara is as follows: "They are all extremely well-behaved, friendly, tractable, and very cheerful" (Brown 2001:419). The church and its missionaries were poised to play the paternal role, taking care of the natives by bringing them into the missions and teaching the heathens about their god, thus saving them from an eternity in purgatory. This paternal role is one the missionaries would have known well, as priests are universally labeled in the Catholic church as "fathers" or "padres," and the bulk of their work comprised guiding and training their congregations. In Crespí's writings, as well as in many other records kept by missionaries, there is little evidence that the missionaries believed the natives were inherently biologically inferior to themselves. Rather, their perceived superiority appears to be intellectual, deriving from their knowledge of religion, agriculture, and the "modern world." Believing they had much to teach the natives, while conversely the natives had nothing to teach them, the missionaries set about educating the natives about

European values and culture, transforming them from hunter-gatherers to agriculturalists, and from non-believers to neophytes.

While Crespí's account is invaluable for the many details it provides of life in California immediately prior to missionization, scholars should be wary of using Crespí's interpretations to reconstruct models of native social, political, and economic systems. Crespí used hand signals and gestures to communicate with the natives, as no interpreters were available. In some instances Crespí appears quite confident in his interpretations, while other times he admits, "as we cannot understand what they say, we are only able to sketch idle speculations, supposing one thing or another about them" (Brown 2001:435). Much of Crespí's writings primarily record his observations, and in many instances, his observations match what is known from ethnographic and archaeological records. However, some observations do not fit with other lines of evidence. For example, Crespí notes that among the Chumash of the Ventura area, "all of these villages have three or four chiefs, one of whom is head, and gives orders to everyone and to the other chiefs..." (Brown 2001:393). Today, we understand the political system of the Chumash to be varied, with some villages being overseen by a single chief, some by multiple chiefs, and others without chiefs. Also, while in the Ventura region, Crespí observes that the Chumash "have two grave yards, one belonging to the men and the other to the women" (Brown 2001:393). All of the excavated Chumash cemeteries have contained the remains of both men and women, so there is no evidence that the Chumash buried men and women in different areas.

Crespí's journals provide valuable information for archaeologists to contextualize and supplement their research; however, the limitations of these and the accounts of other missionaries should also be acknowledged. He sought to understand this new world by superimposing his system of western knowledge on what he observed during his brief visits to native villages. All mission-era narratives should be read with the caveat that interpretations of native Californians and their culture are based on the observations of western Catholic priests, believing themselves to be spiritually superior and concerned only with establishment and maintenance of missions and conversion of cooperative neophytes. Throughout his diary, Crespí frequently mentions how friendly and happy the natives are to see his group. For example, when leaving one group in the Ventura region, he notes,

> I understood them to be telling me that they were awaiting our return for us to stay with them, and that we will plant, and they will sustain us and we will clothe them. Using signs I told them yes, and they were all very well pleased (Brown 2001:371).

I find it difficult to believe that Crespí could have interpreted this intricate meaning from hand signs and body language. This outcome is clearly what Crespí desired from his interactions with the Native Americans, and he therefore chose to interpret the interaction in a way that suggested the Chumash would be happy to be missionized. Crespí's accounts were also undoubtedly directed towards his superiors for whom they were written, and they would be pleased that the Chumash were so receptive to missionization.

Documents from the Mission era that have been particularly effective in reconstructing Chumash demography, marriage and kinship practices, and social organization are the mission registers. True to their monastic training, the Franciscans kept detailed records, including five major types of registries. These registers include the *libro de bautismos* (baptismal register), *libro de casamientos* (marriage register), *libro de entierros* (burial register), *the padrón* (a census-type document), and *libro de confirmaciones* (a register of when neophytes were confirmed into the church and received the sacrament of confirmation) (Johnson 1982b:94, 1988:48-50; Gamble 2008:42). Not only do these documents list names (both Chumash and Spanish) and dates of neophytes receiving sacraments, they also record the neophyte's age, village of origin, names and village associations of parents and relatives, prior marriages, and sometimes their political status. While the registers are not always complete, they are generally assumed to be consistently accurate in terms of the recorded factual information related to them by the neophytes at a time when interpreters were widely available. To the Franciscans, these registers were important proof of their work, and when registers at the San Diego mission were lost in a fire during the 1775 insurrection, the priests went to the effort to re-create much of the logs from memory (Gordon 2006; Hackel 2006). Recently, the Early California Population Project at the Huntington Library in San Marino, California, has completed compiling the registers from 21 California missions and two other sites into a computerized repository that allows for public access (Gordon 2006; Hackel 2006).

2.4 Chumash Ethnography: Perils and Rewards

Postcolonial theorists, in particular Gayatri Spivak (1988), have questioned whether ethnography of the subaltern can represent authentic narratives, as the cultural identity of a group is often stereotyped when accounts from a few members of the group stand as the narrative for all members. An additional concern is that the epistemic violence, inflicted in all colonial encounters, destroyed non-Western ways of understanding, perceiving, and knowing the world, and informants are therefore limited to relating their stories in ways that the dominant Western world can understand and interpret (Sharp 2009; Spivak 1988).

There are some who believe that post-colonial and other critical theories have severely damaged the field of Anthropology (Lewis 1998; 2007). And there are also those who suggest non-natives should no longer conduct indigenous ethnography (King 1997; Swisher 1998). While anthropology has benefited in some ways from the introspection induced by post-colonial critiques by highlighting the moral and ethical risks involved in writing about other cultures, it has also impaired the discipline by instilling in many the belief that the practice of anthropology and doing ethnography are morally suspect (Dwyer 1982; Lewis 2007:779; Gregor and Gross 2004:689).

2.4.1 Chumash Ethnography in the Post-Mission Era

In 1821 California became part of Mexico, and the California mission lands were secularized by the Mexican government in the early 1830s. While some natives were deeded land, many were quickly cheated out of their holdings and the winners of this land grab were mostly soldiers and European settlers, especially those with government influence who received large land grants. Many of the Chumash dispersed to area towns and ranches. During the late 19th and early 20th centuries, several notable anthropologists conducted ethnographic research among the Chumash, including A.L. Kroeber, C. Hart Merriam, and H.W. Henshaw, although John Peabody Harrington was undoubtedly the most prolific recorder of Chumash ethnography. Harrington (Figure 2.5), seemingly destined for the role of recording Chumash language and culture, was born in 1884 and raised in Santa Barbara. With an early-identified talent for linguistics and languages, Harrington graduated from Stanford in only two and a half years with majors in German and Classics, picking up a variety of languages in his spare time (Golla 1991:337). He then chose to go abroad in 1905-1906 to study phonetics at German universities. Returning to California in 1906, Harrington took a position as a high-school teacher in Santa Ana, California, mostly as a means to support himself while spending his spare time and summers diligently documenting the Mojave, Yuma, and Diegueño languages of Southern California (Golla 1991:337). His publications soon garnered him the support of professional institutions and organizations, and the Bureau of American Ethnology hired him as a researcher.

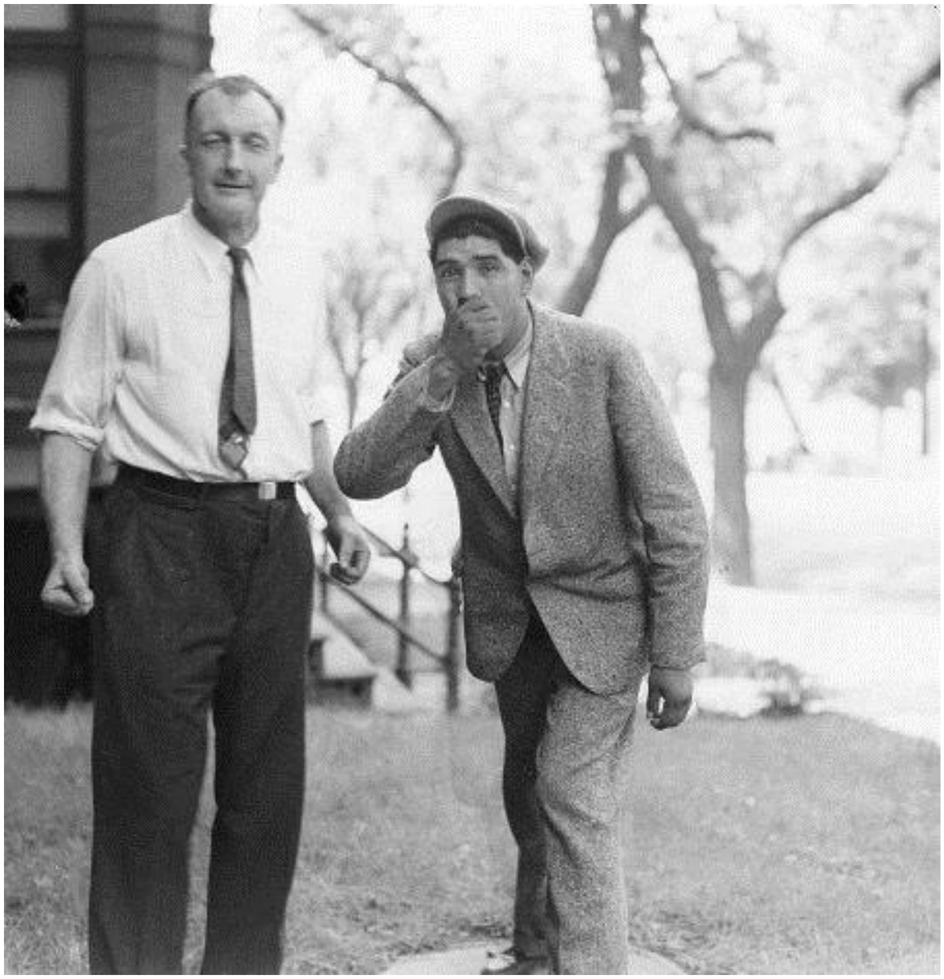

Figure 2.5. John Peabody Harrington (left) pictured with Chief Wi'ishi demonstrating the techniques of psychic duels. Acc. 90-105- Science Service, Records, 1920s-1970s, Smithsonian Institution Archives.

For an entire decade, from 1912 to 1922 Harrington worked tirelessly with Chumash informants of the older generation to record their language, which was rapidly falling into disuse, and aspects of their culture from before mission times through the modern times (Applegate 1975). His dedication to this work was uncompromising, although he has been widely described as obsessive and eccentric (Callagan 1991; Golla 1991; Laird 1975; Stirling 1963; Walsh 1976). In his exwife's account of their six-year marriage, Carobeth Laird (1975) pens a portrait of an obsessed genius who relied heavily on her for her impressive linguistic abilities and value as a field assistant. During his life, Harrington recorded over one million pages of notes on Native Americans (Mills 1981-5; Mills and Brickfield 1986-9; Mills and Mills 1991), and a project to transcribe and digitize these records is currently underway at the University of California at Davis (Woodward and Macri 2005). Harrington's work is widely cited by anthropologists and archaeologists working in California today, and much of what we know about traditional Chumash culture is the result of Harrington's persistence and the dedication of his Chumash informants.

In the case of Harrington's corpus of Chumash ethnography, one could posit that Harrington had specific research needs in interviewing his informants. Harrington is described as having a non-focused style of interviewing informants; however, he was very concerned with documenting and preserving Chumash languages. His informants therefore were not chosen randomly, as they needed to have knowledge of Chumash languages and the old ways, and they needed to be willing to speak with Harrington, sometimes for hours on end. The eccentric and obsessive Harrington could not have been easy to work with, especially for long periods of time. He undoubtedly had research goals and objectives, and if informants did not meet his standards he likely did not continue to work with them. Additionally, it is uncertain what Harrington deemed worthy of recording in his notes. According to Hudson (1979:xi), Harrington's notes lacked continuity, and he was in the practice of breaking complete stories apart to re-file the text under various topics, and in some instances only bits and pieces of stories remained. From this we may construe that Harrington was concerned more with gathering all the information he could on as many subjects as possible instead of preserving the narrative in context.

What remain more elusive are the motives of the Chumash informants for agreeing to work with Harrington. Fernando Librado *Kitsepawit* (Figure 2.6) was one of Harrington's principal informants. After meeting Fernando in 1912, Harrington worked with him for the next few years until Fernando's death in 1915 (Johnson 1982a). Information Fernando Librado shared with Harrington about Chumash history, culture, and ritual has been published in many works, including *The Eye of the Flute* (Hudson et al. 1977), *December's Child: A Book of Chumash Oral Narratives* (Blackburn 1975), *Breath of the Sun* (Hudson 1979), and *Tomol: Chumash Watercraft as Described in the Ethnographic Notes of John P. Harrington* (Hudson, Timbrook, and Rampe 1978). Additionally, scholars have uncovered some background information about Fernando's family (Johnson 1982a). However, absent from the thousands of pages of notes taken by Harrington are Fernando Librado's motives for assisting with the project and what he hoped to accomplish through his participation. We do know that Harrington paid Librado a modest salary and made him sign an agreement that he would not serve as informant to anyone else, but this information alone does not speak to Librado's motivation (Hudson et al. 1977:3). This arrangement in which the informant was compensated monetarily could affect the quality and accuracy of information provided if the informant was seeking to receive compensation as long as possible. Johnson (2001) has tested some of the information related to John P. Harrington's work and has found that archival and mission records are generally consistent with Librado's accounts.

2.5 Beyond the Historic Record: Turning to Archaeology

The ethnographies and historic documents described above are valuable resources for painting a broad picture of the natural and cultural history of Southern California at the time of European contact with Native Californians. However, these documents also have limitations in terms of their research potential, and these issues must be considered when attempting to reconstruct a detailed portrait of life in California at this time. Archaeological research of Contact and Early Historic period sites has incredible potential to fill in gaps in our knowledge of this transitional period. Additionally, interpreting artifacts and features from prehistoric sites is often a more ambiguous process than interpreting artifacts and features found at Contact and Early Historic period archaeological sites, as ethnographic narratives and historic documents aid in reconstructing the natural and cultural landscape of the region during this later period. If we are to continue to employ the direct historical approach (which seems inevitable) it is prudent to devote more attention to archaeological investigation of this time period, instead of relying so extensively on historic documentation. The following chapters narrow our focus to the Island Chumash and review the limited Contact and Early Historic period archaeological research that has been carried out to date on the Northern Channel Islands.

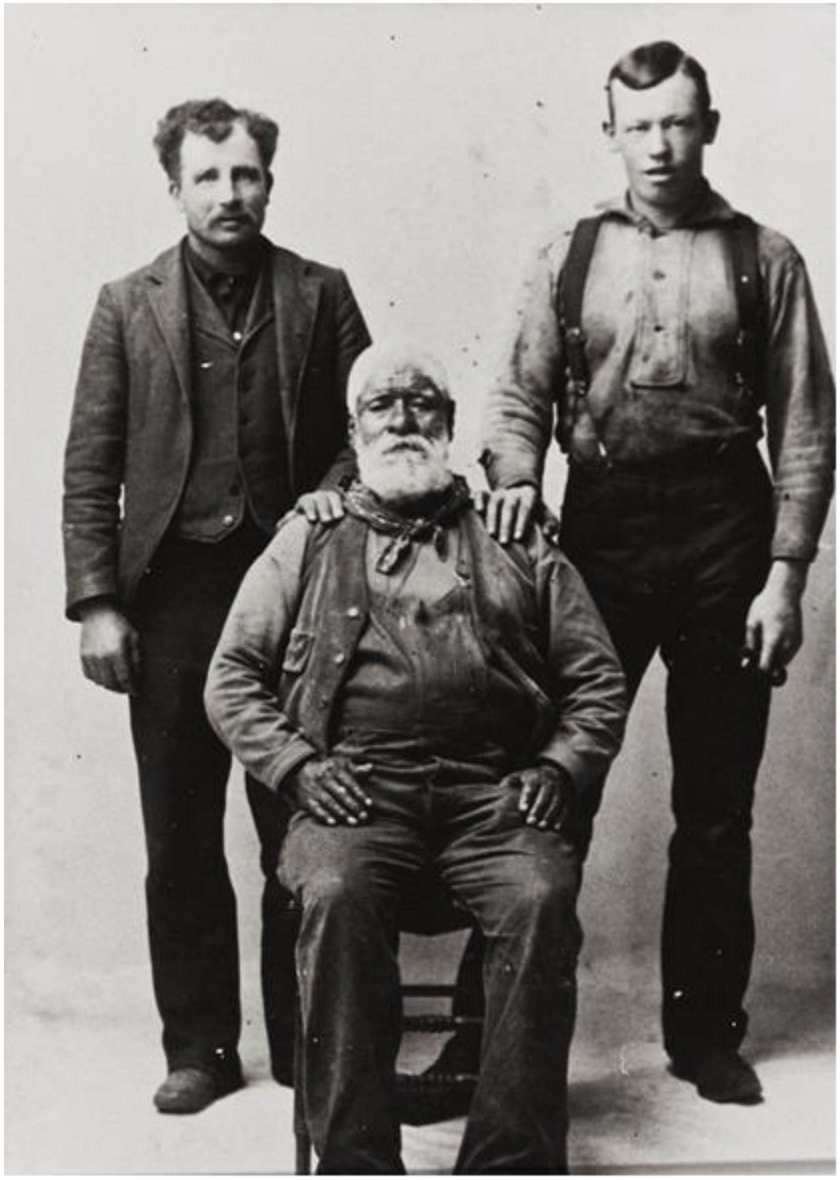

Figure 2.6. Fernando Librado *Kitsepawit* (seated) with Jerd Barker and Pat Forbes in Lompoc, California circa 1912. Smithsonian Institution Archives: J.P. Harrington Collection. Photo courtesy of the California Digital Library. Contributed by Black Gold Cooperative Library System.

CHAPTER THREE

The Organization of Chumash Communities and Households on the Northern Channel Islands

3.1 Reconstructing Island Villages: Boundaries and Borders

If we are to engage in a discussion of community organization on Santa Cruz Island, we must first identify the known island communities and their boundaries. Over the years, maps of Island Chumash *rancherías* have been revised as data from archaeological investigations increased and data was gleaned from ethnohistoric and ethnographic sources. The primary sources for these maps of island villages are the *ranchería* names and general locations compiled by Juan Esteban Pico in 1884, and information in mission registers. Archaeologists then attempted to correlate the names and general location information with archaeological sites containing Historic period material (Johnson 1982b). Figure 3.1 below is a map of most Historic period island *rancherías* named in Pico's list (Heizer 1955) and in mission registers. A question mark represents a possible but uncertain location. This map differs from most recent maps of Historic period villages because it includes *Nimatlala*. Mission records did not include any person known to have come from this village; so many assumed that although it may have been a village at some point, it likely was not occupied into the Historic period. Other maps, such as that of King (1975), depict *Nimatlala* on the North coast of Santa Cruz Island, approximately where *Xaxas* is currently placed. Chapter Four details the evidence for the existence and location of *Nimatlala* on Santa Cruz Island.

Figure 3.1. Likely locations of Island Chumash Early Historic period villages. Names followed by a question mark indicate uncertain locations.

Pico's (Heizer 1955) list contains a record of twelve villages for Santa Cruz Island, seven villages on Santa Rosa Island, and only one village on San Miguel Island. Mission registers indicate a second village, *Niwoyomi*, on San Miguel Island, and two additional villages, *Helewashkuy* and *Xonashup* on Santa Rosa Island (Johnson 1999a:54-56). Mission registers also indicate a *ranchería* by the name of *Tonsteche* on Santa Cruz Island, which some have suggested is an alternate spelling of the *Ch'ishɨ* (Johnson 1999b:58). A native speaker of Ventureño, Pico's (Figure 3.2) is considered to be the most accurate list of villages as he compiled lists of Chumash place names while working closely with Henry Henshaw, who was employed by the Bureau of American Ethnology. Pico was likely assisted with information regarding locations of villages by Martina Leqte (and possibly others), who had been born on Santa Cruz Island and lived there for only a few years before the islanders left for the mainland missions (Johnson 1999c:188).

The process of locating the villages archaeologically has often been confusing. Mission records and ethnographic information on village names do not precisely correlate. Detailed geographic locations for almost all villages is not available, and for the most part, determinations have been made by finding sizeable archaeological sites containing Historic period artifacts, and using Pico's list to estimate the general location of the *ranchería* in relation to other known Historic-period villages. Determining village boundaries is another task altogether. The archaeological site correlations given above in Tables 3.1 and 3.2 demonstrate that most villages consist of multiple sites or loci. Of course, site numbers alone are not an accurate determination of loci, as different archaeologists have recorded the sites, sometimes "lumping" and other times "splitting" the archaeological deposits when officially recording and characterizing sites.

Figure 3.2. Juan Esteban Pico, a Ventureño Chumash informant, with the tools of his carpentry profession. Pico also took an interest in his native language and developed his own linguistically accurate orthography. Smithsonian Institution Archives: J.P. Harrington Collection. Photo courtesy of the California Digital Library. Contributed by Black Gold Cooperative Library System.

Chumash Place Name	Pico's List	Mission Records	Pico's Description	Translation/ Meaning of Chumash Place Name	# of Baptisms	# of Chiefs	# of House Pits	Site #s
<u>Anacapa Island</u>								
'Anyapax				mirage, illusion				
<u>Santa Cruz Island</u>								
Limuw (name given by people of the island)				in the sea				
Michumash (name given by mainlanders)	X		*La isla todo*	place of the islanders				
Xaxas	X	X	*El puerto principal*	the sand	129	1	?	SCRI-240
Nimatlala	X		*El rancho grande*	center, "*muy centro*"	0	0	4-9	SCRI-324, 384, 801
Mashchal	X	X	*En direccion al oeste*		69	1	11	SCRI-434, 435
Ch'ishi	X		*Mas al oeste*		0	0	?	?
L'alale	X	X	*Punta del Diablo*	the west one	5	0	8?	SCRI-436?
L'akayamu	X	X	*Mas al oeste*	it is piled up	50	0	19-20	SCRI-328, 329, 330
Ch'oloshush	X	X	*En direccion al sudoeste*	very strong	28	0	15	SCRI-236
Shawa	X	X	*En direccion al este*	stranger	9	0	14	SCRI-192
Liyam	X	X	*En direccion al este*		117	1	?	SCRI-1(plus 2 sites)*
Nanawani	X	X	*Mas al este*		61	0	15	SCRI-504, 506
Swaxɨl	X	X	*A la punta del este*		205	1	?	SCRI-423, 507
Lu'upsh		X	*En direccion al norte*		63	0	6	306,392,416,420,422
Tonsteche?		X			3	0	?	

Table 3.1. Chumash Historic period villages from Pico's list and Mission records, with known descriptions, numbers of recorded baptisms and chiefs, and likely archaeological site correlates.

* SCRI-1 plus two other sites in the vicinity (see Peterson 1994). Information from: Heizer 1955; Johnson 1982 b, 1999a-c; Johnson in Glassow (ed.) 2010; Applegate 1974, 1975; King 1975; Kennett 2005; Arnold 1990; Rick 2004.

Chumash Place Name	***Pico's List***	***Mission Records***	***Pico's Description***	***Translation/ Meaning of Chumash Place Name***	***# of Baptisms***	***# of Chiefs***	***# of House Pits***	***Site #s***
Santa Rosa Island								
Wimal	X			red pine/driftwood	7			
He'lewashkuy			*Todo la isla*	it which is in the middle				
Qshiwqshiw	X	X	*Rancho Viejo*		119	2	8	SRI-85, 87
Hichɨmɨn	X	X	*El Puerto*	droppings	71	1	12	SRI-60
Silimihi	X	X	*En direccion al oeste*		53		24	SRI-40, 502
Niaqla	X	X	*Mas al oeste*	always water	10		70	SRI-2?, SRI-6?
Nɨmkɨlkɨl	X	X	*Mas al oeste*	it won't break	51		25	SRI-15?, SRI-2?
Nawani	X	X	*En direccion al sur*		2		19	SRI-97, 98?
Nilal'uy	X	X	*Mas al Sur*		48	1	12	SRI-62
He'lewashkuy?		X			37		12	SRI-436?
Xonashup?		X		it which is in the middle			?	?
San Miguel Island								
Tuqan	X							
Tuqan		X			34	1	6	SMI-162, 163, 159
Niwoyomi		X			3		4	SMI-470?

Table 3.2. Chumash Historic period villages from Pico's list and Mission records, with known descriptions, numbers of recorded baptisms and chiefs, and likely archaeological site correlates. Information from: Heizer 1955; Johnson 1982b, 1999a-c; Johnson in Glassow (ed.) 2010; Applegate 1974, 1975; King 1975; Kennett 2005; Arnold 1990; Rick 2004.

As a consequence, boundaries of single archaeological sites should not be misinterpreted as village boundaries. The different loci of Historic villages can be located on opposite sides of a creek or drainage, or even up to several hundred meters apart. Although Peterson (1994:221) labels only archaeological site SCRI-1 (at the mouth of Coches Prietos canyon) *Liyam*, he has found evidence of Early Historic period occupation in a large midden on the opposite side of the creek from SCRI-1, and also at a small rock shelter behind the beach. It seems logical that all three sites, if not more, were located within the boundaries of the village. *L'akayamu* on the western end of Santa Cruz Island is situated on a marine terrace, and two drainages separate the three primary loci (SCRI-328, -329, and -330) of the village. Each site reveals evidence of house depressions, with 11 house depressions recorded at SCRI-328, two recorded at SCRI-329, and seven visible at SCRI-330 (Arnold 2001:46). Another example from Santa Cruz Island is Arnold's (1990) original placement of *Swaxil* at Smugglers Cove and *Nanawani* close by at Smugglers Point. When Kennett et.al (2000) finally found evidence of historic artifacts at Scorpion Anchorage, it became clear that *Swaxil* was located at Scorpion Anchorage and the sites at Smugglers Cove and Smugglers Point were likely two loci of *Nanawani*.

Early Historic period villages may be imagined as occupying general vicinities or regions, and not specific, tightly bounded points on the landscape. While site boundaries are useful in an archaeological context as units of analysis, they only accurately represent surface visibility of the physical remains of past human behavior. In the maritime-oriented Chumash communities on the Northern Channel

Islands, the home territory of a village group could include residential areas, public spaces, and resource patches including fishing areas at sea.

3.2 Patterns of Settlement and Mobility

It is thought that sedentary populations occupied all Early Historic period Chumash villages, and the majority of these villages were positioned along the coastline of the Santa Barbara mainland and Northern Channel Islands (Arnold and Bernard 2005:112; Gamble 2008:276). During this time period, no significant occupation was believed to have existed in the islands' interior regions (Kennett 2005:169). Given the maritime subsistence focus, a village in the interior of one of the islands seems unlikely; however *Nimatlala* is located in the Central Valley in the very center of Santa Cruz Island. The discovery of this village in the island's interior suggests that the Chumash settlement system during the Contact and Early Historic periods is more complex than previously believed. If the small village of *Nimatlala* were occupied year round, it would represent an interesting anomaly and could suggest that a more complex, hierarchical settlement system was in place. If the village were occupied seasonally as a special-purpose camp, it would indicate that the Chumash may have been more mobile than previously believed, also suggesting a more complex settlement system was in place. There are several additional known archaeological sites on Santa Cruz Island that are relatively small, with only a few smaller than average house depressions, and these may also date to the Contact and Early Historic periods. These sites have not yet been investigated, and determining the nature of settlement, household, and activity organization at *Nimatlala* will help to guide and provide a context for future research at both these small sites and the large village sites.

Generally it is thought that the evolution of a complex society demands the transition to a fully sedentary life style (Rosenberg 1998). Sedentism is typically accompanied by a suite of cultural changes, including population growth, the development of more effective subsistence technology, production of surpluses, reliance on stored foods, development of complex trade networks, development of status distinctions, and the development of complex organizational systems (Byrd 1994; Flannery 1972; Keeley 1988, 1995; Plog 1990; Price and Brown 1985; Rafferty 1985). The cause of sedentism is highly debated, but the majority view sedentism as an adaptation to external conditions that are related to many other social changes either through a cause or effect relationship (Ames and Maschner 1999; Cohen 1985; Hayden 1990, 1992; Henry 1991; Keeley 1988; Rosenberg 1998). Most complex groups practicing agriculture are sedentary, occupying a single, stable residence. That being said, even sedentary agriculturalists may enjoy a limited degree of mobility, for example staying at a field house nearer to the fields at certain times of year for convenience. Residential mobility is a more effective risk reduction strategy among groups engaging in a hunter-gatherer subsistence strategy (Binford 1983; Brown 1985; Kelly 1983). Sedentism is a significant risk for hunter-gatherers, even those who depend highly on marine resources, as it can lead to the depletion of local resources, reduce the quantity of high-ranked resources thus requiring more time and energy to exploit these resources in more distant areas, and cause more social stress (Binford 1983; Brown 1985; Cohen 1985; Lambert 1993; Lambert and Walker 1991; Lieberman 1993). And while these costs may be buffered to some extent by the development of surpluses and storage facilities, these developments also increase demand for labor and create additional costs (Price and Brown 1985).

Here, a distinction needs to be made between fully sedentary and semi-sedentary strategies. In sedentary communities, it would be common for residents to be present in the village most of the time. This is not to say, however, that residents are restricted to the confines of their village. They may travel out from the village to harvest seasonally available resources such as plants and seasonally available fish and game, and also to exchange goods with other groups. However, among sedentary groups, the majority of residents will be found in their home village at any given time. In the absence of an agrarian economy, full sedentism is difficult to maintain, as it would require stable, abundant, local natural resources, as well as developed preservation and storing technologies including, for instance, smoking, drying, and storage pits and baskets. Semi-sedentary groups are known to have established, permanent villages, but spend significant time occupying temporary camps. A small number of residents, particularly the elderly, may remain in the permanent village to maintain the structures, protect stored resources, etc., but the majority of residents may move to temporary camps during different times of the year.

While full sedentism is commonly practiced by complex societies, it is noted that among complex hunter-gatherer groups, a semi-sedentary pattern of mobility is frequently found (Ames and Maschner 1999). Other complex hunter-gatherers such as some Jomon groups (Matsui 1996) and some Pacific Northwest Coast groups (Cannon and Yang 2006; Lepofsky et al. 2005; Moss et al. 1989) are known to have occupied primary villages year-round, these being located in prime locations, while some residents at times moved away to establish temporary residential camps to exploit productive seasonal resource patches. This type of mobility is characteristic of a "collector" strategy. Outlined several decades ago by Binford (1980) the forager-collector model remains a valuable tool for predicting hunter-gatherer land use based on temporal and spatial resource availability. The model has frequently undergone adaptation to assist with more modern archaeological problems (e.g., Fitzhugh and Habu 2002) and it is used here to briefly characterize Chumash mobility patterns. According to Binford's model (1980), the foraging strategy is common in environments where important resources are temporally and/or spatially homogeneous. Foragers tend to map onto resource patches, and are more residentially mobile, moving the entire group from one location to another when resources within the foraging radius of the camp have been depleted. Conversely, a collecting strategy is common in environments where key resources are distributed unevenly, either spatially or temporally. Collectors practice logistical mobility, occupying temporary camps near resource patches and moving food back to permanent residential villages after processing.

By the Early Historic period, the Island Chumash are clearly classic "collectors". Using the large, primary villages as residential bases, community members likely went out frequently across land or sea to collect valuable resources and brought them back to the settlement. The question that remains, which this project is aimed at answering, is how much variation existed in Chumash mobility. What percentage of the population stayed in primary villages year round and what percentage resided in smaller seasonal logistical settlements? How permanent were the temporary camps and how was mobility structured in terms of seasonal shifts and social factors? Finding the answer to these key questions will provide necessary information for understanding how Chumash communities were organized at the most basic level, and will allow for an understanding of how this organization compares to that of other complex societies, particularly the comparatively small number of other complex hunter-gatherer groups. The answers to these questions will provide much insight into the social and economic organization of Chumash society and lead to determination the finer aspects of Chumash household and community organization.

Some aspects of Chumash settlements during the Early Historic period suggest that the Chumash may have been fully sedentary. Many of the villages were very large, housing several hundred residents (Gamble 2008). The Chumash groups inhabiting the Northern Channel Islands and the Santa Barbara area mainland coast were skilled seafarers and relied heavily on aquatic resources for subsistence. Generally, aquatic hunter-gatherers are believed to be more sedentary as well as possibly more complex socially and economically than most terrestrial hunter-gatherer groups (Ames 2002:19). While this may be due in part to the higher productivity and dietary value of marine resources relative to terrestrial resources (Ames 2002:19-20), access to boat technology may alone have had a significant impact and allowed for greater population size and stability (Batten 1998). However, there is also mounting evidence that some of the Island Chumash groups may have established temporary camps at least seasonally which were located away from primary villages. It appears that Chumash settlement systems were more variable and complex than previously believed.

Using descriptions of mobility among Historic period Northern mainland Chumash groups found in the early journals of Spanish explorers and accounts of missionaries, Landberg (1965) posited that the mainland Chumash groups were more aggregated or dispersed depending on the season. Landberg's model suggests that in spring when plant foods were abundant people would disperse to establish campsites near hunting and collecting areas. In summer people would remain dispersed as fresh water supplies decreased and in fall they would also be more mobile, moving up in the coastal range to oak groves. Winter would be a time of aggregation when people would subsist mostly on stored foods. Seasonal movement of Early Historic period Southern Chumash groups in the Santa Monica Mountains from primary villages on the coast to interior camps is also likely (Chester King, personal communication 2008). The Northern and Inland Chumash relied on terrestrial resources for the bulk of their diet, and were therefore known to be more terrestrially mobile to procure seasonally available plants and game. The Island and Coastal Chumash relied more on maritime resources, but were also mobile, moving over land and across the water in *tomols* to reach both aquatic and terrestrial resource patches.

On the Northern Channel Islands, a number of plant and animal resources were limited by season. In terms of plant resources, blue dicks corms were available year-round but are most abundant in spring (Kennett 2005:58). Seeds, bulbs, and corms were available in grassland and sagebrush communities primarily during the summer, and acorns and pine nuts were collected in the fall on Santa Cruz and Santa Rosa Islands (Kennett2005:58). Shellfish were collected throughout the year, as are kelp bed and rocky shore fish (Kennett 2005:58). Additionally, large numbers of schooling fish enter the channel in summer and fall and can be harvested *en masse* with nets (Kennett 2005:58). Sea mammals are also available year round, although they inhabit rookeries on San Miguel, Santa Rosa, and Santa Cruz in greater numbers during the summer (DeLong and Melin 2000; Melin and DeLong 2000).

The shallow nature of deposits and house depressions at *Nimatlala* suggest that the site was occupied seasonally or for only a short time span. The diameter of Chumash house floors is known to have ranged from 4 to12 m, with 6 to 8 m being the norm (Gamble 1991, 1995; Graesch 2004). The diameters of house floors at *Nimatlala* range between 2.5 and 3.5 meters, while the diameter of the house depressions range between 3 and 4 meters. This is significantly smaller than average. Additionally, other small Contact and Historic period residential sites on the

Northern Channel Islands have been identified away from known primary village locations (Table 3.3).

Cueva Escondida (SCRI-440) is a small cave on the northwest coast of Santa Cruz Island that likely served as a temporary residence or fishing camp, accessible only by boat. A midden located at the mouth of Willows Canyon, SCRI-496, was earlier thought to be the ethnohistoric village of *Shawa* (Johnson 1982b:189), although subsequent investigations at SCRI-192 (Arnold 1990, 2001; Arnold ed. 2001; Graesch 2004) revealed that a location at Morse Point is the more likely location of *Shawa*. SCRI-711 is predominately a prehistoric shell midden, but an area of the site on a point overlooking the ocean contains a discrete deposit of glass beads and needle-drilled olivella disc beads, dating to the Early Historic period (Johnson in Glassow 2010:3.12-3.13). Most likely the concentration of Early Historic period beads indicates a shrine or important spot on the landscape. On San Miguel Island, SMI-516 is believed to have been a temporary camp situated on the Southwest coast of the island (Rick 2007a). Located in the general vicinity of the Historic period of *Tuqan*, SMI-536 is a shell midden that may represent a residential outlier associated with *Tuqan* (Rick 2007a). SMI-602 near Point Bennett represents a residential site radiocarbon dated to the Early Historic period (Kennett and Conlee 2002; Rick 2007a:121-122).

ISLAND	***SITE#***	***VICINITY***	***REFERENCES***
***Limuw*, Santa Cruz**	324 384 801	*Nimatlala*, Central Valley	Perry and Delaney-Rivera 2011; Sutton 2008
	440	Cueva Escondida, NW Coast	Johnson and West 2008; Johnson, West, and Deal 2010
	496	Mouth of Willows Canyon	Coleman and Wise 1994:189-190
	711	San Pedro Point	Johnson 1994 site visit
***Tuqan*, San Miguel**	516	Southwest Coast	Rick 2007a: 123
	536	West Cuyler Harbor	Rick 2007a: 122-123
	602	Point Bennett	Kennett and Conlee 2002; Rick 2007a: 121-122

Table 3.3. Sites on the Northern Channel Islands, identified as dating to the Contact and Early Historic Periods, but not immediately associated with a permanent Historic village.

For a hunter-gatherer-fisher population, this small number of recorded non-primary village sites is unusual. Even if Early Historic period populations on the islands were fully sedentary, many other small temporary campsites undoubtedly exist. Not many archaeologists are investigating Late and Early Historic period Chumash occupation of the Channel Islands; however, the main confounding issue is that archaeologists are not expecting to find Early Historic period sites outside of the boundaries of the permanent villages. A fully sedentary hunter-gatherer population would occupy temporary residential camps across the islands, likely near subsistence resource patches and raw material sources. A semi-sedentary population would occupy a greater number of temporary camps, with greater midden depths, as the sites would have likely been occupied for longer durations. We should therefore expect to find Contact and Early Historic period archaeological sites across the landscape of the Northern Channel Islands, and as more sites are investigated and dated, it is inevitable that the inventory of sites dating to these time periods will grow.

The degree to which Chumash populations during the Contact and Early Historic periods were fully or semi-sedentary may be of little consequence to our understanding and interpretation of Chumash history. However, what is of consequence is the lack of consideration of Chumash settlement systems in general. Archaeologists do not look for or expect to find Early Historic period satellite residential sites, camps, or other meaningful places on the landscape away from permanent villages. We have chosen not to recognize the mobility required to maintain a hunter-gatherer lifestyle. Chumash history has become simply the story of a people who occupied large villages and were subject to the control of elite chiefs. Not all Chumash villages were large and much activity took place away from large population centers. Many individuals and households may have enjoyed a good deal of autonomy and mobility. The ability for groups to aggregate and disperse freely, coupled with an intimate knowledge of the location (both temporally and spatially) of resources across the broad island landscape and seascape would be very advantageous in mitigating the extreme social and environmental conditions confronting the Chumash during the Early Historic period. This project seeks to initiate a discussion of what Chumash mobility and settlement may have looked like during the Late Prehistoric and Early Historic periods through excavation of a small village site on Santa Cruz Island which does not appear to be a densely populated permanent village.

3.3 Previous Investigation of Contact and Early Historic Period Island Chumash Households

While little archaeological investigation of Late and Early Historic period sites on the Northern Channel Islands has occurred, even less attention has been paid to the study of households.

3.3.1 The Early Excavations

Archaeologists working in the Santa Barbara Channel region excavated whole and partial Chumash houses since the late 19th Century (Orr 1968; Rogers 1929; Schumacher 1875, 1877; Woodward 1932). Although not true "household archaeology" projects, the substantial volumes of deposits excavated provided the advantage of being able to define house floors and features, which consequently provided a basic understanding of how these structures were fabricated and the variation in construction and features between houses. However, these excavations did not employ practices comparable to modern methods or excavation standards. In many cases the excavated material was not screened, or a large-sized screen mesh was used, resulting in the loss of small artifacts such as shell and glass beads as well as bone and stone tools. The accompanying excavation notes and published reports can also be incomplete or contradictory (Gamble 1991:59; Rick 2007b:247).

Because the early archaeological work was not concerned with addressing research questions involving subsistence, in most cases the faunal remains encountered during excavation were neither described nor collected (Erlandson 1994:39). In many instances, the goal of these projects was solely to excavate Chumash burials with grave accompaniments (Benson 1997; Olson 1928; Schumacher 1875, 1877). Moreover, although parts of houses were dug in the course of some of these investigations, and a cursory description of the features recorded, no samples of deposits from the houses were retained. This unfortunately means that there are no bulk midden samples available for analysis to supplement information provided by the excavated artifacts, and that new houses will need to be excavated in order to determine the variation in household production, consumption, and activities.

3.3.2 Modern Household Excavations

Only a few groups of researchers have engaged in modern excavations and analysis of households on the Northern Channel Islands. Gamble (1983, 1991, 2008) has conducted household investigations on the mainland coast, and has also recently commenced investigations at El Montón (SCRI-333) on Santa Cruz Island to examine emergent sociopolitical complexity in a Middle Holocene village (Gamble 2012; Jazwa et al. 2013). Torben Rick (2004, 2007b) reanalyzed the collection from Orr's work at SRI-2 (possibly the village of *Niaqla*) and excavated additional test units, and also conducted small-scale testing at SMI-163, known to be part of the Early Historic period village of *Tuqan* on San Miguel Island. Jeanne Arnold and her students John Dietler, Anthony Graesch, and Anna Noah have engaged in excavations and analysis of households at several village sites on Santa Cruz Island (Arnold ed. 2001, 2004; Dietler 2003; Graesch 2000; Noah 2005). These excavations employed modern techniques to obtain samples from Chumash houses located in large Early Historic period villages. High-resolution data from these excavations have contributed greatly to our understanding of Chumash household production and specialization, trade relationships, and status differentiation. However, because previously investigated Historic village sites are very large, some being home to several hundred inhabitants, only an extremely small percentage of these sites has been excavated. Consequently, the excavated samples do not provide the whole picture of how household and village activities were organized.

Excavations of mainland villages have additional obstacles to consider. In her work at both the village at Pitas Point (VEN-27) and the village of *Helo'* on Mescalitan Island (SBA-46) Lynn Gamble was interested in elucidating the organization of activities at Chumash villages (Gamble 1983, 1991, 2008). While these excavations provided data of fine enough resolution to compare features across households and hypothesize about the role of these villages in regional exchange networks and interactions, the extent of krotovina, the destruction by modern land development of significant sections of the sites, the small number of houses excavated do not allow for a detailed discussion of the economic and social relationships between households. In contrast, the absence of burrowing animals and modern development make the Northern Channel Islands an ideal location for studying inter-household variability and interaction.

Gamble's excavations at Pitas Point (SBA-27) and *Helo'* (SBA-46) uncovered the remains of mainland Chumash houses and features, but they are nonetheless extremely pertinent to a discussion of Island Chumash households as they represent large-scale excavations of Chumash structures using modern archaeological methods. Although formal house floors were not encountered at Pitas Point (SBA-27), the excavated structures contained domestic debris, and at the site many features such as hearths, post holes, ovens, and artifact clusters were identified (Gamble 1983). The painstakingly detailed excavations at *Helo'* (SBA-46) led to the discovery not only of multiple house floors, but also to the identification of multiple layers within a single house floor (Gamble 1991:267-268). Both house floors contained clay, although Floor 1 contained a high clay content, while Floor 2 contained a much lower clay content (Gamble 1991:269). Both floors were associated with post holes and hearths and also appeared to have been plastered multiple times (Gamble 1991:269). These floors were concave in shape, with Floor 1 measuring 5.5 m in diameter, and Floor 2 measuring 8 m in minimum diameter (Gamble 1991:270). Interestingly, although some artifacts were associated with each floor, large rocks and artifacts were generally absent. After the house associated with Floor 2 was abandoned, it appears that the house collapsed and the house depression was then used as a place to discard refuse (Gamble 1991:270). We will later return to these house floors at *Helo'* in a discussion of the results from excavations of the structures at *Nimatlala*.

3.3.3 Excavation of Samples from Chumash Houses on Santa Cruz Island by Jeanne Arnold

Jeanne Arnold's work on Santa Cruz Island during the 1980s was primarily aimed at determining when sociopolitical complexity emerged and characterizing Chumash political economy. In order to determine when sociopolitical complexity emerged among the Chumash, Arnold looked for specific signals of complexity such as evidence of specialized occupations, changing trade relations, reorganization of labor, and evidence for resource control (Arnold ed. 2001). Although Arnold's work did not focus specifically on households, she did excavate several auger units and 1 m x 1 m units in houses. At four of the sites investigated, one or two 1 m x 1 m units were placed in one house at each site, and a 10cm diameter auger hole was excavated in up to three more houses at each site. At the village site of *Lu'upsh*, (SCRI-306) samples from each of four visible house depressions were excavated, but a different percentage of each house was excavated. House 3 was the house with the largest percentage of excavated material, but only approximately 10% of the house was excavated. Given the scope of Arnold's research, larger sample sizes were not necessary. The investigation of houses was aimed at elucidating Chumash political economy, and this goal required only the excavation of small samples from houses without exposing house floors.

The project at *Nimatlala* detailed in the following chapters focuses on investigating the organization of household and community activities, and therefore requires the excavation of larger proportions of both houses and sites. Much information regarding the development of craft specialization on the Channel Islands has been gained through Arnold's work and the project at *Nimatlala* seeks to complement these findings by offering an understanding of other activities such as food production and consumption, tool manufacture and maintenance, and ritual practices.

During the course of Arnold's excavations on Santa Cruz Island, a significant portion (approximately ¼) of one house was excavated at the village of *Xaxas* at Prisoners Harbor (SCRI-240). Prior to the household archaeology project at *Nimatlala*, this is the only Early Historic period house to be excavated on the Channel Islands to such a great extent using modern archaeological methods. House depressions are no longer visible on the surface at *Xaxas* and it was only by chance that the one house floor was discovered. Many post holes were found, indicating the method of house construction, and Arnold notes that this house at *Xaxas* is also the only one known on the islands or mainland to use redwood poles in its construction (Arnold 2001: 51). This house at *Xaxas* has been interpreted by Arnold as an elite household because it was constructed using redwood poles and high densities of exotic and valued local goods were found in the structure. Phil Orr's 1940s-1960s excavations of houses at SRI-2 on Santa Rosa Island discovered redwood in several houses, although the function of that redwood remains unknown (Rick 2007b: 253-

254). Redwood was the preferred material for making Chumash *tomols* (large plank canoes), which only elites are believed to have owned. As the southernmost extent of coastal redwoods is the Monterey Bay region, redwood would have only been obtained as driftwood and therefore a relatively rare and possibly highly valued commodity. Although we have ethnohistoric accounts of Chumash house construction, very few houses in Chumash territory have been excavated to such an extent to determine which types of building materials and methods were used (Gamble 1995). In addition to the typical wooden post and thatch construction (Hudson and Blackburn 1983), there are some accounts of whale ribs being used as the supportive structure for houses (Schumacher 1877; Olson 1928). The house floor treatments can also be somewhat variable, built up of packed layers of either sand or clay (Arnold et al.1997a).

3.3.4 Graesch's (2000) Analysis of Shell Bead Production by Household

During the course of his investigations of shell bead production in Late Prehistoric and Early Historic period Chumash villages on Santa Cruz Island, Anthony Graesch (2000) analyzed samples from 32 houses from four Early Historic period communities: *Ch'oloshush* (SCRI-236), *Xaxas* (SCRI-240), *Shawa* (SCRI-192), and *L'akayamu* (SCRI-328, -329, and -330). Most of these samples were surface samples: roughly the top 3 cm of material was collected from 1 m by 2 m units strategically placed to be half inside the house and half outside of the house. Two houses at both the village of *Ch'oloshush* and the village of *Shawa* were excavated more extensively with between five and nine 1 m x 1 m units excavated in each house. Each of these more extensive subsurface units was excavated down to approximately the level of the house floor. As the focus of these excavations was to investigate general differences in shell bead production between households, the excavation units were not designed to be deep or extensive, as only a sample was needed from each house. Graesch's analysis of household shell bead production suggests that households were autonomous in labor organization and craft production and not attached to elites or functioning as independent specialists (Graesch 2000).

3.3.5 Dietler's (2003) Analysis of Microblade Production at Lu'upsh

John Dietler (2003) investigated microblade production at the Early Historic period Chumash village of *Lu'upsh* (SCRI-306) on Santa Cruz Island to better understand the correlation of craft production to household status. Three households were investigated and both the intensity and quality of microblade production were considered. The relative social status of each household was determined based on the presence of exotic and valuable goods found in each house. Dietler (2003) concluded that although some possible correlations between household wealth and the quality of microblade production were noted, the small number of households investigated (three) and the disproportionately small sample size from one house may have influenced this result. In general it was noted that the production of microblades appeared to be very similar among the three houses, requiring an identical tool kit, and also the stages of production were identical in all households, suggesting that they were operating independently from each other (Dietler 2003). Households specializing in microblade production could increase status by gaining access to regional trade networks and exotic goods, and increased production of microblades would provide more access to trade networks (Dietler 2003). However, increased skill in the production of microblades and participation in other unspecialized tasks appears to have no effect on household status (Dietler 2003).

3.3.6 Noah's (2005) Analysis of Faunal Remains and Animal Procurement Tools from Fourteen Houses at Four Historic Period Villages

Noah (2005) analyzed faunal remains and animal procurement tools from fourteen Chumash houses at four Early Historic period villages on Santa Cruz Island: *Ch'oloshush* (SCRI-236), *Xaxas* (SCRI-240), *Shawa* (SCRI-192), and *L'akayamu* (SCRI-328, -329, and -330). The analysis was undertaken in order to determine how the procurement and distribution of animal foods may have established or maintained economic and social relationships. In order to address this question, the research focused on determining subsistence specialization and differential access to animal products at the household level, as well as public feasting (Noah 2005). Noah (2005) concluded that there were no significant differences among households as to the major categories of animals procured by households, therefore no evidence of true subsistence specialization was found. In regards to differential access to preferred animal products, no evidence was found for differential access at *Ch'oloshush,* where all investigated houses appear to be commoner households (Noah 2005). However, at *Shawa* differential access was suggested, and although only one house at *Xaxas* was excavated, it appears to be a higher status household with access to higher ranked animal products (Noah 2005). Possible evidence for public feasting was identified at *Xaxas*, as features of large accumulations of whole abalone shells were found, although these features were not directly associated with a house (Noah 2005).

3.3.7 Excavation of Samples from Houses and Other Contexts at SRI-2 (possibly Niaqla) on Santa Rosa Island and Tuqan on San Miguel Island by Torben Rick (2004, 2007a, 2007b)

Rick (2007b) recently reanalyzed much of the material from Orr's early archaeological work at SRI-2, which could possibly be the Chumash village of *Niaqla* on Santa Rosa Island. Artifacts were reexamined, Orr's notes were consulted, and Rick then provided supplemental material by excavating two small new units at the village, mapping the village, and conducting extensive radiocarbon dating of material from the houses. Although Orr had excavated and stored some unsorted midden samples from his project at the Santa Barbara Museum of Natural History, these midden samples were removed from the cemetery portion of the site and cannot aid in reconstructing household variability. As much of Orr's work (as well as the work of other early archaeologists) was never published, Rick's project provided new insight into the history of occupation at SRI-2, Chumash house construction, and a general understanding of village activities. However, the low resolution of the early data is admittedly an issue, and Rick emphasizes that the lack of household archaeology in coastal southern California has led to a gap in knowledge of hunter-gatherer social dynamics in this region.

Rick's excavations at *Tuqan*, (specifically site SMI-163) were part of a broader project aimed at investigating changes in daily activities, emergent complexity, and ecology over the last 3,000 years on San Miguel Island (Rick 2007a: 4). In order to collect data to address these broad questions, numerous small samples were taken from across archaeological sites. At *Tuqan*, six house depressions are visible. A total of twelve auger units were excavated at the site, with one auger hole excavated from each of the six house depressions. A 0.5 x 1 m unit was excavated in one house, and two 0.5 x 0.5 m units were placed on the edges of house depressions. Additionally, ten 0.5 x 0.5 m surface units were excavated to a depth of around 10 cm. In four of the house depressions only one surface unit was excavated, while two surface units were excavated in each of the other two house depressions. Radiocarbon dates from each house suggest that they were mostly occupied in the Protohistoric period, with Early Historic period components identified in two of the six houses.

Less than one percent of each of the six house depressions was excavated, and because of the small sample size, comparison of artifacts and midden constituents to infer differential household status and access to trade goods and higher ranked prey species is not possible. The excavations at *Tuqan* were valuable in confirming site SMI-163 as the likely location of part of the Early Historic period village of *Tuqan* and generating a sizeable collection that provides insight into the daily activities that took place on San Miguel Island during the Protohistoric and Early Historic periods.

3.4 Conclusion

The goal of this section was to provide a summary and history of household and community archaeological fieldwork undertaken on the Northern Channel Islands, and to outline the most recent theoretical and methodological considerations addressed in the study of Early Historic period Chumash villages on the Channel Islands. The information regarding household and community organization presented in this chapter serves as the framework for evaluating results of the recent investigations at *Nimatlala* discussed in the following chapters. Alhough the projects discussed above have clearly made significant contributions by providing baseline information about households during the Early Historic period, there clearly continues to be a lack of detailed knowledge on how the Island Chumash were organized at both the household and community level during this time. The project at *Nimatlala* begins to fill in this gap. Similar to early household excavations, this project included the excavation of larger volumes; however, modern techniques were implemented to garner data at a finer resolution.

CHAPTER FOUR

Finding *Nimatlala*: Historic References and Archaeological Methods

4.0 Introduction

This chapter details the research process through which the village of *Nimatlala* was recently identified. This village was not “lost” in the traditional sense: no one was looking for it, nor was it even hidden from view. Documentary and archaeological evidence is reviewed in order to evaluate the reliability of the claim that the archaeological complex of sites SCRI-324, -384, and -801 represents the Early Historic period Chumash village of *Nimatlala*. While *Nimatlala* is a public space, I acknowledge that it is also sacred ground. Some contemporary Chumash view Early Historic villages as sacred in that they were places where ancestors lived, held ceremonies, died, and were buried. I am privileged to have had the opportunity to lead this project and am thankful to my crews for the respect they have shown for the project, artifacts, and the village site.

4.1 Hiding in Plain Sight

Many scientists working on the Northern Channel Islands are intimately familiar with the field station located in the Central Valley of Santa Cruz Island on land owned by the Nature Conservancy and operated jointly with the University of California Santa Cruz Island Reserve. Although lacking in a few modern conveniences, the field station is equipped with hot showers, an internet connection, and even a lopsided pool table. In short, the necessities a researcher needs at the end of a long day of traipsing across the island are covered. Just across the road from the field station is a small home which shelters the field director, Lyndal Laughrin, when he is on the island. Lyndal's house was not the first residence constructed in this spot, and three small house depressions are visible in the area in front of the house (Figure 4.1). The driveway up to the house actually runs directly through half of one of the depressions. This site had been previously recorded as SCRI-384.

Figure 4.1. Site CA-SCRI-384. House depression outlines added as they are too shallow to be clearly seen in the picture.

As my interest in household archaeology developed, testing these houses grew in appeal, especially given that no house depressions in the interior of any of the Northern Channel Islands had previously been investigated. Additionally, as many of the archaeological sites in the Central Valley date to the Middle Holocene, it was originally assumed that SCRI-384 would also date to this time period. No Chumash houses dating to this time period have ever been excavated on the Northern Channel Islands. The shallow nature of the deposits at the site, as well as the small size of the house depressions, was intriguing and they would allow for a significant portion of the houses to be excavated during the course of a dissertation project.

An investigation of the site record for SCRI-384 proved illuminating. Originally recorded in 1977 by Craig and King (1977), a cupped olivella bead and historic glass bead indicating Contact and/or Early Historic period occupation were collected from the surface of the site at the time it was recorded. A search of the site records for other sites in the vicinity revealed that SCRI-324, also recorded in 1977 by Craig and King and located just across the main Valley creek bed from SCRI-384 (Figure 4.2) contained evidence for the presence of six house depressions. Additionally, the SCRI-324 site record indicated the site also likely dated to the Early Historic period. Upon contacting Chester King who recorded the site, it was revealed that an Early Historic period occupation was indicated for the site because of the presence shell bead types dating to that period. Some difficulty was encountered trying to relocate SCRI-324 (the Central Coast Information Center had the site mapped on the wrong hill), and only two house depressions were now visible on the surface. SCRI-324 was recorded in 1977 right after a brush fire had burned vegetation in the area, and surface features were more visible. Currently, much vegetation is present at the site and the surface is partially obstructed.

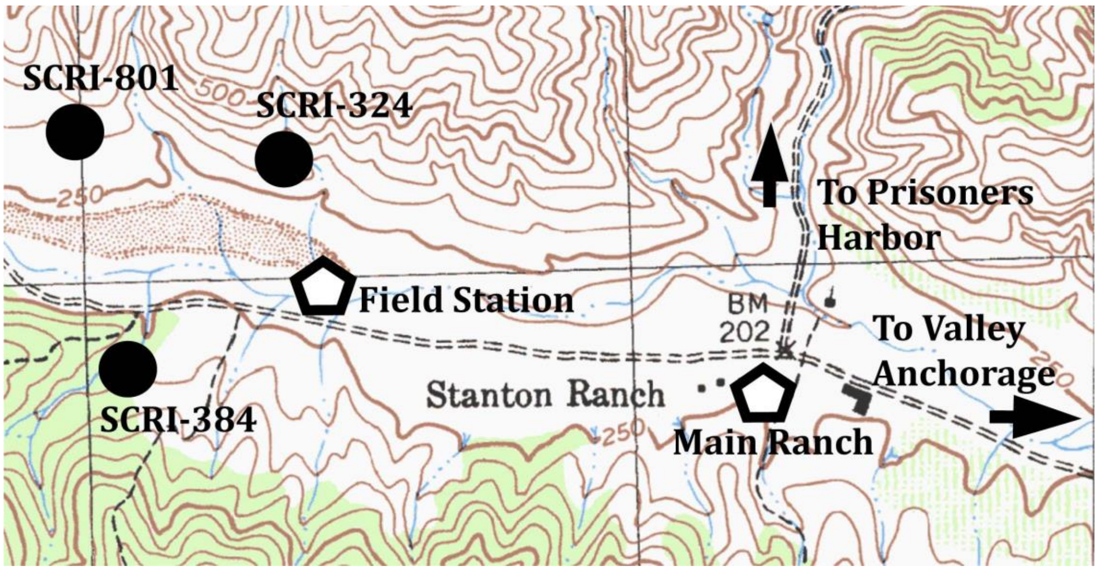

Figure 4.2. Topographic map with modern buildings and archaeological sites SCRI-324, -384, and -801 identified.

Located on an adjacent, relatively flat terrace also overlooking the Central Valley creek bed, the third site (SCRI-801), was documented recently by Jennifer Perry, and the younger of two components at the site dates to between 200 and 500 years ago (Perry and Delaney-Rivera, 2011). Evidence of Early Historic period occupation consists of an ash lens containing cooked food remains, including bones of high status animals such as swordfish and dolphin, which Perry and Delaney-Rivera (2011:118) have interpreted as evidence of a feasting event. Perry's investigations at SCRI-801 commenced after I began testing at SCRI-324 and -384, and Perry was not expecting to encounter Early Historic period material at that site. SCRI-801 is therefore not part of this dissertation project, and will not be discussed in further detail.

In October 2006, during the initial testing phase at SCRI-324 and -384, three test units were excavated at each site for the purpose of obtaining material for radiocarbon dating, and obtaining a better understanding of the depth of deposits. Each test unit was at 20 cm by 20 cm in area, and at both sites test units were placed both inside and outside of house depressions (Figures 4.4 and 4.5). Shell fragments from the test units were selected for radiocarbon dating, and an effort was made to date the top and bottom of the deposit at each site (Table 4.1). From site SCRI-384, the site with three house depressions located in the field director's front yard, a calibrated date of approximately AD 1690 was returned from mussel shell excavated from the 0-10 cm level of Test Unit 2. Mussel shell from the bottom of the 20-30 cm level of the same test unit yielded a much earlier date of around 200 BC (~Cal BP 2150) and is indicative of an earlier component at the site. At site SCRI-324, mussel shell from the 0-10 cm level of Test Unit 2 returned a date of approximately AD 1470, while mussel shell from the 10-20 cm level of Test Unit 3 yielded a date of approximately AD 1700. Given the artifacts excavated from both sites during the expanded testing period of the project, it is certain that both sites were occupied during the Early Historic period. After radiocarbon dating suggested the Early Historic period occupation at the sites, historic and ethnographic sources were consulted to investigate the possibility of references to Early Historic period Chumash occupation of the interior of Santa Cruz Island.

Beta Analytic Sample No.	***Site No.***	***Test Unit***	***Level***	***Calibrated Date (1 sigma)***
224998	SCRI-324	2	0-10 cm	AD 1440(1470)1520
224999	SCRI-324	3	10-20 cm	AD 1670(1700)1820
225000	SCRI-384	2	0-10 cm	AD 1660(1690)1720
225001	SCRI-384	2	20-30 cm	BC 340(200)140

Table 4.1. Radiocarbon dates from test units at *Nimatlala*, sites SCRI-324 and SCRI-384.

4.2 References to *Nimatlala* in Historic and Ethnographic Sources

Juan Esteban Pico's 1884 list of Island Chumash villages (Heizer 1955) includes *Nimatlala* as a *ranchería* on Santa Cruz Island, and gives the general location of the village as "*el rancho grande*," or "the big ranch." This description likely refers to the "Main Ranch" located in the Central Valley of Santa Cruz Island near the field station (Figure 4.2). Captain Andres Castillero was the first private owner of Santa Cruz Island from 1839-1857. Under his ownership, a few ranch houses were built in the 1850s. Justinian Caire and his associates then founded the Santa Cruz Island Company in 1869, and by the late 1880s Caire owned all of the shares of the company. Many of the ranch structures had been built by 1884 when Pico recorded his list. It is known as the "Main Ranch" because it was the headquarters for island ranching operations (Figure 3.3). It was the largest of several ranches built on the island and the other smaller facilities served as outposts. "*El rancho grande*" was not the only non-Chumash and Euro-American geographic landmark used in Pico's list. Pico notes the location of *Qshiwqshiw* on Eastern Santa Rosa Island as "*Rancho Viejo*," meaning "the old ranch."

The earliest historic reference to *Nimatlala* may be the diary from Cabrillo's voyage in 1542. When sailing off of the Northern Channel Islands, one of the villages mentioned as being located on the island is *Nimitipal* (Bolton 1916:27), which is phonetically very similar to "*Nimatlala.*" In fact, J.P. Harrington identifies the two as the same (John Johnson 2014, personal communication). King (1975) also links other villages mentioned in Cabrillo's account to Early Historic period Chumash villages. The radiocarbon dates obtained from site SCRI-324 do suggest that the village could have been occupied at the time of Cabrillo's voyage in AD 1542 into the Early Historic period and Mission era (see also Heizer 1972).

Figure 4.3. The Central Valley of Santa Cruz Island with structures belonging to the Main Ranch complex.

When John P. Harrington questioned Fernando Librado about the meaning of *Nimatlala*, Librado believed the name meant "*muy centro*," meaning very central in a geographic sense (Hudson et al. 1977; King 1975). Some sources simply provide the translation of "center" as the meaning of "*Nimatlala*." However, Librado does not recollect the name being tied to a settlement in the interior of Santa Cruz Island. Librado instead cites *Liyam* several times as being the *ranchería* located in the interior of Santa Cruz Island. He notes that *Liyam* is "the whole center of the island" and "where the ranch now is" (Harrington 1913; Johnson 1982b:128). Elsewhere, Librado recalls that *Liyam* meant "center" and was located in the middle of the Island, accessible by landing at *Xaxas* (which was known as Prisoners Harbor in Librado's time) and traveling up a canyon to the interior of the island (Hudson et al. 1977:14). Even today, following these directions will easily get you from Prisoners Harbor and the location of *Xaxas* at SCRI-240 on the coast to the location of sites SCRI-324, -384, and -801 in the Central Valley. Although Librado places *Liyam* and not *Nimatlala* in the center of the island, Pico's designations and locations of Early Historic period Chumash villages are more compelling as Pico had the benefit of several collaborators who were born on Santa Cruz Island. Additionally, these two villages are not the only ones that Pico, Librado, and other sources locate in differing places on the landscape. If Pico is correct in his placement of *Xaxas* on the north coast of the island, *Nimatlala* in the center, and *Liyam* on the south coast, then the most expedient way to get to *Liyam* from *Xaxas* would be to travel to the Central Valley where *Nimatlala* is located and then traverse over the southern ridge, following Coches Prietos canyon down to the coast. This may account for some of the confusion regarding the location of the villages and Librado's placement of *Liyam* in the Central Valley.

Librado also clearly associates *Liyam* as the home village of the main chief of Santa Cruz Island (Hudson et al. 1977:14). Mission records indicate 117 neophytes from *Liyam*, but there is not one record of a person from *Nimatlala* (Johnson 1982b, 1999c). Additionally, SCRI-324 and SCRI-384 show surface evidence of only four to nine small house depressions. The sum of evidence available at this time suggests SCRI-1 and vicinity as a far more likely location of *Liyam* than SCRI-324, -384, and -801 in the Central Valley. This does not exclude the possibility that residents of *Liyam* lived in *Nimatlala* for part of the year, and this scenario is discussed later in greater detail.

Nimatlala actually appears on early maps of Chumash *rancherías* on the Northern Channel Islands, although it is located on the North coast of the island in the general vicinity of Prisoners Harbor, where the large settlement of *Xaxas* is now believed to be located (King 1975; Kroeber 1925). It is unknown why this location was given for *Nimatlala*. Pico's description for the village of "*el rancho grande*" may have been misinterpreted as "the large *ranchería,*" or Librado's given meaning of "center" for the Chumash word "*Nimatlala*" may have been misinterpreted as an economic or social center, rather than geographic center. Additionally, the Caire family constructed a large ranch house near Prisoners Harbor, and perhaps this large structure and its associated outbuildings were interpreted as the "*el rancho grande*."

In the 1920s, David Banks Rogers, employed by the Santa Barbara Museum of Natural History, excavated at many Chumash sites on the mainland, and conducted some research on the Northern Channel Islands as well. Several paragraphs from Rogers's work, *Prehistoric Man of the Santa Barbara Coast* (1929:306-307) are very pertinent to the discussion of the location of *Nimatlala*, and the nature and constituents of the sites in the Central Valley of Santa Cruz Island:

> One mile and a half southeast of Pelican Bay is Prisoners Harbor. This is the only place on Santa Cruz Island that offers any facilities for landing except through the surf. Prisoners Harbor is the outlet to the sea of the central valley, which carries the largest stream of water on the island. This fact is, doubtless, partly the reason for the existence there of one of the greatest deposits of camp refuse to be found along the coast.
>
> A great central encampment once occupied the floor of the gorge, near the surf line and only a few feet above it. In recent years engineering activities have straightened the channel of the creek, cutting through the deepest portion of the debris heap. The original size of this central heap was four hundred feet long by one hundred and fifty feet wide…
>
> From the great central heap, the site extends in every direction except seaward, the eastern and western wings occupying the crests of high bluffs, and the southern extension following the floor of the gorge. The entire site is about one-half mile long, east and west, by thirty rods wide in the center. This location is indicated on Kroeber's map as "*Nimilala*."
>
> The central valley that finds outlet at this place, besides the two sites previously mentioned near the western end, has at least four others scattered along its length, two being near the central ranch house. A rather careful examination was made of the surface at each of these places, and in every case my investigations lead to the same conclusion. These interior sites are all small. The deposit of debris in each instance is quite shallow. All are of comparatively recent date, and all contain objects manufactured by the whites. To me it appears certain that these are the last places of refuge before the people finally vanished.

Several aspects of Rogers's description are intriguing. First, he acknowledges Kroeber's placement of "*Nimilala*" at Prisoners Harbor, and identifies the village site there as extending far beyond the "central heap" which itself is almost certainly the archaeological site, SCRI-240. Next, Rogers mentions the stream in the Central Valley as the largest source of fresh water on the Island, which is true even today. During dry years, the water does not always flow on the surface over the full expanse of the creek bed, but some flowing water can be found at points along the drainage where the stream bed dips below the water table. Of particular importance to our discussion of *Nimatlala* and Central Valley Early Historic period sites is Rogers's identification of a number of sites scattered throughout the Central Valley (two in particular close to the central ranch house) and all small, shallow, and containing Historic period artifacts. This description suggests that the Central Valley Early Historic period sites are very different from the large, centralized village sites on the coast. *Nimatlala* appears to be more dispersed, with small clusters of houses dotting the landscape in the vicinity of the Main Ranch. It is evident from his discussion that other Early Historic period sites that may have comprised this settlement have yet to be identified and recorded.

I do, of course, disagree with Rogers's statement that the people (i.e., the Chumash) have vanished, for they most certainly have survived and persisted, even though they moved/were removed from the islands to the mainland. His comment is indicative of a different time and sentiment.

At SCRI-324 and -384 deposits are also shallow and relatively discrete. Because of the small size of the sites and house depressions, *Nimatlala*, offers a unique opportunity to build upon previous archaeological findings and interpretations. The larger sample sizes required by this project may aid in determining roughly how representative the small household samples previously collected from the other Early Historic period sites are of each household.

4.3 Field and Laboratory Methods

Excavation of the most unobstructed house depression at SCRI-384 began in the summer of 2007 (Figure 3.4). A 0.5 meter wide trench was placed in the central area of the house depression and extending west to the edge of the depression 1.7 m. The trench was excavated in 10 cm levels until sterile soil was obvious. The goal of excavating this trench was to determine layers of occupation and stratification that might be observable in the profiles of the walls of the unit. At the edge of the depression we encountered an interesting deposit of predominantly chlorite schist stones, and consequently we extended the trench further, moving outside of the house depression. A post hole feature was identified during the excavation of this trench near the center of the house depression. House features will be discussed in detail in the next chapter. With the test trench completed, and an understanding of the soil characteristics and stratification reached, a 2 meter long by 1 meter wide unit was excavated directly east and adjacent to the test trench. This unit was also

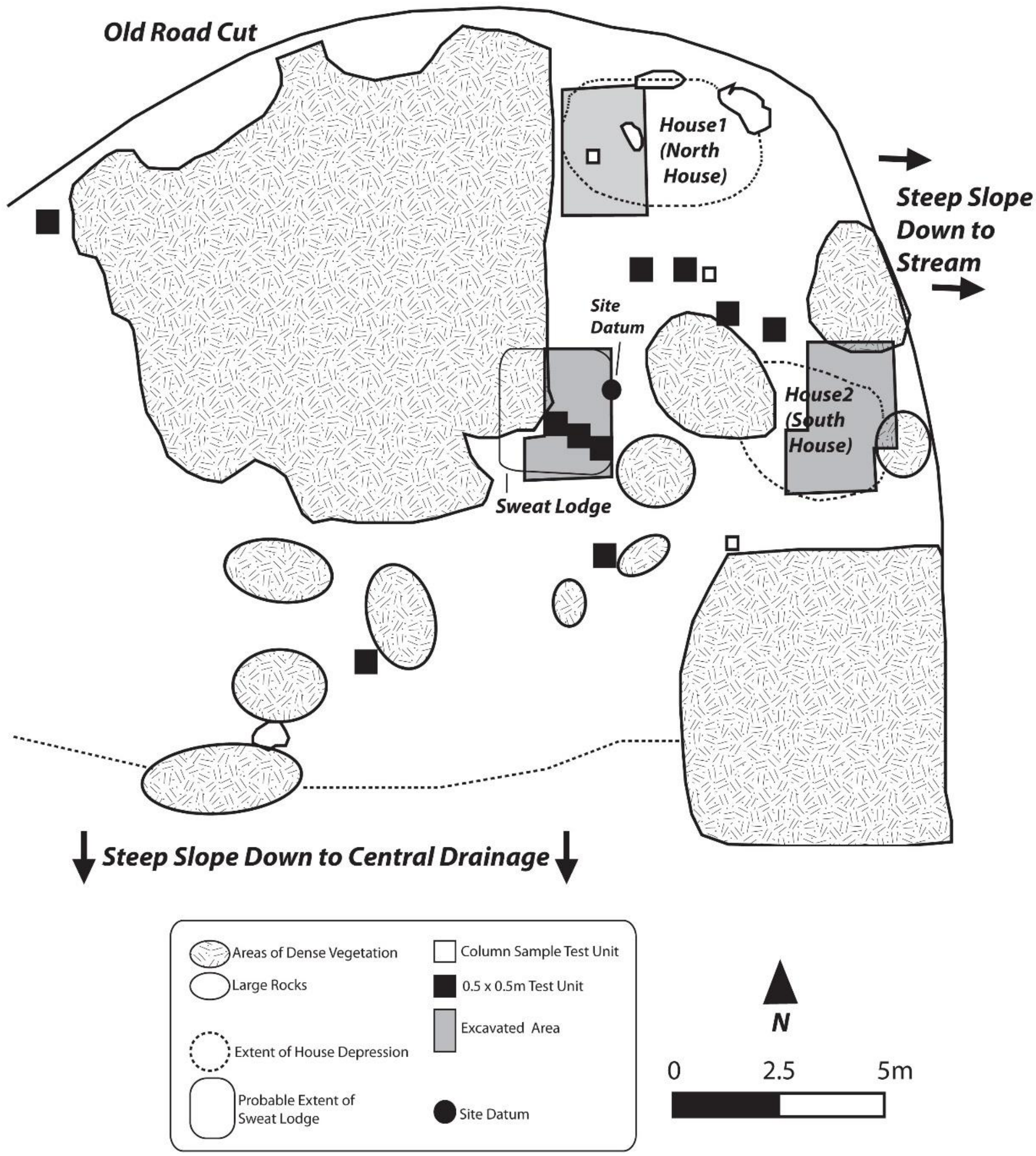

Figure 4.4. Map of SCRI-324 with features and excavated areas indicated.

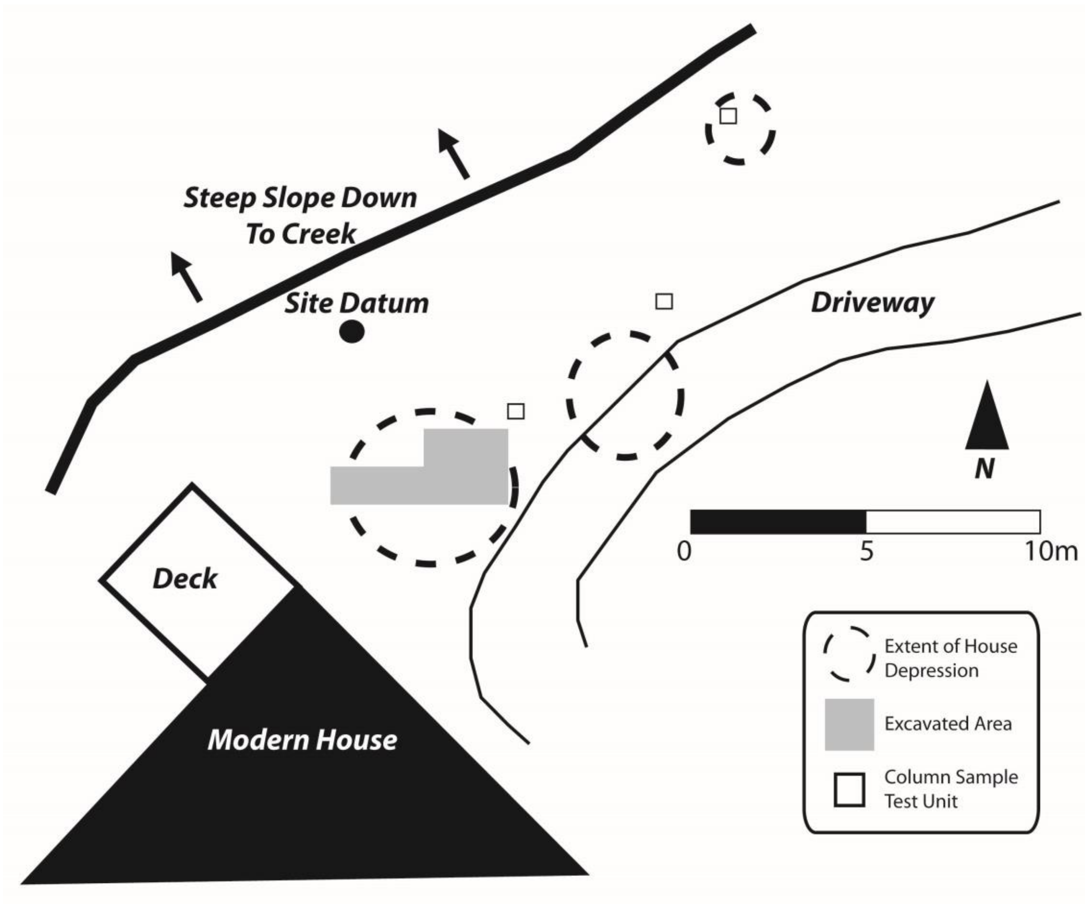

Figure 4.5. Map of SCRI-384 with features and excavated areas indicated.

excavated in 10 cm levels. The excavated area bisected the house, and approximately one quarter of the house depression was excavated. In the larger 2 x 1 m unit, a hearth was discovered. Before closing the unit, a 20 cm x 20 cm column sample was collected in 10 cm levels from the center of the house, near the hearth.

In the center of the circular driveway at SCRI-384, several eucalyptus trees over 100 years in age are present, likely planted as a windbreak during the ranching era. Large and small eucalyptus tree roots have permeated the deposits at the site. Due to the disturbed nature of the deposits at this site, both from tree roots and human development, the decision was made to perform no further excavations at the site. The units were filled in partially with cobbles from the Central Valley creek bed, and then topped with the back-dirt from the excavations. The reserve director's wife subsequently capped the house depression with a large mound of soil and planted a native plant garden. Therefore, this house depression is no longer accessible or visible.

In 2008, excavations at SCRI-324 commenced. A datum was established using a metal stake, placed in the highest area of the site to the south of house depression 1 and west of house depression 2 (Figure 3.5). After a field map was made of the site, a grid was placed over the site map. All areas free of dense vegetation were considered available for possible excavation and assigned a number. In the area between the two visible house depressions, four 0.5 x 0.5 m units were chosen for excavation using a random numbers table. These units were excavated in 10 cm levels, and deposits proved to be shallow, ranging from 10 to 20 cm in depth.

Using a random numbers table, five additional 0.5 x 0.5 m test units were selected, and these units were placed throughout the general area (i.e., all areas of the site except for the house depressions and the area between the two visible house depressions) of the site. These were also excavated in 10 cm levels and deposits in most of the units were very shallow. However, in two of these units located near each other, deposits were still present at between 30-50 cm in depth, and large rocks purposefully placed in a line were found at the bottom of each unit. Another 0.5 x 0.5 m unit was then excavated adjacent to these, in an attempt to discover what the rock wall feature represented. Intermittently during the course of the next few years, excavations were extended to reveal approximately half or more of a semi-subterranean structure, the details of which will be discussed in detail in the next chapter.

We began excavation of the House Depression 2 in 2009. Again, a 0.5 m wide trench was dug from the approximate center of the house out to the edge of the house. This time, the trench was dug from the center of the house to the eastern edge. The total length of the trench was 2.5 meters. It was dug in 10 cm levels, and a hearth and post holes were discovered in the central area of the house. Then a 2 x 2 m unit was excavated in stratigraphic layers, just north of the trench in the northeast portion of the house. Later, an additional 2 x 1 m unit was excavated just south of the trench, in the southeast area of the house depression. For this house depression, a total of 7.25 m^2 of the house area was excavated down to sterile soil (at various depths), which was likely the equivalent of a little more than half the total area of this house.

Excavation of House Depression 1 at SCRI-324 was conducted in 2011. From excavation of the house at SCRI-384, and House Depression 2 at SCRI-324, it became clear that it was easier to determine features and changes in soil when excavating larger units. Therefore, we did not excavate a trench through House Depression 1, but instead commenced with the excavation of 1 x 1 m units in the center and west of the house. The 2 x 3 m western portion of House Depression 2 was excavated, and again, this likely represented a little more than half of the total area of the house. The excavations at SCRI-324 was completed in the summer of 2011.

In the field, all excavated materials (apart from column and soil samples) were screened through 1/8" mesh. Deposits retained in the screen were placed in plastic bags for transport back to the mainland. Back at the lab at UCSB, the materials were wet screened, again using 1/8" mesh. After drying, they were screened through 1/5" mesh in the lab. All materials captured in the 1/5" mesh screens were sorted into midden constituents. Materials smaller than 1/5" were scanned for diagnostics, but not sorted by material. Sorting took place both at the labs at UCSB and Utah State University.

For household excavations on the Northern Channel Islands, this project resulted in the excavation larger samples from each structure than any previous project conducted with modern archaeological methods. A little more than a quarter of the house at SCRI-384 and more than half of each house and the small, possible sweat lodge at SCRI-324 was excavated. While this is a large sample size for projects on the Northern Channel Islands, and for academic projects generally within California, it is a conservative when compared to other projects nationally and internationally.

4.4 The Context of the Project with Regard to Management of Cultural Resources on the Northern Channel Islands

Currently under management of the National Park Service, the US Navy, and The Nature Conservancy, the four Northern Channel Islands of San Miguel, Santa Rosa, Santa Cruz, and Anacapa, along with Santa Barbara Island to the south, are within Channel Islands National Park and are protected from development. In fact, not only are these islands protected, but also great time, effort, and finances continue to be expended in restoring the islands to something close to their natural state. The clear focus of management activities on the Northern Channel Islands is the restoration and conservation of native natural resources, although the mission of the National Park Service also tasks park management with the protection of cultural resources within the park, including thousands of archaeological sites, a number of historic structures, and even shipwrecks and plane wrecks found offshore but within park boundaries. The intense focus on natural resources has sometimes created the illusion that the islands' native terrestrial and marine flora and fauna were undisturbed for thousands of years before ranching began in the 1830s. However, humans have traversed the island landscape for over 10,000 years (Erlandson, et al. 2008:19). Human remains found at Arlington Springs on the north coast of Santa Rosa Island, have been dated to 13,000 years ago and are among the oldest human remains ever found in North America (Johnson et al. 2002, 2005, 2007). During prehistory, the Santa Barbara Channel region had one of the highest population densities in all of California, and residents of the Northern Channel Islands hunted and harvested native flora and fauna for food, shelter, clothing, and tools, and they altered the landscape by creating numerous large shell middens.

While NPS funds some archaeological projects on the islands, most of the funding for cultural resources is directed towards preservation. Archaeology, an inherently destructive science, is not generally aligned with the preservation ethos. However, NPS and TNC support archaeological investigations on the islands, particularly survey projects to record sites, and projects involving auger testing or the collection of small samples. Sites in areas threatened by erosion or other forces are periodically evaluated, and sometimes stabilized.

Conservation and preservation of archaeological sites is also the preferred method of cultural resources management by most Native American Chumash groups, whose ancestors inhabited the islands (as well as the mainland coast) continuously from at least 7500 BP until removal in the 1820s AD. Chumash sentiment against further large-scale excavation is not surprising, given the early archaeological excavations on the Northern Channel Islands from the mid-1870s through the 1930s by Paul Schumacher, Léon de Cessac, Stephen Bowers, Richard

Van Valkenburgh, David Banks Rogers, Ronald Olson, and Arthur Woodward (Benson 1997; Coleman and Wise 1994; Heizer 1951; Olson 1930; Rogers 1929; Schumacher 1875, 1877, 1879). These excavations, although under the guise of scientific discovery, more often resembled treasure hunts with the unceremonious and extensive destruction and plundering of Chumash cemeteries for fine artifact specimens to fill well-respected museums such as the Santa Barbara Museum of Natural History, the Lowie Museum at UC Berkeley (now the Phoebe Hearst Museum), the Los Angeles County Museum of Natural History (now the Natural History Museum of Los Angeles County), the Smithsonian, and several French museums. Even Phil Orr's investigations on Santa Rosa Island for the Santa Barbara Museum of Natural History in the late 1940s through the 1960s involved large-scale excavations, including the excavation of ten houses and two cemeteries at SRI-2, which is possibly the village of *Niaqla,* an Early Historic Period village on the northwest coast of Santa Rosa Island. In this instance, excavation equipment even included the use of blade attached to a jeep that operated in a manner similar to that of a bulldozer (Orr 1968; Rick 2007b).

The development of modern archaeological field and laboratory methods coupled with new technology allows archaeologists to gain more information from smaller samples. However, the research questions addressed in each archaeological project guide the excavation team in determining how much material must be excavated in order to adequately address the questions. In many areas of the world, large excavations of tombs, tomb complexes, and even whole villages and cities continue to be commonplace. In California, cultural resource laws, smaller hunter-gatherer archaeological sites, and a general sentiment towards conservation of archaeological sites, especially within historically documented Native American communities, all contribute to the practice of smaller-scale excavations and non-destructive testing. This is, of course, a generalized view of California archaeology, and large archaeological projects such as the Playa Vista Archaeological and Historical Project in Marina del Rey, Los Angeles County, California, do sometimes occur in the context of cultural resource management. As in the case of Playa Vista project, which involved survey and testing of 1,000 acres in a coastal estuary slated for development and included the removal of more than 400 Tongva burials, the cost was very high (estimated at $25 million dollars), and was undertaken only because the potential monetary profit for the development company and investors was exponentially more than the cost of the archaeological project (Altschul et al. 1991).

Much archaeological research has been, and continues to be, conducted on the Northern Channel Islands. Faculty and students from the University of California at Santa Barbara, the University of California at Los Angeles, the University of Oregon, California State University Channel Islands, and San Diego State University have active research programs on the islands, as do scholars from the Santa Barbara Museum of Natural History and the Smithsonian National Museum of Natural History. The topics studied by these researchers are broad, such as the peopling of the new world, responses to changing environmental patterns, and the evolution of Chumash culture. Additionally, most fieldwork conducted conforms to the NPS, TNC, and Chumash ideals of cultural resource preservation, using survey and low-volume subsurface sampling techniques. Archaeology on the Northern Channel Islands advances our understanding of the timing and complexity of human migration into the Americas, of historical ecology and human management of natural resources over the past 10,000 years, and of the development of one of the more complex groups of hunter-gatherers in the world.

This evaluation of cultural resource management on the Northern Channel Islands was intended to outline the author's biases, detailing the predominant cultural values of the time and place in which the author is conducting research, and with which the author is aligned. While this dissertation project required significant portions of Early Historic period Chumash structures to be excavated, it also purposefully left some portions of these structures unexcavated. Any additional excavation would have been unfeasible for a dissertation project, not required to answer the posed research questions, and would have been in opposition to the conservation culture of the region. Additionally, it is always possible that new archaeological techniques, methods, and testing will be available in the future, and could be used to further excavate these sites to compare results.

CHAPTER FIVE

The Anatomy of a Village: Chumash Structures in Archaeological Context

5.0 Introduction

According to ethnographic and historic accounts, Chumash villages were comprised of clusters of secular and ceremonial structures. The most common structures were houses and sweat lodges while other village components included storage facilities, playing fields, ceremonial grounds, windbreaks, sacred enclosures, cemeteries, male puberty huts, menstrual huts, and childbirth huts. All structures were of basic pole and thatch construction, and depressions seen at habitation sites serve as surface indicators of once standing structures. Houses and special-purpose huts are indistinguishable on the surface because the structures were built with the same techniques and materials, the structures are of similar size and shape, and occupants of both types of structures engaged in similar activities (work, sleep, food preparation and consumption). Archaeological investigations could aid in determining the function of each structure; however, artifact and ecofact assemblages may not differ significantly between types of structures. Perhaps if most structures in a village were completely excavated and analyzed, subtle nuances could be apparent. Sweat lodges are believed to be semi-subterranean and therefore may not be visible at all on the modern landscape, but because they are semi-subterranean they should be archaeologically distinguishable from other structures. Particularly on the Northern Channel Islands, few Chumash structures have been excavated to the extent necessary to reveal architectural features and to generate artifact collections large enough to determine the function of the structure. This chapter reviews what is known of Island Chumash structures from archaeology, early historic descriptions, and ethnographic informants.

5.1 General Village Areas

Apart from areas where structures were clustered, two large, flat open areas were found in or adjacent to Chumash villages: the playing field and the ceremonial grounds (Bolton 1927:169). The playing field was open and flat, and possibly edged by low fence posts interwoven with mats or branches (Hudson and Blackburn 1986:48, Hudson and Timbrook 1980:2). This area served as a place for recreation and games. The ceremonial ground also required placement in a flat, open area and was either bounded by a low fence or windbreak, which was also built using posts and mats (Hudson and Blackburn 1986:50-51). In the center of the ceremonial ground was located a sacred enclosure built of poles and thatch in which rituals were performed (Hudson and Blackburn 1986:56-60). Between the sacred enclosure and the windbreak was space for dancing and also for hearths around which families could gather (Hudson and Blackburn 1986: 50-51).

Cemeteries were also located next to villages. Some cemeteries may have been within enclosures, and they contained grave markers of wood, stone, or bone (Hudson and Blackburn 1986:71-83). Grave markers were sometimes painted or incised. During the 1769 land expedition, Portolá noted that “in all of these towns they have cemeteries" (Wagner 1929:52). On the same expedition, Crespi noted that "they have two cemeteries, one for the men and another for the women, all surrounded by high, sharpened palings, painted in may colors" (Bolton 1927:38). Excavations of several Chumash cemeteries, however, have shown that females and males were not interred in separate cemeteries. It is therefore uncertain how common gender specific cemeteries were. Evidence has been found that suggests people of similar social status may have been interred near each other within a cemetery (Gamble et al. 2001).

5.2 Ethnohistoric Chumash House Descriptions

Houses were the most common type of structure in Chumash villages. The first written accounts of Chumash houses date to the Cabrillo voyage in 1542, with later descriptions garnered from Unamuno's voyage in 1587,Vizcaino's voyage in 1602, Portolá's land expedition of 1769, and Martinez's expedition of 1792. All of the accounts describe Chumash houses as semi-hemispherical thatched houses, and several members of Portolá's expedition likened the shape to half an orange (Hemert-Engert and Teggart 1910:133-135; Priestly 1972:24-25, 48). Houses are further described as having a hole in the top for venting smoke from interior fires, containing interior raised platforms on which the occupants would sleep, and sometimes having several holes in the side to serve as windows (Figure 4.1).

Figure 5.1. Partial reconstruction of a Chumash house at the Satwiwa Native American Indian Cultural Center in Newbury Park, CA. Public domain photograph.

What is particularly interesting about these ethnohistoric descriptions of Chumash houses is that many are described as being fairly large. In reference to the Chumash of the Northern Channel Islands, the log from Cabrillo's expedition in 1543 mentions that, "In each house they say there are fifty souls" (Wagner 1929:90). When Unamuno's expedition in 1587 came across an abandoned village in the Northern Chumash region near Morro Bay, they observed that, "Judging from the size of the [houses], each could hold more than a dozen persons" (Wagner 1929:147). Fifteen years later when Vizcaino's expedition landed on one of the Channel Islands in 1602, a party from the expedition, "had gone into the interior of the said island and [said] that there was a pueblo there with more than two hundred large houses, in each one of which lived more than forty Indians" (Bolton 1916:90). Over 150 years later, foreigners again set foot on Chumash lands during Portolá's 1769 land expedition. Several descriptions of Chumash houses were recorded during this expedition, including an account of which describes each house as "capable of sheltering four to five families which, being kin, are accustomed to live together" (Priestley 1972:48). During the same expedition, the Chumash near present day Santa Barbara were described: "They live in towns, the houses of which are spherical in form, like the half of an orange, are covered with reeds, and are as much as 20 yards in diameter. Each house contains three or four families" (Hemert-Engert and Teggart 1910:133-135). Twenty Spanish yards is the equivalent of approximately 16.5-16.8 meters. Crespí, another member of Portolá's expedition described Chumash houses along the coast of the Santa Barbara Channel:

> Some of these houses, round like half oranges, are extremely large; we entered for curiosity sake within some of them, and were struck with wonder at their size, for no doubt at all they must be able to lodge sixty people or more without hindrance (Brown 1967:4).

These ethnohistoric descriptions of Chumash houses, although varied, are fairly consistent in their description of Chumash house construction, size, and number of inhabitants. The accounts describe large semi-hemispherical pole and thatch houses up to almost 17 meters in diameter that housed extended families or groups of between ten to fifty individuals. The descriptions of large houses with many inhabitants contrast with descriptions of houses from ethnographic sources, which describe both smaller and larger house types.

5.3 Ethnographic Accounts of Chumash Houses

In 1912, John P. Harrington began collecting ethnographic information from Chumash consultants. Harrington's notes offer a great wealth of information on Chumash culture, and it is from these notes that Hudson and Blackburn (1983:325-331) assembled a detailed overview of Chumash houses. The corpus of information Harrington gathered from his informants generated a description of houses from all Chumash areas as:

> domed, circular structures. The peripheral posts were a step apart, and varied in number; there were no central posts. The thatch was of tule, wild alfalfa, fern or Carrizo. The entrance faced the "street" or beach, so that it would not face the north wind. The fireplace was in the center, or nearly so, and was built on the surface of the ground or in the slight hollow formed by throwing out ashes (Hudson and Blackburn 1983:325).

The diameter of smaller houses ranged between about 3.5 and 5.5 meters, while other house structures were larger. The upright posts used in house construction are described as between 5.5 and 6 meters tall or higher. Several consultants described earth being put around the house to keep the water out when it rained. Consultants disagreed on the arrangement of houses, with some proposing the houses were arranged in rows, and others reporting they were not arranged in this manner. Harrington (1942:9) described the larger houses as "communal" and occupied by related families. His consultant, Fernando Librado, however, noted that, “each Indian family lived in a separate hut” (Hudson and Blackburn 1983: 331). One of the mission padres, Father Estevan Tapis noted that he observed an average of four persons per house (Johnson 2014, personal communication).

Figure 5.2. Reconstruction of a Chumash house for the 1924 Ventura County Fair. John P. Harrington oversaw the project, and the structure was built by Chumash men, including José Winai, who was one of Harrington’s Ventureño Chumash consultants. Smithsonian Institution: J. P. Harrington Collection. Courtesy of the University of California’s California Digital Library. Contributed by Black Gold Cooperative Library System.

Figure 5.3. Completed reconstruction of a Chumash house for the 1924 Ventura County Fair. Smithsonian Institution: J. P. Harrington Collection. Courtesy of the University of California's California Digital Library. Contributed by Black Gold Cooperative Library System.

5.4 Ethnographic Accounts of Special Purpose Houses

Some houses were used for specific purposes. Ethnographic sources describe separate houses being used as male puberty huts, menstrual huts, and childbirth huts. In addition to these huts, Fernando Librado remembered that at *Kamexmey,* a post-Mission village founded at the mouth of the Ventura River and inhabited mostly by Island Chumash, semi-circular half houses were constructed in which community members performed tasks such as bead or fishnet making (Johnson 2001:59). Little else is known about the history, construction, and use of these half-houses.

5.4.1 The Male Puberty Hut

A group of adolescent boys would occupy a male puberty hut during the time they participated in a coming-of-age ceremony. One of Harrington's informants related that the boys would sleep as a group in the specially constructed house for the duration of a month (Hudson and Blackburn 1986:44). The hut is described as an "isolated structure" (Hudson and Blackburn 1986:44), but it is not known how far or in what way this structure would have been separated from the rest of the houses in a village. If this type of structure was used for the same purpose throughout its entire lifespan, then few or no artifacts associated with females should be found within the structure. Because the boys were supposed to abstain from meat during their residence period, few animal bones may be found within the associated middens (Hudson and Blackburn 1986:44). No extant examples of this type of structure are identified and no excavated Chumash structures have been interpreted as a male puberty hut.

5.4.2 The Menstrual Hut

This type of special purpose house is described as small and isolated (Hudson and Blackburn 1986:45). It is again unknown how isolated this hut would have been from the rest of the village. Girls occupied the house during their first menstruation up to a period of several months and would reside in the house alone (Hudson and Blackburn 1986:45-46). This house would be smaller than most as it was designed for only one occupant. If the structure was used only as a menstrual hut, archaeologically it is expected that few or no artifacts associated with males would be found inside. There are no identified examples of Chumash menstrual huts.

5.4.3 The Childbirth Hut

Harrington noted that some Chumash groups utilized a special hut for childbirth, and it is possible that one structure may have served as both the menstrual and childbirth hut for a village (Hudson and Blackburn 1986:47). The archaeological signatures for menstrual and childbirth huts would likely be very similar, with few artifacts being associated with male activities. There are no identified examples of Chumash childbirth huts.

5.5 Historical Accounts of Chumash Sweat Lodges

Ethnographic accounts indicate that the Chumash Indians of southern California built and employed two types of sweat lodges at the time of Spanish colonization: one smaller, semi-circular type for one or a few people (*'uqstilulu*) and a larger, circular type for a greater number of occupants (*'apayɨk*) (Hudson and Blackburn 1986). In the historical accounts, only two descriptions of the small type are given. One description is from Unamuno's voyage in 1587: A little apart from the river in the other direction a hut was found among some trees, big enough for about two persons, built of sticks and covered with earth, and having only one small opening. Inside were dried grass and leaves (Wagner 1929: 146). Additionally, in 1793, Menzies offered a similar description, noting:

> At each village we observed a sweating place made by digging a deep pit or cavity of from 10 to 15 feet square in a bank near the water side and covering it all over with spars and earth so as to be scarcely distinguishable from other parts of the bank, excepting by a small hole left open at the top for an entrance through which only one person could descent at a time by means of a post notched with steps (Eastwood 1924:325).

There are several historical accounts of the larger sweat lodges. In 1776, Font provided this general description of a sweat house:

> They also have a common temescal. This is a hot, closed room for sweating, made somewhat subterranean and very firm with poles and earth, and having at the top, in the middle, an opening like a scuttle, to afford air and to serve as a door, through which they go down inside by a ladder consisting of straight poles set in the ground and joined together, one being shorter than the other. In the middle they make a fire (Bolton 1931:254).

Sweat lodges, therefore, are generally known from historical accounts as semi-subterranean, circular to semi-circular in shape, and covered with an earthen roof.

5.6 Ethnographic Descriptions of Chumash Sweat Lodges

Numerous ethnographic accounts of both small and large sweat lodges were recorded by Harrington, and the two types of sweat lodges were terminologically distinguished in his notes. Because the *'uqstilulu* (small sweat lodge) and *'apayɨk* (large sweat lodge) were given distinct names, it is likely that the form and function of the two types were also distinctive. All known ethnographic descriptions of sweat lodges are presented in Hudson and Blackburn (1986:33-41). According to John P.

Harrington's consultants, the smaller sweat lodges were semi-subterranean, semi-circular, covered with earth, and were tall enough to allow for one person to stand in the center (Hudson and Blackburn 1986:33). The large sweat lodges were also subterranean and covered with earth but they were circular in shape and could shelter larger groups of people. The large sweat lodges are believed to have been locations for ceremonies and other ritual activities, and therefore commoners and women were largely excluded from these structures.

The most common type of sweat lodge was the small sweat lodge, and these were frequently built into an existing bank using several forked poles with crossbeams (Figure 5.4) (Hudson and Blackburn 1986:33-34). The small sweat lodges had earthen roofs or roofs made of thatch and then covered in mud. Sweat lodges were located near water sources so that after sweating, people could exit the sweat lodge and go directly into a pool of water. Harrington's informants widely characterized sweating as a male activity, although women were not necessarily excluded.

Large sweat lodges had an earthen roof with a small hole by which to enter and exit the structure via a notched pole ladder. The hearth was typically located in the center of the structure. The use of sweat lodges extended into the Mission period, and Harrington's informants indicate that a sweat lodge was even located near the garden at the Ventura Mission (Hudson and Blackburn 1986: 37-38). This sweat lodge was created by erecting four large forked willow posts with four crossbeams. This structure was then covered with thatch and earth was then mounded on top to make the structure airtight (Hudson and Blackburn 1986:38). Large sweat lodges were also located near sources of water to allow people to cool off after their sweat. One of Harrington's consultants related that commoners were not allowed to enter into some of the large sweat lodges (Hudson and Blackburn 1986:41).

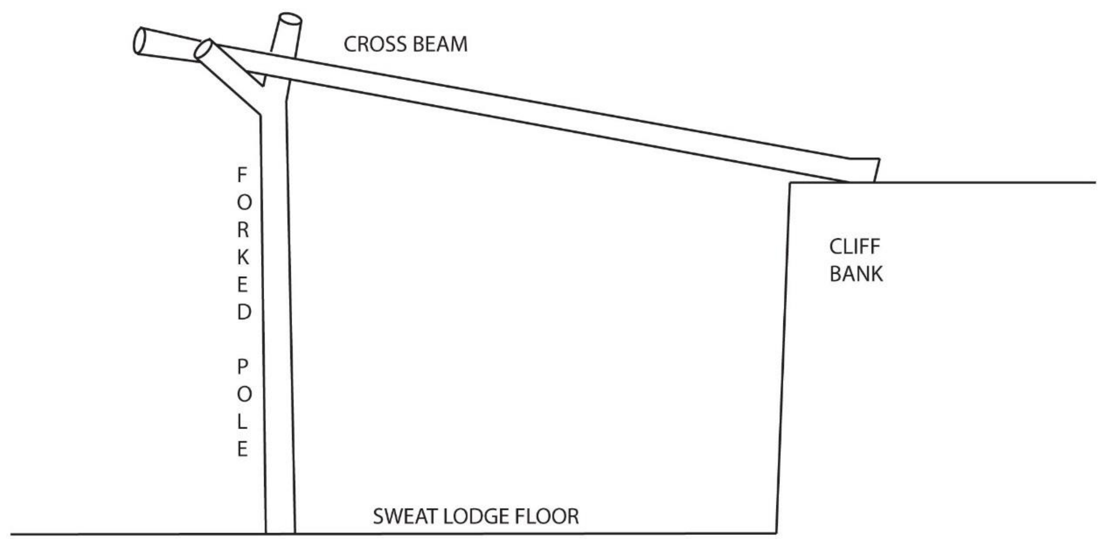

Figure 5.4. Diagram of a small sweat lodge constructed into a bank using forked poles and crossbeams, after a John P. Harrington sketch from information provided by the consultant, Luis Antonio María Ortega. After Hudson and Blackburn (1986:33).

5.7 Archaeological Expectations for Chumash Houses and Sweat Lodges

Few examples of Chumash sweat lodges have been documented archaeologically. In extensive research on Chumash structures, Gamble (1991, 1995, 2008) has documented only nine archaeological examples of Chumash sweat lodges. Excavations of Chumash houses are more numerous, although in the last fifty years, household excavations of whole structures are rare. Sweat lodges and houses were the primary structures built by the Chumash during the Early Historic period, and an understanding of the differences between the two structures is necessary to accurately interpret activities at village sites. Table 5.1 summarizes Gamble's (1995:58) findings of both house and sweat lodge attributes. Note that the attributes of sweat lodges refer primarily to the large sweat lodge type. Structures do not need to exhibit all of the listed attributes to be classified as a house or sweat lodge, but given these attributes, excavated structures will likely resemble one type of structure more than the other.

	CHUMASH HOUSE	CEREMONIAL CHUMASH SWEAT LODGE
Posts	-small, around perimeter -small, interior for beds or bedroom partitions	-large, interior
Earthen Roof	-none	-present
Central Fireplace	-small	-large
Entrance	-path used as doorway	-large central pole near hearth used to climb into structure from above
Placement	-above ground -other houses nearby	-semi-subterranean
Debris/Artifacts	-evidence of domestic debris	-domestic debris not deposited at time of structure use -few artifacts associated with female activities

Table 5.1. Archaeological expectations for Chumash houses and large sweat lodge structures.

5.8 Archaeological Examples of Island Chumash Sweat Lodges

Only two possible sweat lodges have been recorded on the Northern Channel Islands. David Banks Rogers (1929) described both of these possible structures, and both were located on Santa Cruz Island. The first possible sweat lodge was unearthed during the excavation of trenches in a cemetery at a village site just inland from Arch Rock on the north shore of Santa Cruz Island. Rogers (1929:297) recalls:

> One trench was extended beyond the confines of the cemetery, at the place that had been occupied by a 'temescal.' A sunken, stone-encircled structure was traced that had been approximately fourteen feet in diameter, the floor having been forty inches below the present level of the surface. This floor was probably not so far below the surface originally; the encroaching debris had doubtless aided materially to increase its depth, as time passed. In the center of the circle was a pronounced heap, over twenty-four inches in thickness, consisting of alternate layers of ashes and charcoal, some of the latter being as much as three inches in diameter.

No mention was made as to the presence of post holes or other structural elements. The second sweat lodge mentioned by Rogers was located at Willows (SCRI-496) on the southern coast of Santa Cruz Island. Rogers was assisting Ronald Olson from the University of California, Berkeley, with excavations at the site. Rogers's (1929:314) brief note regarding the structure reads, "Near the present beach line, we found the ruin of a circular sweat-house, the floor of which was slightly above high-tide level." No further explanation is given for why Rogers believed the structure to be a sweat lodge. Because a detailed description of an Island Chumash sweat lodge is not available, examples of a large and a small excavated sweat lodge from the mainland are provided below.

5.9 An Excavated Small Chumash Sweat Lodge

Only one example of a possible small Chumash sweat lodge has been excavated. In 1935, Strong (1935) excavated several Chumash structures in the Cuyama River Valley. One of these structures dates to the Protohistoric period, and is located at the Mathews site at the head of Quatal Canyon. It is described as a semi-subterranean structure of approximately 5 meters in diameter, with two charred

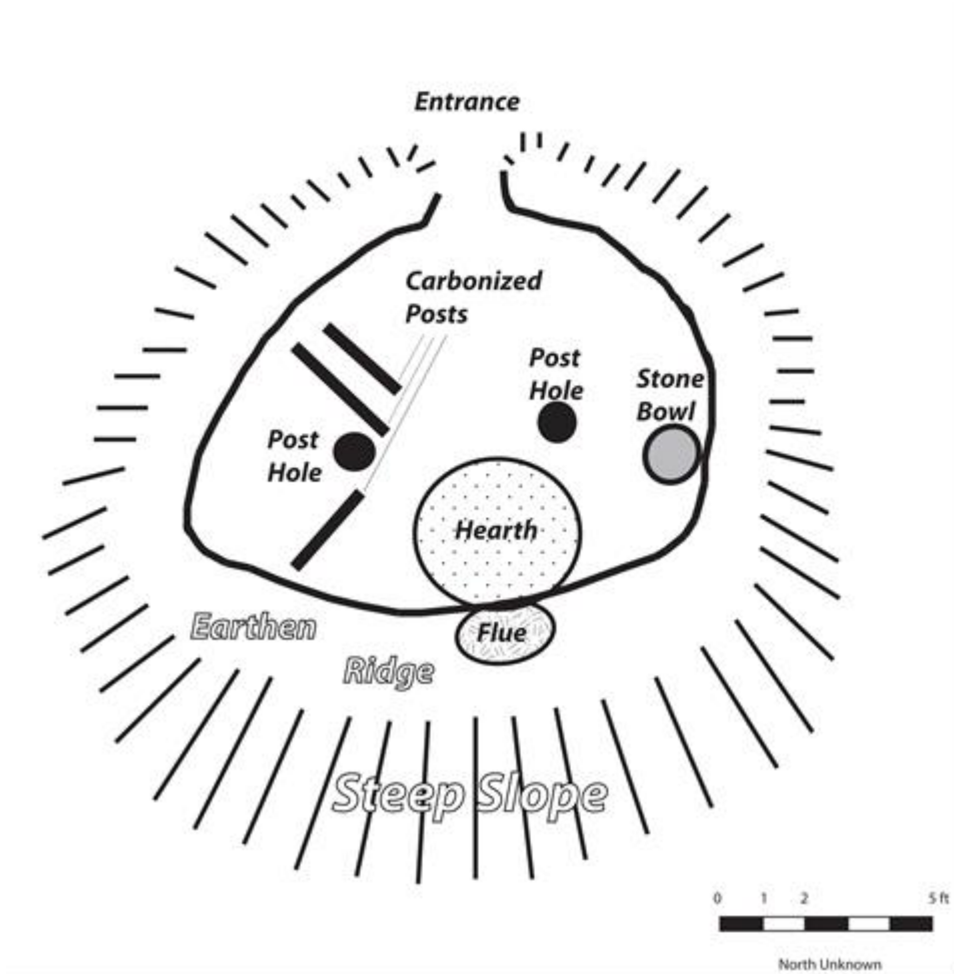

Figure 5.5. Drawing of a small sweat lodge from the Mathews site at Quatal Canyon, after Strong's 1934-35 field notes and Gamble (1995, Fig. 8).

central posts, a clay fireplace, and a hard, black floor (Strong 1935:69; Gamble 1995:67-68). Similar to the ethnographic descriptions of small sweat lodges, this structure was built next to an earthen bank (Figure 5.5).

It is worth noting that Jerry Moore (1987) reported a late prehistoric elliptical burned structure at SBA-1809 near Goleta, California, that is similar in size and shape to a small sweat lodge. Moore (1987) interprets this structure as an isolated homestead and not as a sweat lodge as it is not semi-subterranean and it contained refuse from a variety of activities such as tool manufacture and repair and bead making which may have been difficult in a dark, steam and smoke-filled structure.

5.10 An Excavated Large Chumash Sweat Lodge

Eight possible large sweat lodges have been excavated on the mainland (Gamble 1991). Harrison's (1965) excavation in 1958 of a sweat lodge at *Mikiw* (SBA-78), a historic village located along the Santa Barbara coast just west of the Goleta Slough area, was perhaps the most carefully executed and most thoroughly documented of all the large sweat lodge excavations. The structure was found to be semi-subterranean and oval shaped with a maximum diameter of about 6.4 meters. The floor was concave and plastered, and there was a central platform containing a smaller basin (Figures 5.6 and 5.7). Additionally, a fire pit was located in the southern section of the structure. Six large posts located around the central platform supported the ceiling, although no post holes were found on the exterior of the structure (Harrison 1965:153-154). Carbonized roof beams and additional evidence suggests that the structure burned down; however, it likely burned before the site was abandoned, as trash appears to have been thrown into the depression and accumulated on top of the remains of the structure (Harrison 1965:153-154). Radiocarbon dates obtained from carbonized posts and shell at the floor level reveal the structure was probably built in the early 1700s and abandoned by the early 1800s (Harrison 1965:154-155).

Figure 5.6. Photo of sweat lodge floor at *Mikiw*, SBA-78. Courtesy of the University of California Santa Barbara Repository for Archaeological and Ethnographic Collections.

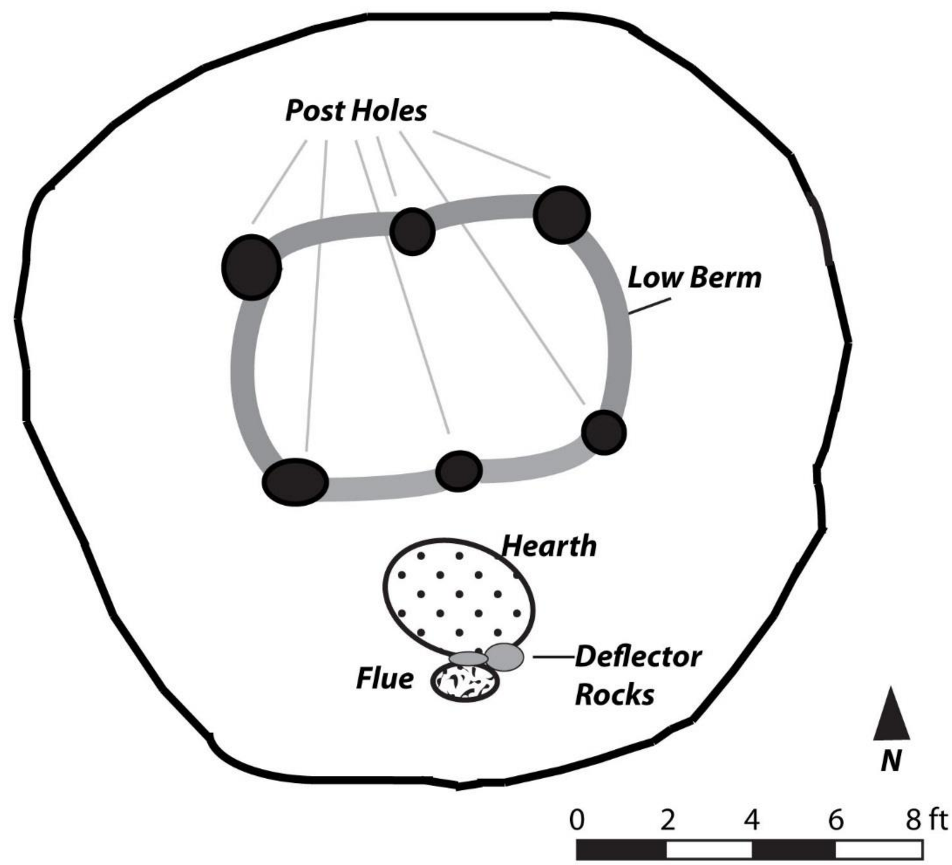

Figure 5.7. Plan view of sweat lodge from *Mikiw*, SBA-78, after Harrison (1965: Figure 73).

5.11 Archaeological Examples of Island Chumash Houses

Reviewed here are the houses that have been excavated on the Northern Channel Islands. It is speculated that houses at *Nimatlala* would likely most resemble other structures found in the territory of the Island Chumash. For a thorough review of all Chumash houses excavated prior to 1990, see Gamble (1991).

5.11.1 Schumacher's Excavations on Santa Cruz Island

Paul Schumacher engaged in excavations in the Santa Barbara Channel area for both the Smithsonian and the Peabody Museum between 1873 and 1880. His contemporary, Léon de Cessac, also excavated at sites on all of the Northern Islands and the mainland in 1877 and 1878, although detailed notes of these excavations are not available and collections generated from these investigations were taken back to France by the Frenchman and housed in several museums including the *Musée d'Ethnographie du Trocadéro* (now the *Musée de l'Homme*) in Paris (Heizer and Reichlen 1964). On Santa Cruz Island, Schumacher observed house depressions on the western tip of the Island at Forney's Cove (likely at sites SCRI-328 and -330), and he describes discovering human remains that were interred in houses (Schumacher 1877:43-44). A number of excavations in house depressions have uncovered human graves dug into house floors or graves below house floors (Johnson 1993). Although not a common practice, it is not unlikely that once in a while a house was unknowingly built on top of an unmarked grave. Additionally, after European contact in 1542, epidemics may have swept through villages on several occasions. During mass casualty events, particularly in the Contact and Early Historic periods, it may have been necessary to expediently inter people in the houses in which they passed away (Johnson 1993).

5.11.2 Olson's Excavation of Houses on Santa Cruz Island

During 1927 and 1928, Ronald Olson from the Department of Anthropology at the University of California, Berkeley, carried out archaeological investigations on Santa Cruz Island and the Santa Barbara mainland (Hoover 1971; Olson 1930). Olson was initially working with David Banks Rogers of the Santa Barbara Museum of Natural History, and together they concentrated on excavating the cemetery components of Chumash village sites. On Santa Cruz Island alone, over 450 Chumash burials were discovered, spanning all time periods from the Early period to the Early Historic period. Although the excavations focused on cemetery areas, Olson and his crew sometimes inadvertently came across house floors, and they also infrequently placed additional excavation units in or near visible house depressions. Hoover's (1971) dissertation summarizes much of Olson's work on Santa Cruz Island, and in combination with Olson's (1927, 1928) unpublished field notes provides baseline information for Chumash houses on the Island. Although Olson described a number of house depressions, only those in which features or structural elements were described are presented below.

The Christy Beach sites of **SCRI-236 (Olson's site #82)** and **Olson site #83** are located on the western coast of Santa Cruz Island. Ten house depressions were visible at the time of Olson's work at site SCRI-236/ 82 and are illustrated in Hoover's (1971:100) map of the site. The house depressions range in diameter from about 3 to 7.5 meters and may date to the Late period (Gamble 1991:128). At site 83, Olson excavated in two house depressions, but in his field notes (1929, 1930) he mentions that he could not locate definite house floors in these depressions. Additionally, while excavating in an area away from the house depressions Olson inadvertently came across a defined floor with a fire pit lined with stones. The Early Historic period component of these sites, including the area with house depressions, is believed to be the village of *Ch'oloshush* (Johnson 1982b).

At site **SCRI-474 (Posa Landing & Olson's site #100)** on the southwest coast of Santa Cruz Island, Olson recorded eight house depressions. Hoover's (1971) map of the site documents the largest of these house pits as spanning 9 meters in diameter, with five house pits in the 3-4 meter diameter range, and two smaller house depressions measuring only approximately 2 meters in diameter. However, Arnold's (2001:44) more recent map shows the largest depression as spanning approximately 15 meters, which is closer to the sketch map in Olson's field notes that estimates the diameter of the large depression at around 17 meters. Olson's field notes also describe a hearth in the center of this largest house structure. A number of large boulders were found in this house depression, and when removed, the remains of 21 individuals and their associated burial artifacts were discovered. The cemetery dates to the Middle-Late period Transition (Arnold 2001; King 1990).

Site **SCRI-192 (Johnson's Landing or Morse Point & Olson's site #104)** is located on the southern coast of Santa Cruz Island, and Olson's field notes, as well as Hoover's (1971:171) map, define 14 house depressions. Hoover's (1971:171) map shows the depressions as ranging in diameter from about 2 to 4 meters, although Arnold's (2001:47) more recent map suggests some depressions are larger and more consistent with Olson's descriptions. This village apparently represents the Late and Early Historic period village of *Shawa* (Arnold 1990; Johnson 1999b). Olson excavated in two of the depressions and in the largest depression found a clay house floor measuring approximately 6 meters in diameter. An ashy hearth was found in the center of the floor along with a whale bone vertebra and a small number of artifacts. Olson's unit in one of the smaller house depressions also revealed a house floor on which a basket mortar and shell fishhook were found.

The site **SCRI-496 (Willows & Olson's site #122)** is also located on the south coast of Santa Cruz Island. Olson excavated a pit in a house depression approximately 5 meters in diameter. Hoover's (1971:175) map does not indicate the presence of any house depressions, and depressions are currently not visible on the surface of the site. Olson produced a sketch of the excavated structure, and an approximation of this sketch is shown in Figure 5.8 below. The structure included two whale bone posts, possibly marking the doorway of the structure, five interior wooden post holes, and a rotted wooden post. Remnants of grass matting were noted, and the floor consisted of compacted sand and sloped up toward the perimeter. In the center of the house, a fire pit outlined in stone was present. David Banks Rogers, who was participating in the excavation at this site, appears also to have described this same structure in his own work (Rogers 1929:314-315), and he noted that the house structure was located about 20 feet to the northeast of the ruined circular sweat house floor mentioned above.

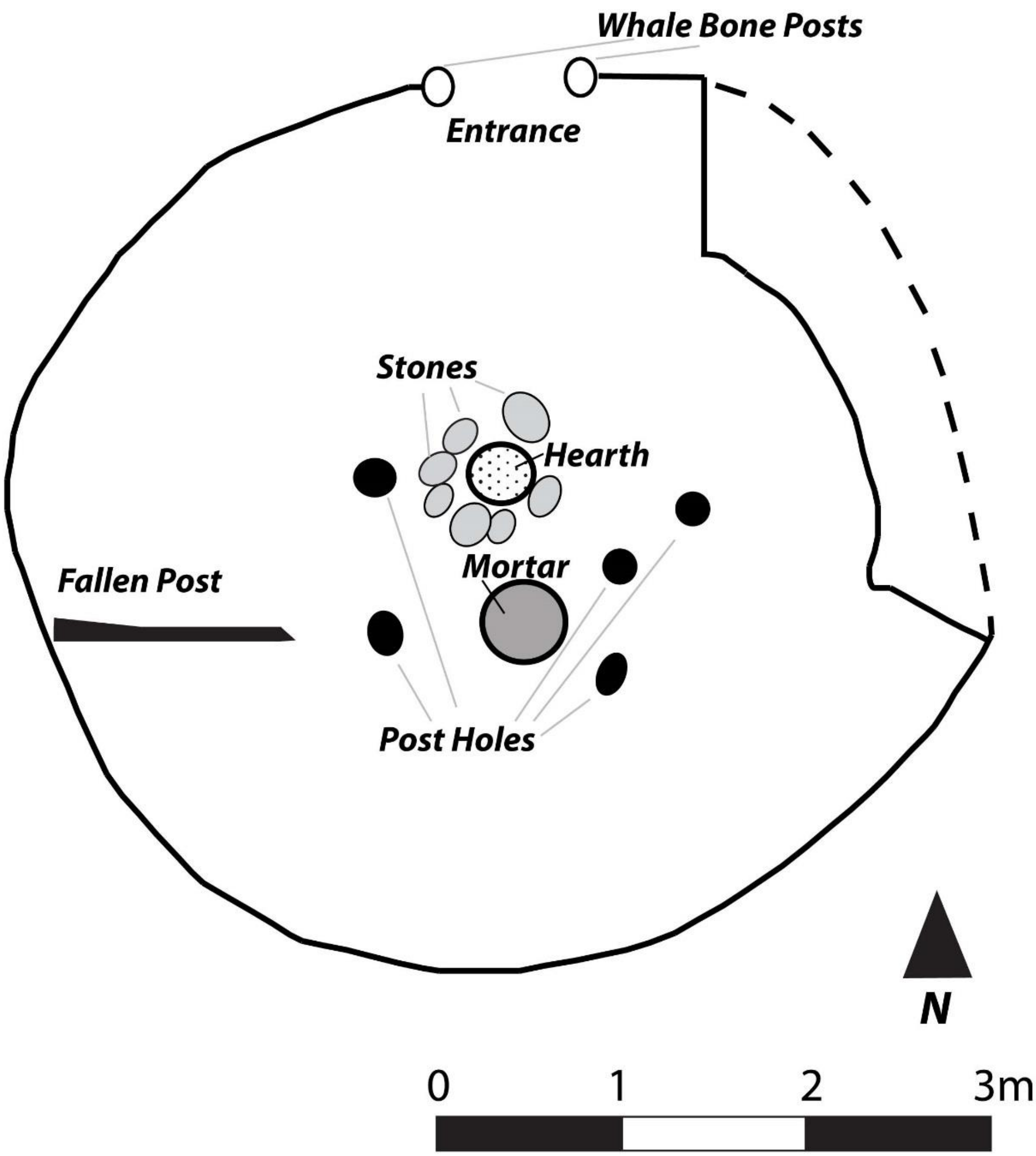

Figure 5.8: Plan view of house floor at SCRI-496 from Olson's notes.

5.11.3 Orr's Excavation of Houses at (SRI-2) (possibly the village of Niaqla) on Santa Rosa Island

Phil Orr of the Santa Barbara Museum of Natural History engaged in excavations on Santa Rosa Island for over twenty-five years, from 1941 through 1967. Much of Orr's work on Santa Rosa Island was concentrated at site SRI-2 on the northwest coast of the Island, at an area known as Skull Gulch. Twenty-eight radiocarbon dates place most of the span of occupation at the site from AD 130 to 1820 (Rick 2007b:245). The most recent occupational components of the site could possibly represent the Early Historic period Island Chumash village of *Niaqla*. At SRI-2, 20-25 well formed house depressions are visible, suggesting a sizeable population, although mission registers indicate that only ten people from the town of *Niaqla* were baptized (Johnson in Glassow 2010; Johnson 1999b). This disconnect between recorded residents and likely population at the community calls into question the identification of SRI-2 as the location of *Niaqla*.

Orr (1968:189, 210) describes the site as containing between 70 and 100 house depressions, although these houses have not been proven to be contemporaneous. The site also contains at least two cemeteries. During his excavations at the site, Orr excavated much of the cemetery portion of the site, but he also excavated whole or partial portions of ten house depressions. Two houses were completely excavated, approximately half of two others were excavated, and trenches were placed through six additional houses. Only the houses in which structural features were encountered are discussed below. Rick's (2007b) recent

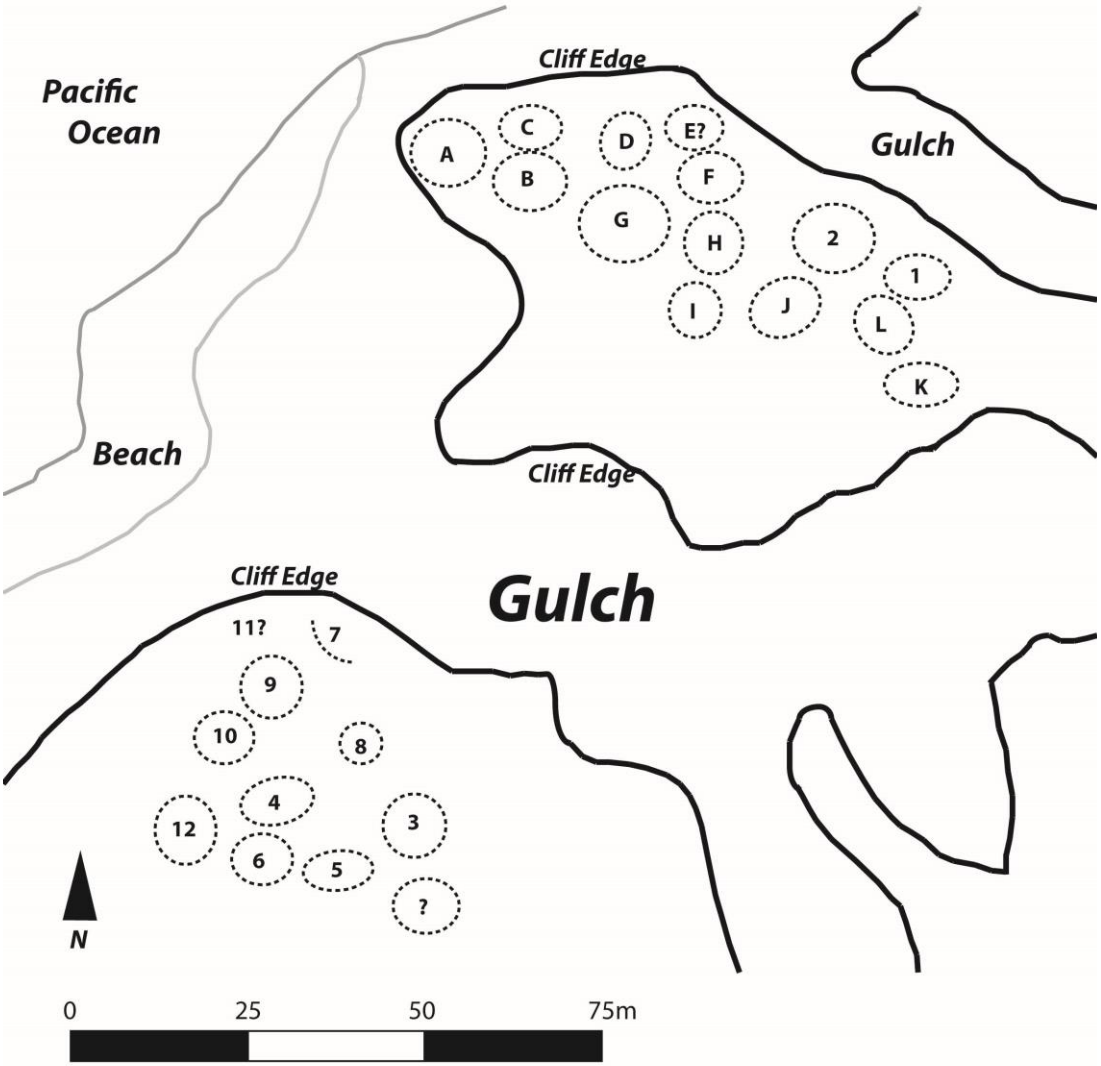

Figure 5.9. Map of SRI-2 (possibly *Niaqla*), after Rick (2007b: Figure 3).

work at the site, including the excavation of augers and two test pits, one on the berm of House 1 and the other on the berm of House 2, has greatly assisted in refining the chronology of both the site and occupation span of the houses.

House 1, also known as Turtle House, was excavated completely. Numerous fragments of sea turtle shell were found in the house, prompting the crew to bestow the moniker of "Turtle House." Sea turtles are not commonly found in the Santa Barbara Channel, so the discovery of so many fragments in one location is rare. Orr measured the house floor at about 4.9 meters in diameter with a central hearth sunk down below the floor level (Orr 1968:212). Forty-eight post holes surround the rim of the house floor, measuring on average 7.6 cm in diameter, and roughly another 78 post holes are scattered around the floor, these possibly representing supports for sleeping platforms and other furniture (Figure 5.10) (Orr 1968:212; Rick 2007b: 250). In his unpublished field notes, Orr notes that wood suitable for constructing houses was not available in that area of the island; and therefore would have needed to be transported from the other side of the Island. Redwood found in several of the houses may have been collected as driftwood (see below). Two radiocarbon dates, one from a wood post and the other from a fragment of olivella detritus placed occupation of this house to the Late period, specifically about AD 1400-1650 (Rick 2007b:251). Two radiocarbon dates from black abalone found in Rick's recent excavation of a unit in the berm associated with House 1 yielded Early Historic period dates of between AD 1660 and1820 (Rick 2007b:251).

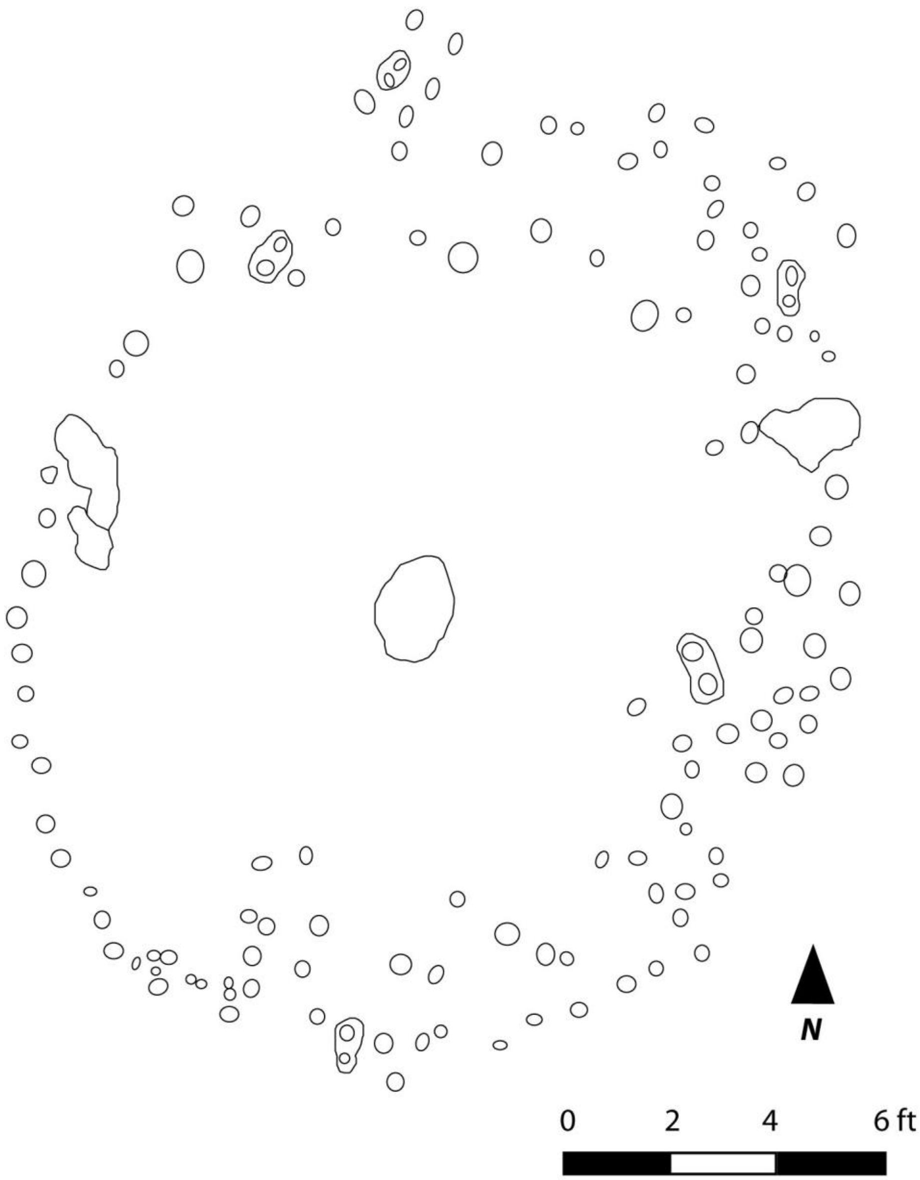

Figure 5.10. Plan view of House 1 at SRI-2, based on Orr's notes.

A trench was cut by Orr's crew through the edge of **House 2**. Post holes were also discovered on the edge of this house floor, and from the small portion of the house that was excavated Orr estimated the diameter of this house to be about 5.5 meters. Using a fragment of black abalone collected from the wall of an auger hole placed in the western side of the house, Rick (2007b:252) recently dated occupation of this house structure to AD 1660-1820.

House 3, or Whale House, was also completely excavated. The house was given the name "Whale House" because a large amount of whale bone was found near the surface of the house depression. The edges of this house floor are not defined, although the house depression measured about 14.6 meter in diameter prior to excavation (Rick 2007b:253). Post holes were scattered indiscriminately across the width of the floor (Figure 5.11) and Orr (1968:215) reported a hearth near the center of the house. In unpublished field notes, Orr describes the frame of the house as consisting of at least one large redwood post and a large section of whale bone with additional supports of smaller and more perishable wood posts and whale ribs. The wood is relatively rare and was valued by the Chumash in the Historic era as it was used to build *tomols* (Chumash sewn plank canoes). Rick's (2007b:254-255) excavation of a recent unit in the berm associated with the Whale House suggests multiple occupations of the area near the house, based on three radiocarbon dates: AD 810-1210 from Stratum 3, AD 1450-1630 from Stratum 2, and AD 1510-1820 from Stratum 1. These dates place occupation of the area near this house from the Middle period through the Early Historic period.

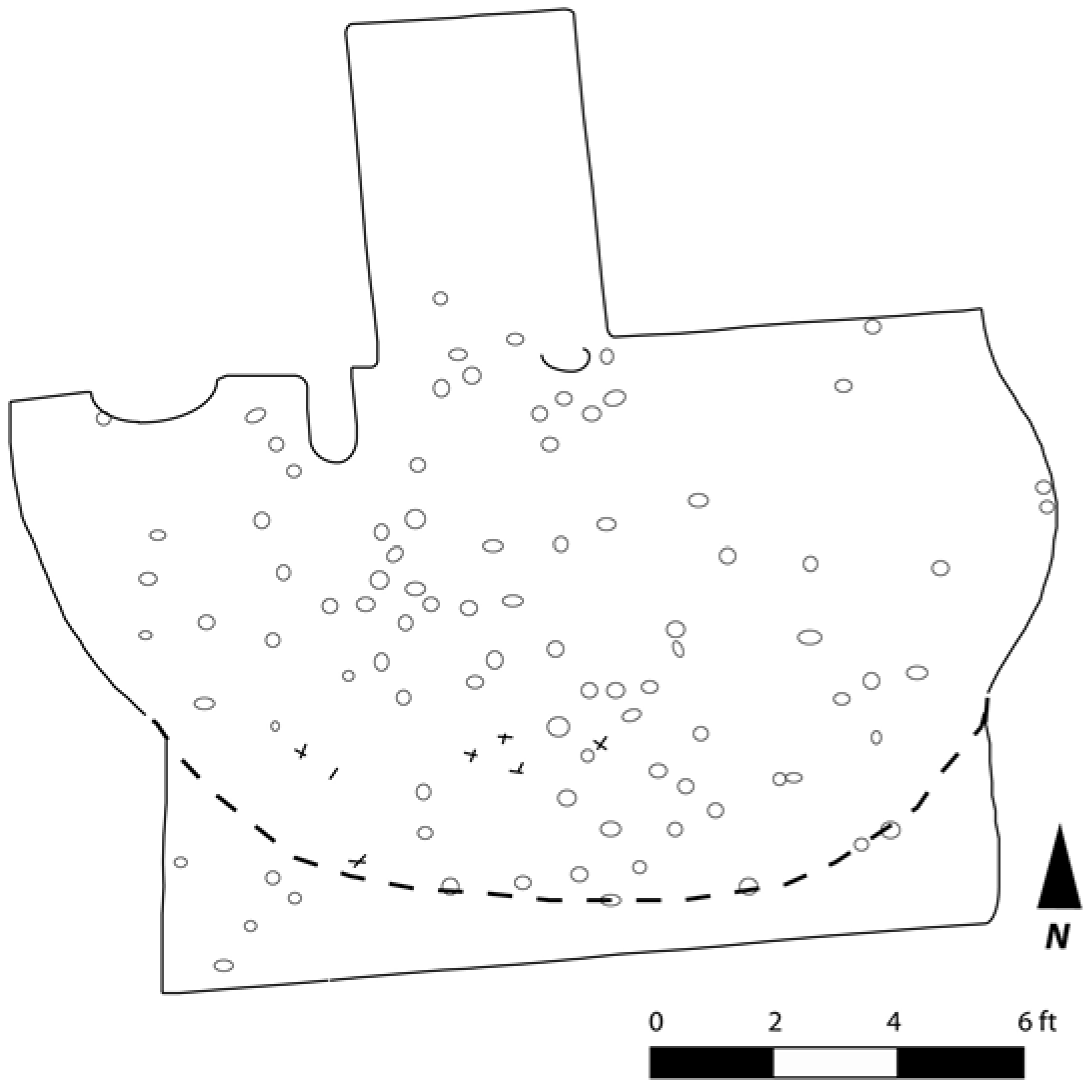

Figure 5.11. Plan view of House 3 at SRI-2, from Orr's notes. Dashed line indicates possible limit of house floor, although the edge of the house floor is obscured due to multiple rebuilding episodes.

Portions of House 7 were excavated during Orr's investigation of Cemetery B because the house is located on top of this cemetery. Eleven post holes associated with this house were recorded, with one post hole extending down into one of the eighteen or more burials uncovered beneath the house. Radiocarbon dates from two of the burials under the house suggest the structure was likely built post AD 1300, and a needle-drilled bead found in the house suggests a Historical period occupation (Rick 2007b:256).

5.11.4 Gamble and Wilcoxon's Excavations at El Montón (SCRI-333) on Santa Cruz Island

In the 1980s Larry Wilcoxon excavated a number of units in and around house depressions at a large site on the western tip of Santa Cruz Island at Frazer's Point (Wilcoxon 1981). The site is believed to have been occupied during the Early period, from 3500 to 1170 BC (Gamble 1991:149; King 1990). Wilcoxon (1981) mapped thirty-eight house depressions at the site, ranging from 3 to 7.5 meters in diameter. This is consistent with the descriptions Olson gave of the house depressions when he excavated at the site (Olson's site #3) (Hoover 1971). The majority of Wilcoxon's work remains unpublished (Gamble 2012). Since 2009 Lynn Gamble has taken up new investigations into households at the site in order to elucidate the timing and nature of emergent sociopolitical complexity (Jazwa et al. 2013).

5.11.5 Arnold's Excavations on Santa Cruz Island

In the 1980s and 1990s, Jeanne Arnold and her students excavated in and around house depressions at many sites on Santa Cruz Island, including SCRI-191 located at Christy Beach on the western coast, SCRI-192 located on the southern coast and believed to be the Historic period village of *Shawa*, SCRI-236 also located at Christy Beach and believed to be the location of the village of *Ch'oloshush,* SCRI-240 at Prisoners Harbor on the north shore which is associated with the Historic period village of *Xaxas*, SCRI-306 also on the north shore and part of the village of *Lu'upsh*, SCRI-330 at Forney's Cove on the western end of the island which is one of three sites (SCRI-328, -329, and -330) thought to comprise the village of *L'akayamu*, and SCRI-474 on the southwestern shore at Posa Creek. During the course of Arnold's excavations, structural house features were exposed at only one house: the house excavated at *Xaxas* (SCRI-240) at Prisoners Harbor.

Over the course of several years in the early 1990s, Arnold's UCLA Field School excavated approximately one-third of the house at SCRI-240 (Arnold 2001:50). Samples collected included material from both Late and Early Historic period deposits, and house floors from both periods were present (Arnold 2001:50-51). Unlike any other Chumash house ever excavated on the Northern Islands or the mainland, the floor of this structure was rimmed with redwood posts. Although snapped, the bases of the redwood posts were found still standing upright, supported by small rocks (Figure 5.12) (Arnold 2001:50). Arnold (2001:51) interprets this unique structure as the residence of a high-status family due to the rarity of redwood and its value associated with constructing *tomols* (Hudson et al. 1978).

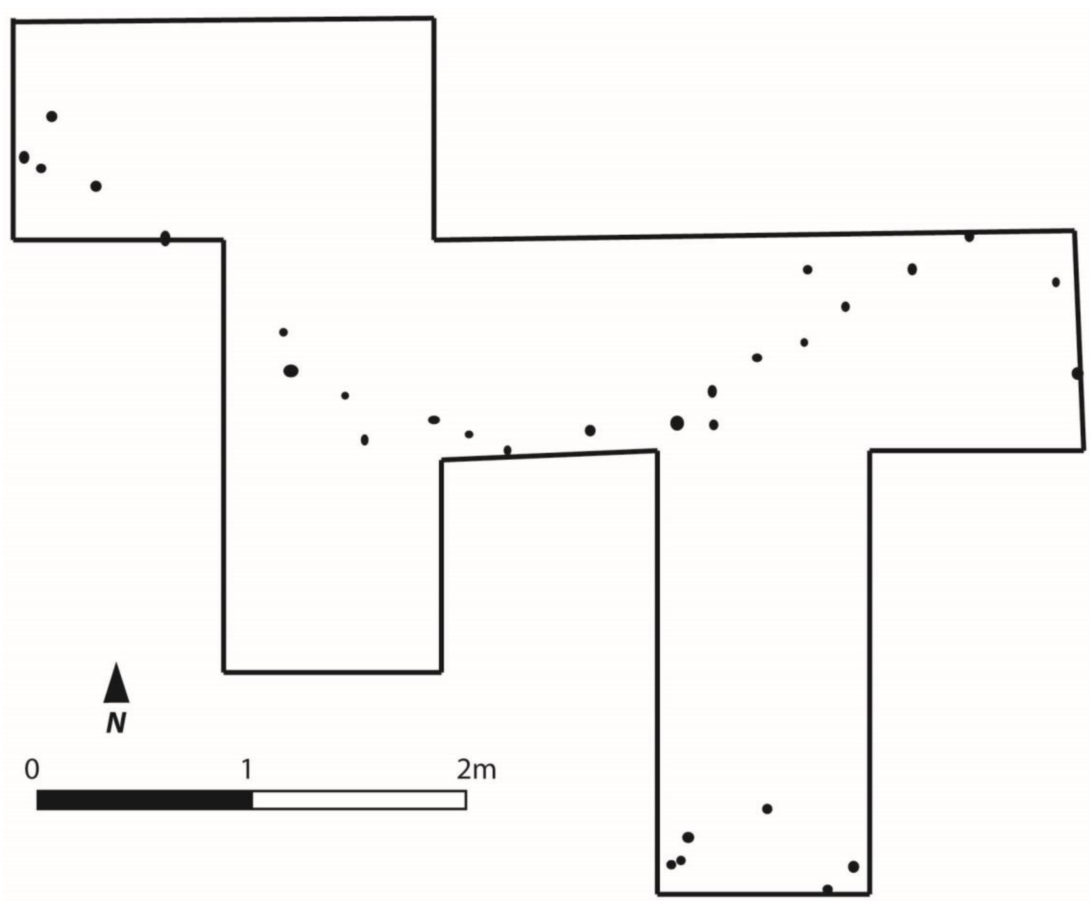

Figure 5.12. Map of excavated areas of the house at *Xaxas*, (SCRI-240, Prisoners Harbor) with redwood posts, after Arnold (2001: Figure 2.27).

5.11.6 Rick's Excavations on San Miguel Island

In addition to his work at SRI-2 on Santa Rosa Island (see above). Rick (2007a) excavated in and around house depressions at a number of sites on San Miguel Island, including SMI-87 on the northern shore of the Island at Cuyler Harbor, SMI-468, -470, and -481 on the northwestern shore at Otter Point, and SMI-163 on the northeastern coast. SMI-163 is believed to be part of the Early Historic village of *Tuqan*. Small test units and augers were excavated at these sites in an effort to generate baseline samples. No structural features were uncovered.

5.11.7 Gill's Excavations at SCRI-619/620 (Diablo Valdez) on Santa Cruz Island

Recent excavations at SCRI-619 and -620 near the northern ridge of Santa Cruz Island inadvertently revealed the edge of a house floor (Gill 2013) with two post holes at the edge of a compacted floor. Other house depressions, hearth clearing pits, and a roasting pit were observed in the vicinity (Gill 2013). The results of this project are the subject of Gill's Ph.D. dissertation research that is still in progress.

5.12 Discussion

Research on the Northern Channel Islands has revealed the presence of house depressions ranging in diameter from two or three meters to upwards of fifteen meters. Subsequent excavations have revealed that Island Chumash structures are varied in form, with defined and non-defined hearths, both compacted and indistinguishable floors, and posts made of a variety of materials and placed throughout the interior of the structure as well as around the edge of the floor. Only two brief descriptions of sweat lodges on the Northern Channel Islands have been recorded, and these accounts are both by Rogers and refer to structures observed on Santa Cruz Island. Although the archaeological examples of Island Chumash structures are varied and limited in number, they provide baseline data for which to evaluate the form and function of the four structures recently excavated at *Nimatlala* and described in detail in the following chapter.

CHAPTER SIX

The Structures of Everyday Life: A Detailed Account of Four Partially Excavated Structures at *Nimatlala*

6.0 Introduction

During the course of this project, portions of four structures were excavated at SCRI-324 and SCRI-384. Features and structural elements were uncovered in each. Excavated portions of each structure range from between one-third to three-fourths of the total structure area. Features are generally consistent with previously excavated examples of Island Chumash structures, but differ somewhat from the prescribed "norm" for Chumash house structure. The structures at *Nimatlala* demonstrate that construction techniques and location of house features are variable and may be influenced by the availability of materials, expected and actual pattern of use, and preexisting topography.

6.1 House 1 at SCRI-384

At the time of this project, three house depressions were visible at SCRI-384. House 1 (Figures 4.5 and 6.1) was chosen for excavation because House 2 lies mostly in the driveway that passes through the site, and the floor of the house is believed to have been partially/mostly destroyed by driveway preparation, maintenance, and use. Additionally, the smaller House Depression 3 could not definitely be associated with a midden deposit and was riddled with extensive tree root disturbance. A total of 3.5 square meters of House 1 was excavated, and as the house depression averaged 3.5 meters in diameter. The excavated 3.5 square meters is approximately one-third of the total area of the depression. Several features were identified during the excavations in this house depression, including a post hole, ashy hearth deposit, and a concentration of chlorite schist rocks (Figure 6.2).

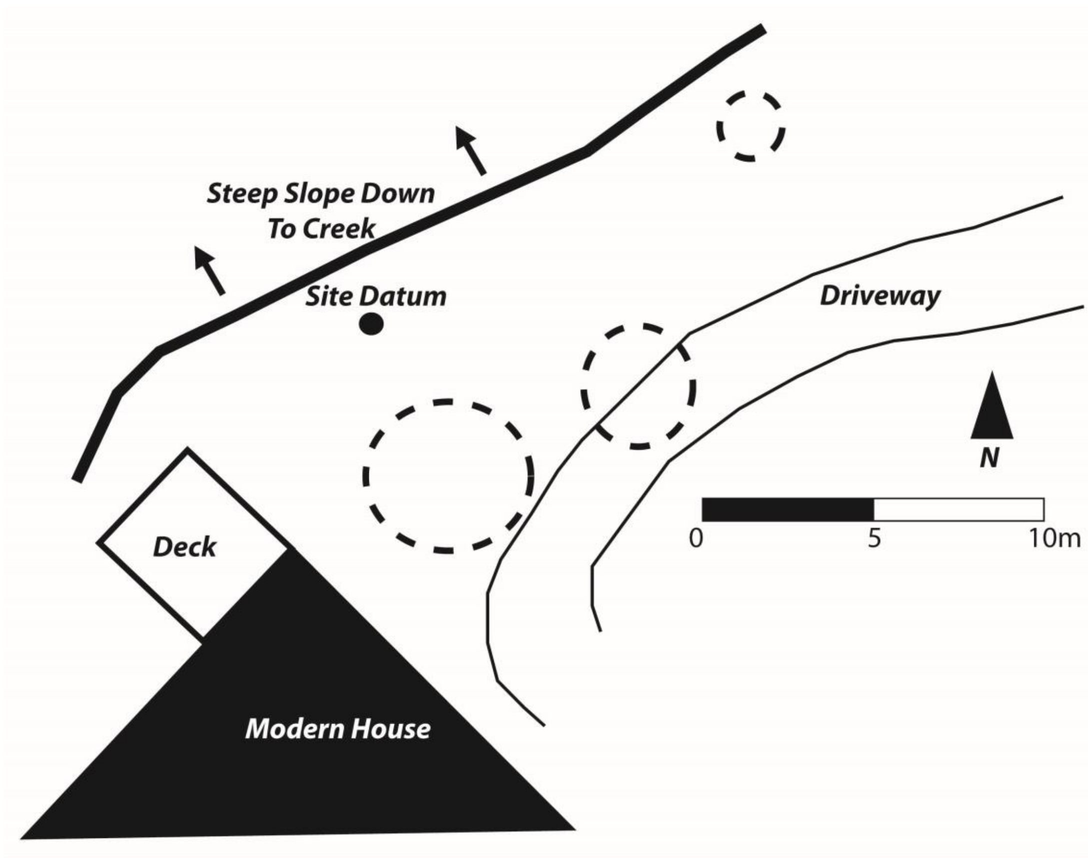

Figure 6.1. SCRI-384 general site map.

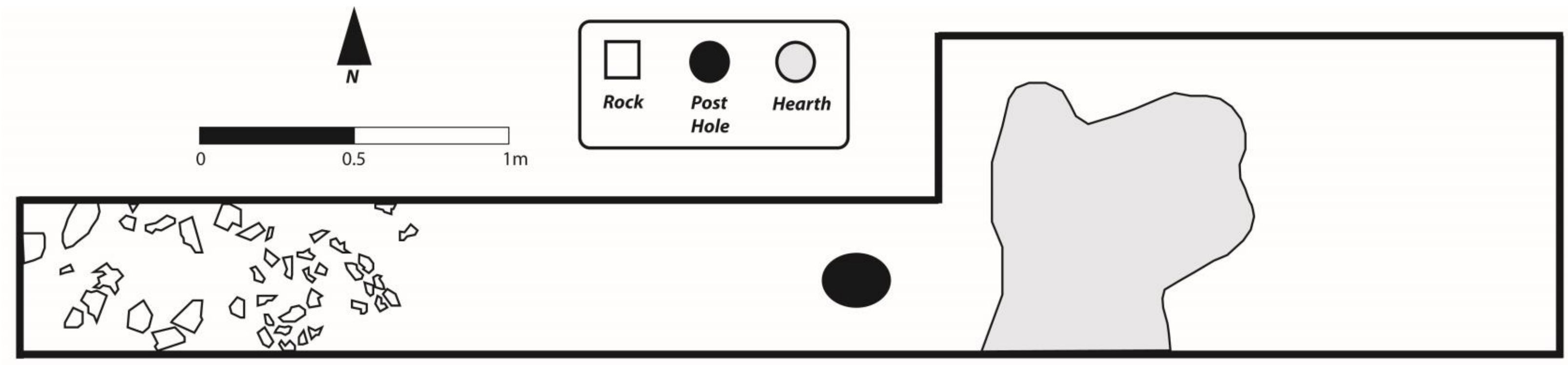

Figure 6.2. Plan view of the excavated area of House 1 at SCRI-384.

6.1.1 Compacted Possible House Floor Layer

In all of the excavated structures at SCRI-324 and -384 formal house floors were not discernable. Generally, the floor level was interpreted to be 2-5 centimeters thick and approximately 33 to 35 cm below the modern ground surface. This layer consisted of compacted soil that varied in both thickness and hardness across the span of the house depressions, with numerous artifacts found on top of and within the layer. In all structures, this compacted layer was also not discernable in the side wall profiles. It is believed that the floors of these structures were not formally prepared or plastered, and that the compact possible floor layer developed during the occupation of the structures, as residents would have compacted the soil inside the house with their movements while residing in the structures. Although the compacted layers were not visible in the sidewalls of the excavated units, during excavations they were generally quite distinctive in density in all structures from the much less compact top soil and fill of the structure and the sterile orange and brown clay below the structures. Additionally, although the compacted probable floor layers of these structures were not formally prepared, they were associated with post holes and hearth features similar to the house floors identified by Gamble (1991) at *Helo'* (SBA-46) and the features identified along with the structures at Pitas Point (VEN-27) (Gamble 1983).

The topsoil layer in each structure averaged about 5 cm in depth and contained mostly soil with an extremely low density of shell, bone, and the occasional artifact. Below the topsoil layer in each possible house structure was a fill layer containing soil along with varying densities of shell, bone, and artifacts that could have been deposited either purposefully after the structures were abandoned or naturally through rainfall or erosion of the surrounding deposit into the depression. The fill found in the possible sweat lodge was different in composition from the fill in the possible house structures and will be discussed below. In the house structures the fill layer was up to 30 cm in depth, and at the bottom of this layer the compacted possible house floor layers were encountered. The compacted layer contained bone and shell, but in lower densities than the fill layer. It also contained a higher density of artifacts. Below the compacted layer, a sterile level containing a high density of brown and orange clay and silt was identified.

At SCRI-384 in the south wall profile (Figure 6.3), the possible floor level appears to be where the sandy silt with shell and compacted silt layer meet. This deposit, interpreted as a floor surface was more compact than the deposit above, and many artifacts were found on this surface. Beginning directly under this level at 35 cm depth, a very compact sterile silt mixed with the orange-red sterile soil was found. The compacted possible floor layer in this house depression was broken apart in many areas by the extensive eucalyptus roots (Figure 6.4).

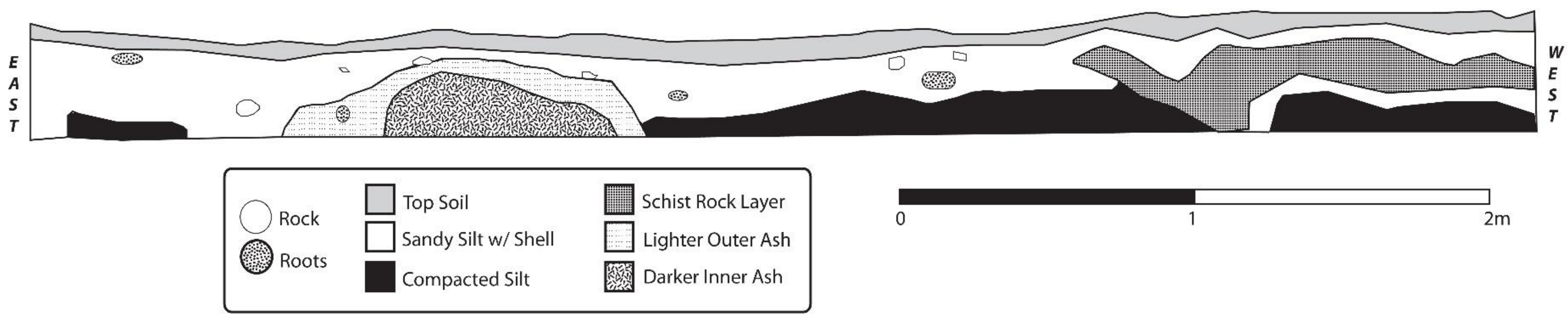

Figure 6.3. South wall profile of House 1 at SCRI-384.

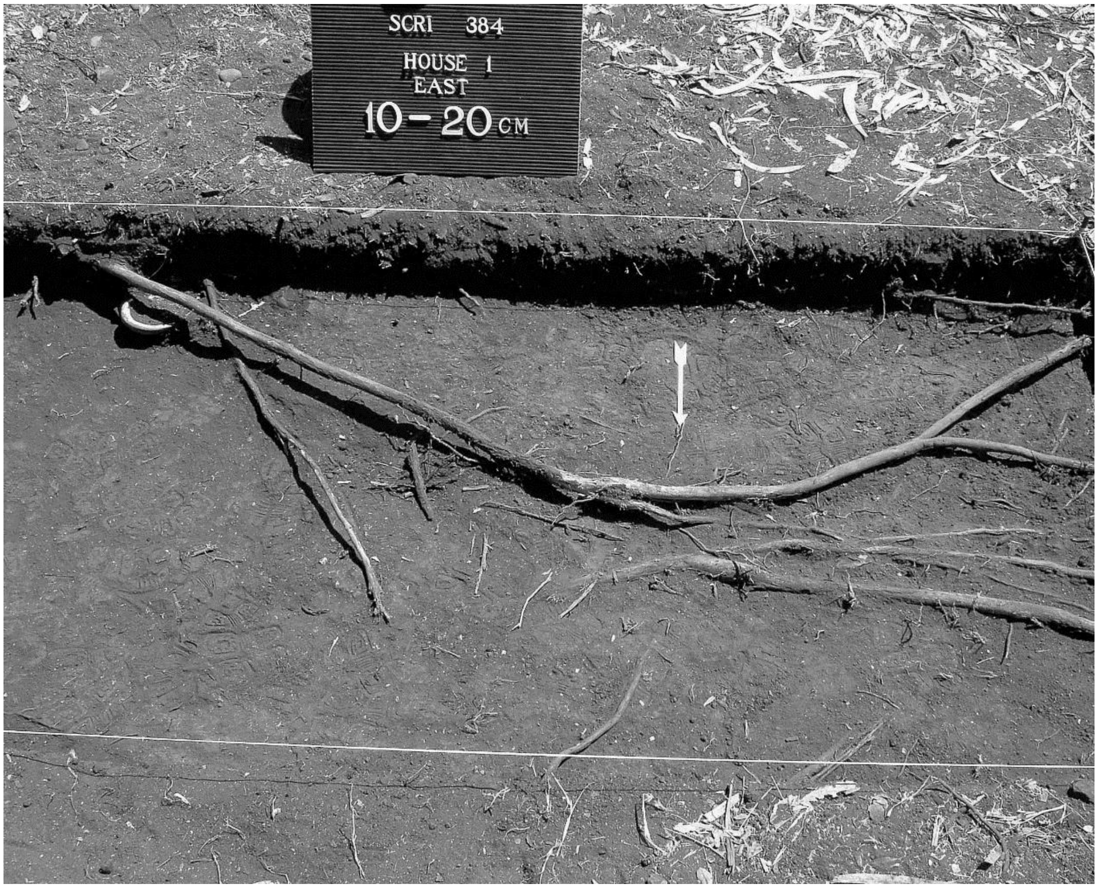

Figure 6.4. Evidence of extensive root disturbance just above and into the house floor.

6.1.2 Feature 1: Post Hole

One post hole (Figures 6.5 and 6.6) was located in the trench near the center of the house depression. A circular, discrete area of charcoal and ash was observed beginning at 26 cm below the surface. This feature was 18 cm in diameter and extended below the possible floor layer (33 to 35 cm below the modern surface) by about 5 cm to a depth of 40 cm. Large pieces of charcoal were found at the bottom of the hole, and these coupled with the discovery of numerous fragments of baked clay found throughout the house imply that this house burned during or after occupation.

Figure 6.5. Post hole at house floor level, with added dashed line to emphasize size and location.

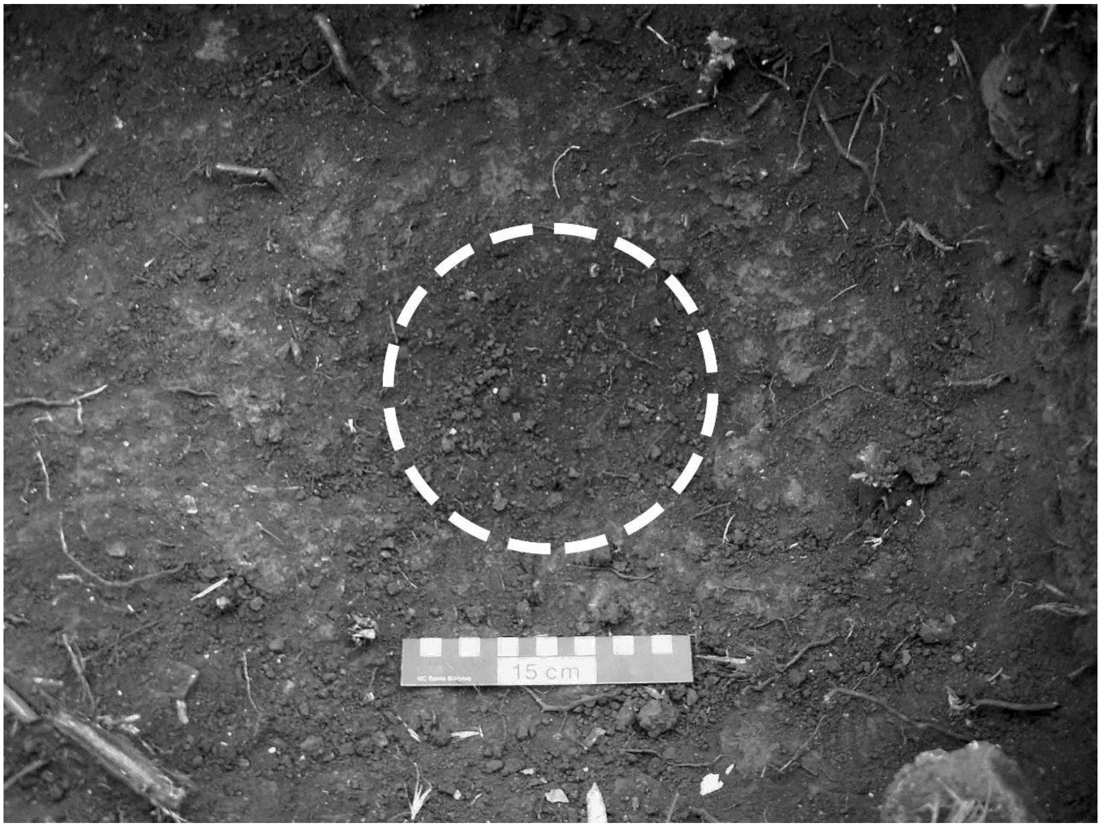

Figure 6.6. Close-up of post hole with dashed white line indicating location of hole. Note the lighter gray compacted silt of the house floor surrounding the darker, charcoal rich soil inside the hole.

6.1.3 Feature 2: Central Hearth

The hearth area was found near the center of the house, just east of the central post hole (Figures 6.7 and 6.8). At its greatest extent, this ash deposit was approximately 1 meter in width and 0.75 meters in length (Figure 6.7), and the deposit was visible in the southern side wall of the unit (Figure 6.8). The ashy matrix of the hearth was fine and very light gray with white patches of ash and small fragments of black charcoal, burned shell, and burned bone. Unlike typical hearths, no reddish hearth staining was found at the base of the deposit. The hearth feature extended below the possible floor layer by up to 20 cm in some areas (52 cm below the modern surface level), indicating multiple uses and hearth cleaning episodes.

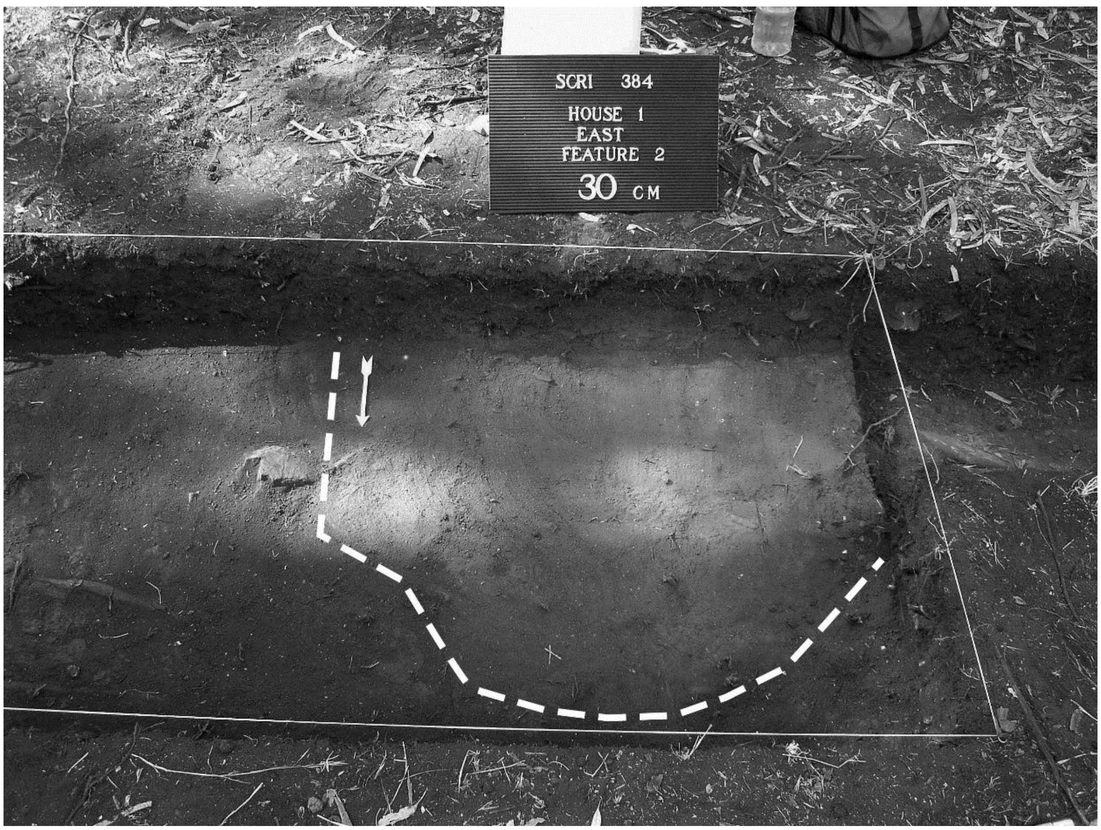

Figure 6.7. The central ashy hearth feature. Dashed white line depicts general extent of deposit.

Figure 6.8. View of southern side wall showing ashy deposit. Dashed white line indicates intersection of unit side wall and unit floor.

6.1.4 Feature 3: Chlorite Schist Stone Feature

While no post holes were identified at the perimeter of the house depression, on the western edge of the house, a rock lens was encountered that contained mostly chlorite schist rocks (Figures 6.9 and 6.10). Some edges of these stones showed wear consistent with being abraded in a drainage, and some showed evidence of heating. In this area of Santa Cruz Island, chlorite schist is naturally occurring in a 10 mile long schist formation located just south of *Nimatlala* (Weaver et al. 1969). The Chumash, particularly during the Middle Period, made stone beads of chlorite schist

(King 1990); however, few artifacts made of chlorite schist have been found on Santa Cruz Island. No formal chlorite schist artifacts were discovered during excavations at *Nimatlala*.

A likely scenario that explains how and why the chlorite schist stones came to be piled up on the edge of the house is that the rocks were originally collected from the creek bed just west of the site where they had washed downstream from the natural formations of chlorite schist. The majority of these stones were fire altered and therefore may have been used at one time in a baking pit that was not uncovered during the limited excavations at SCRI-384. Chlorite schist retains heat well and would be ideal for use in baking or roasting pits. This use would explain the damage to the stones caused by heat. The rocks are piled around the western perimeter of the house, creating a berm, but they do not extend around the entire perimeter of the house. The berm may have been used for several purposes, including support for either the vertical members of the house frame, or in combination with mud the berm may have supported the lowest section of house thatching. The pile of stones may have been sealed with mud which, after drying, would prevent water from washing into the house when it rained. The site itself is on uneven ground, with the western portion sloping up towards the ridge crest and the eastern section sloping down toward the Central Valley drainage. If one were seeking to prevent rain from washing into the house, a rock and earthen berm surrounding the western edge of the house would be necessary.

Figure 6.9. Pavement of primarily chlorite schist stones discovered on the western edge of the house.

Figure 6.10. Stone lens/berm visible in the south wall of the trench, excavated down to 20 cm below the ground surface.

6.2 South House at SCRI-324

Excavations at SCRI-324 began in late 2008, at which time two house depressions were visible (Figures 4.4 and 6.11). Excavation of the South House depression, measuring 4 meters in diameter, began with a 2.5 x 0.5 meter trench extending from the center of the depression to the eastern margin. Excavation of this unit led to the discovery of the southern portion of a central hearth (Figure 6.12). A 2 x 2 meter unit was then excavated directly north of the trench, and an additional 2 x 1 meter unit was placed directly to the south of the trench, totaling 7.25 m^2 of excavated area in the South House (Figure 6.13). Therefore, the total excavated portion of this house was just over half of the 12.6 m^2 total area of this house depression. The test trench provided enough stratigraphic information that the rest of the units were excavated in stratigraphic, not arbitrary levels. Level 1 consisted of modern top soil, and Level 2 contained a matrix of soil with some shell. Level 3, the compacted possible house floor layer, consisted of compacted soil, shell fragments, flecks of charcoal, and small pieces of the orange sterile soil. Directly below this possible floor layer was the orange sterile soil.

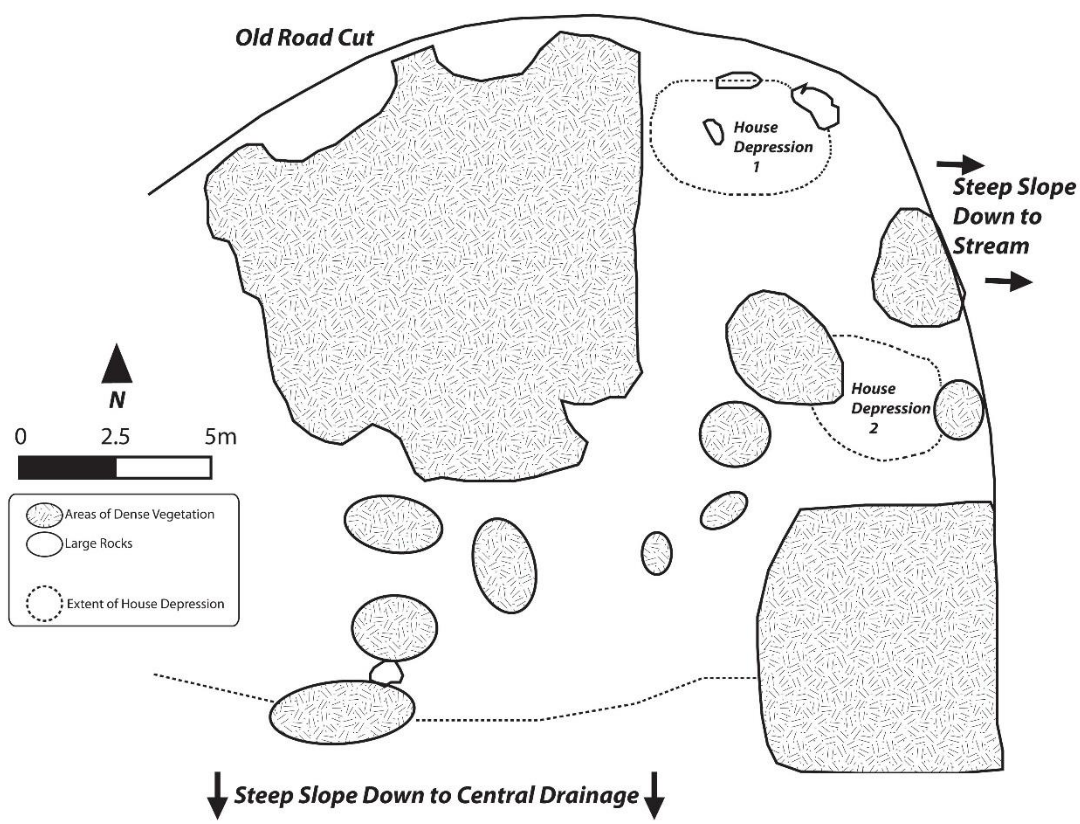

Figure 6.11. General map of SCRI-324 before excavation.

Figure 6.12. Initial trench in the South House at SCRI-324 showing the southern portion of a central hearth. Dashed white line delineates hearth boundary.

6.2.1 South House Compacted Possible House Floor Layer

While no exterior post holes were found around the perimeter of the house floor, a rough outline of the floor was visible (Figure 6.14). Around the northern perimeter, small rocks in a ring shape signal the possible floor edge. In the southern perimeter the structure was dug slightly into sterile soil, likely in an attempt to make the floor more level. The compacted possible floor layer was very difficult to discern in this house. The majority of artifacts were found on a slightly more compacted surface just above the sterile layer, although there was no change in soil color and this compacted layer was not visible in the side walls of the excavated units.

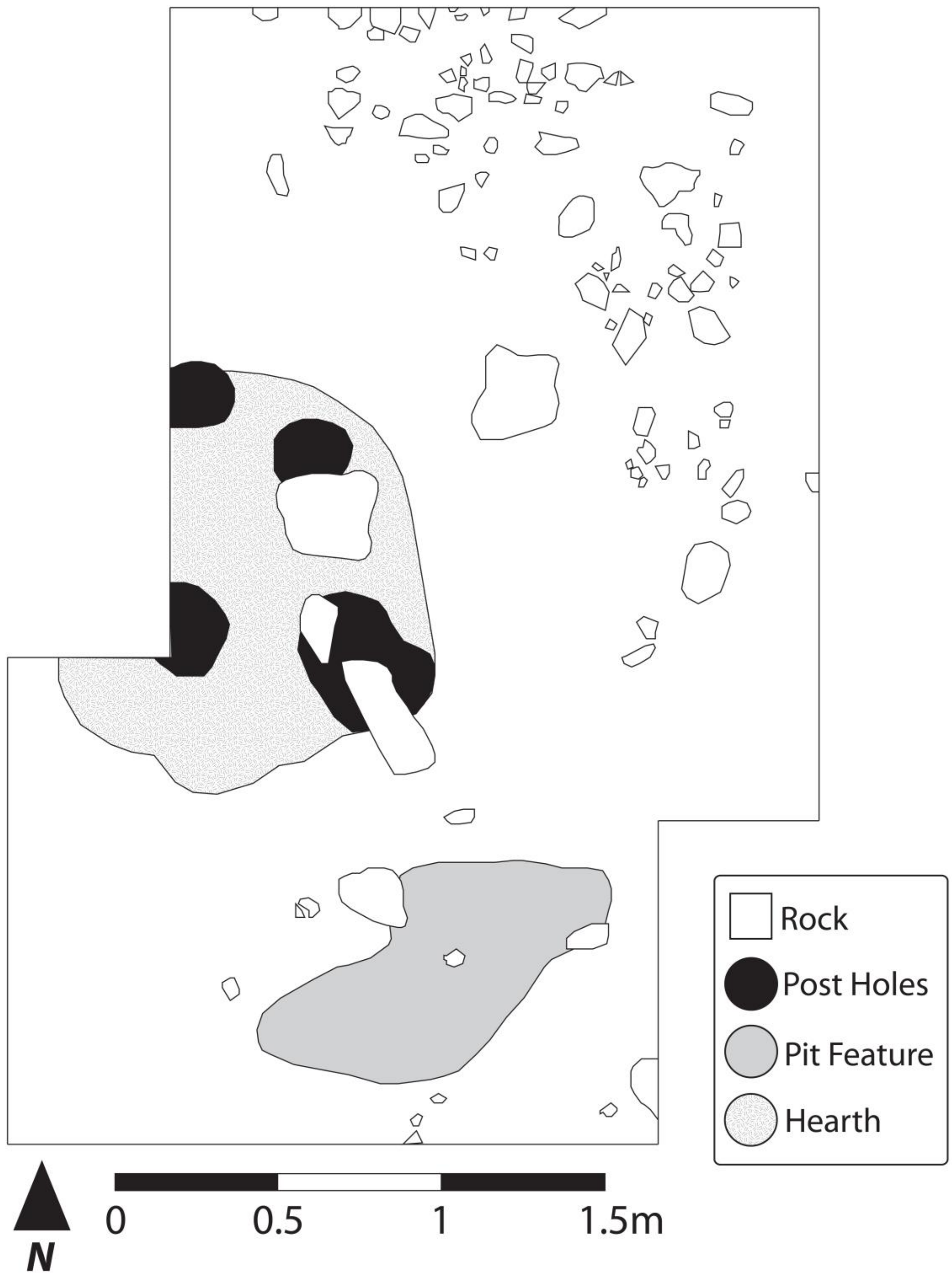

Figure 6.13. Plan view of excavated area of the South House at SCRI-324.

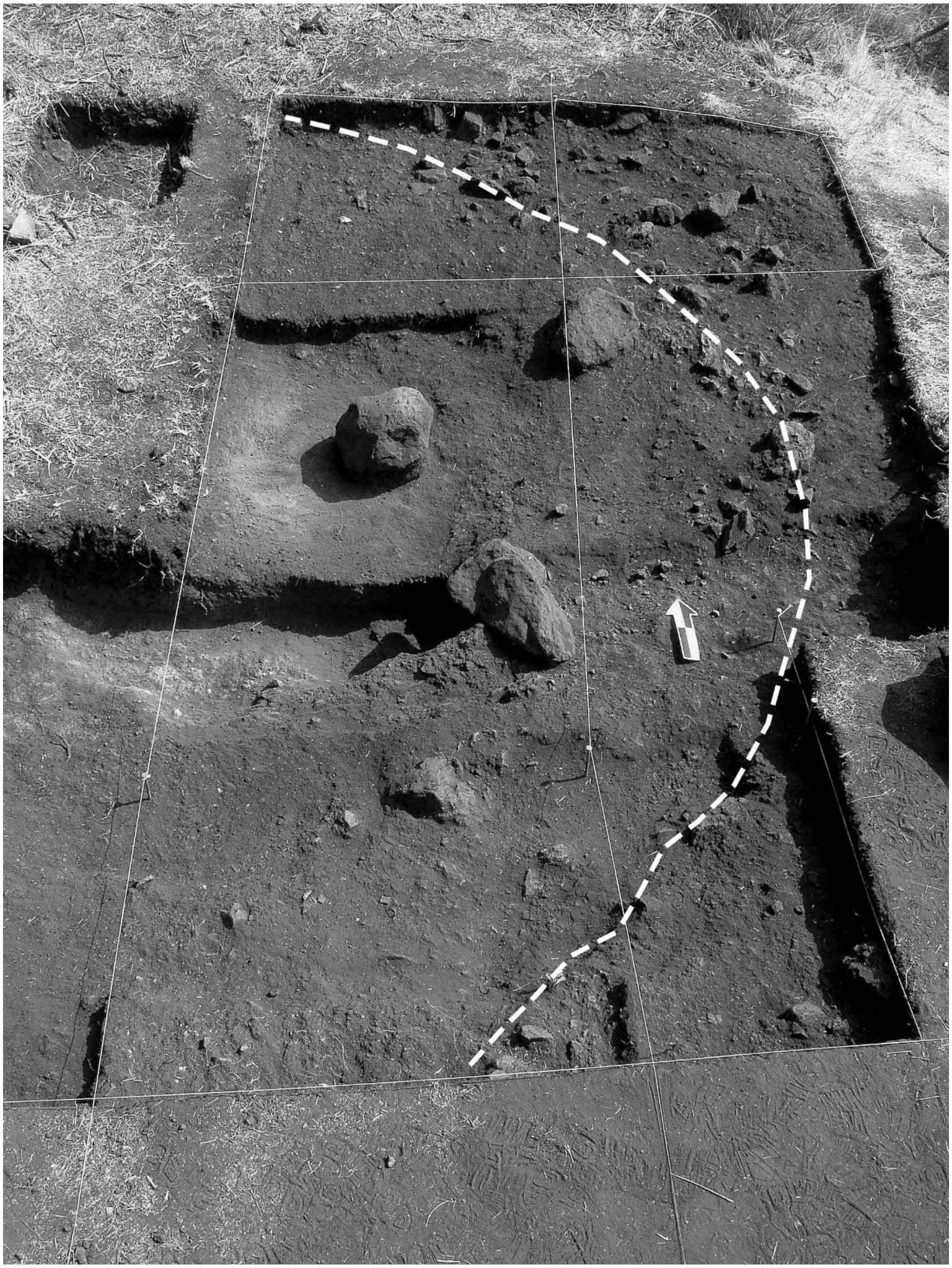

Figure 6.14. View of the South House with a dashed white line added to show the edge of the house floor.

6.2.2 Feature 1: Central Hearth and Four Post Holes

The maximum diameter of the central hearth was 1 meter (Figure 6.15). At the possible house floor level (Level 3) two large stones were placed in or partially inside of the hearth. Under the rock in the northern area of the hearth, a fragment of a burned perforated stone (doughnut stone) was found. Although not visible at the top of the compacted possible floor layer, further excavation of the hearth revealed one possible and four definite post holes (Figure 6.16). No post holes were found around the perimeter of the house depression. The three smaller post holes are approximately 15 cm in diameter at the base and 20 cm or more in diameter at the evel at which they were discovered (possibly the top of the compacted layer). From the level at which they were discovered to their bases, post holes measured between eight and twelve centimeters in depth. The pole that was fitted into the southeast post hole appears to have been moved around frequently, or perhaps even removed and fitted with a new post, as the hole has been damaged and widened. A few stones were found in the hole and possibly served as wedges to keep a post in place in the widened hole. In the bottom of all of the holes, fragments of charcoal were found, suggesting that the house burned during or after use. Additionally, baked clay was recovered from this house. It is uncertain whether all four posts were used at the same time, particularly as all four appear to be located in the central hearth area. Additional posts could have been added to support the structure as it aged, or these post holes may represent house rebuilding episodes.

Of particular interest is the southwest post hole, which appears below the top ash deposit (Figure 6.17). Clearly this post had been removed or had burned before the hearth was in use as the ash layer above the hole is perfectly intact. It appears likely that perimeter posts may have supported the house structure while the hearth was in use. Even though perimeter posts were not uncovered at any of the structures during these excavations, it is possible that small perimeter support posts were in place but left no visible trace. Exterior posts could have simply rested on the ground without being sunk into it. A solid layer of mud around the exterior would have sealed the posts and prohibited shifting. In all four structures the one or more post holes found in the structure are located near the center close to the hearth. This arrangement is counterintuitive, as the heat and flames from a hearth could quite easily ignite a nearby post. However, it is possible that precautions were taken to reduce this risk, such as sealing the posts with mud. There are no ethnographic or historical records of this practice, although the Chumash were known to use mud in house construction for sealing the exterior to keep water out, for plastering the floors of structures, and for sealing the roofs of sweat lodges. Additionally, while food refuse was found in the hearths, the majority of cooking may have occurred in open-air communal hearths such as the one located at SCRI-801 on the adjacent hill and believed to be part of the same village (Perry and Delaney-Rivera 2011). If this were the case, and if the village was occupied during warmer months, the hearths in the structures may have been used infrequently.

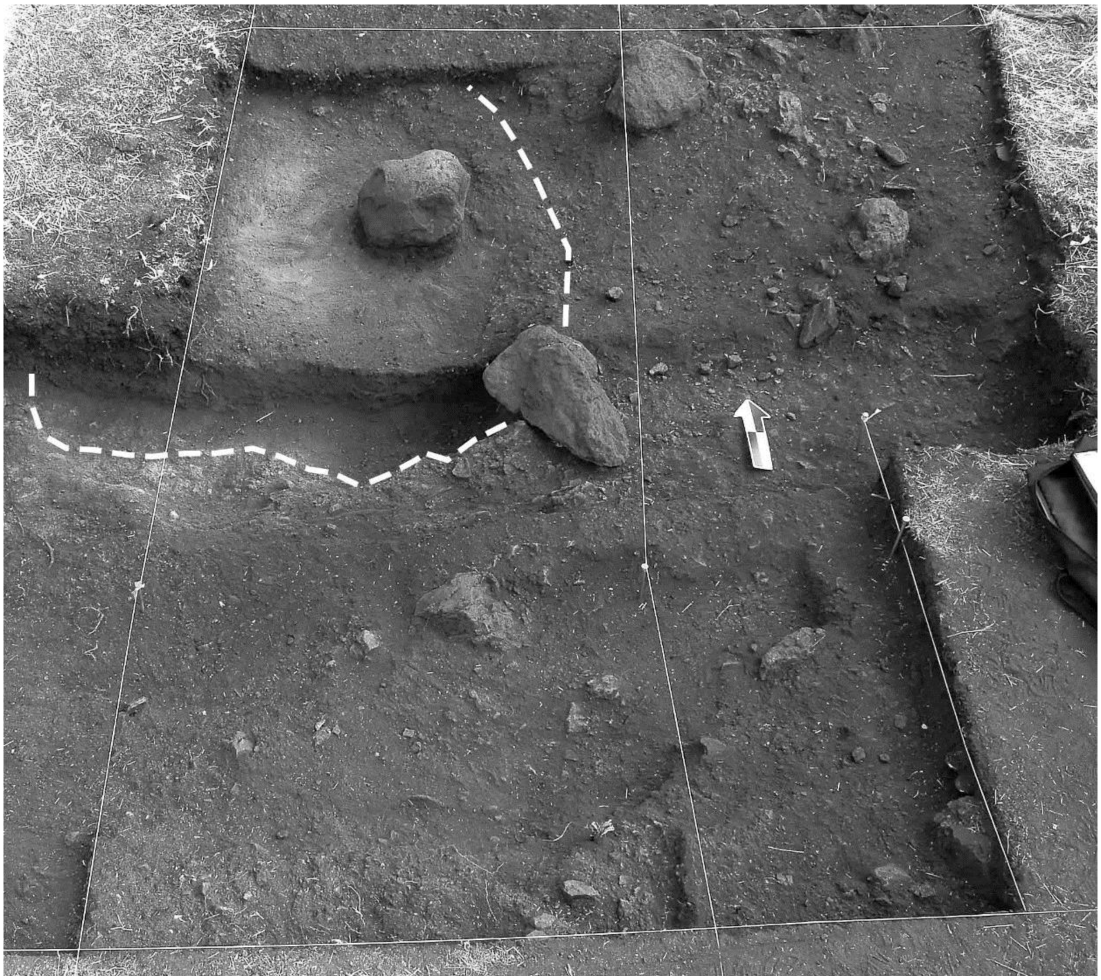

Figure 6.15. South House at house floor level. Extent of central hearth noted with dashed white line.

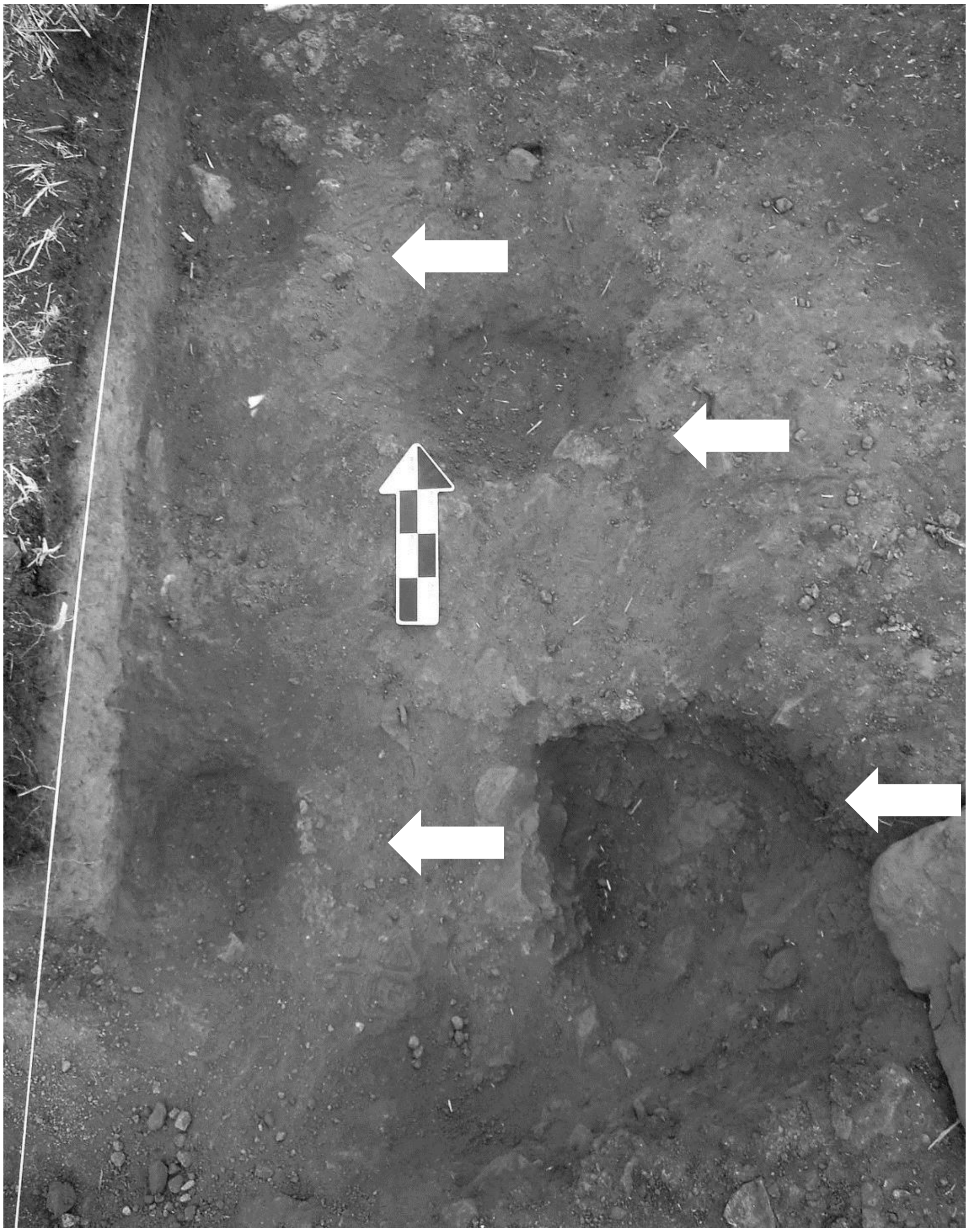

Figure 6.16. Central hearth area with four post holes. White arrows point to each post hole.

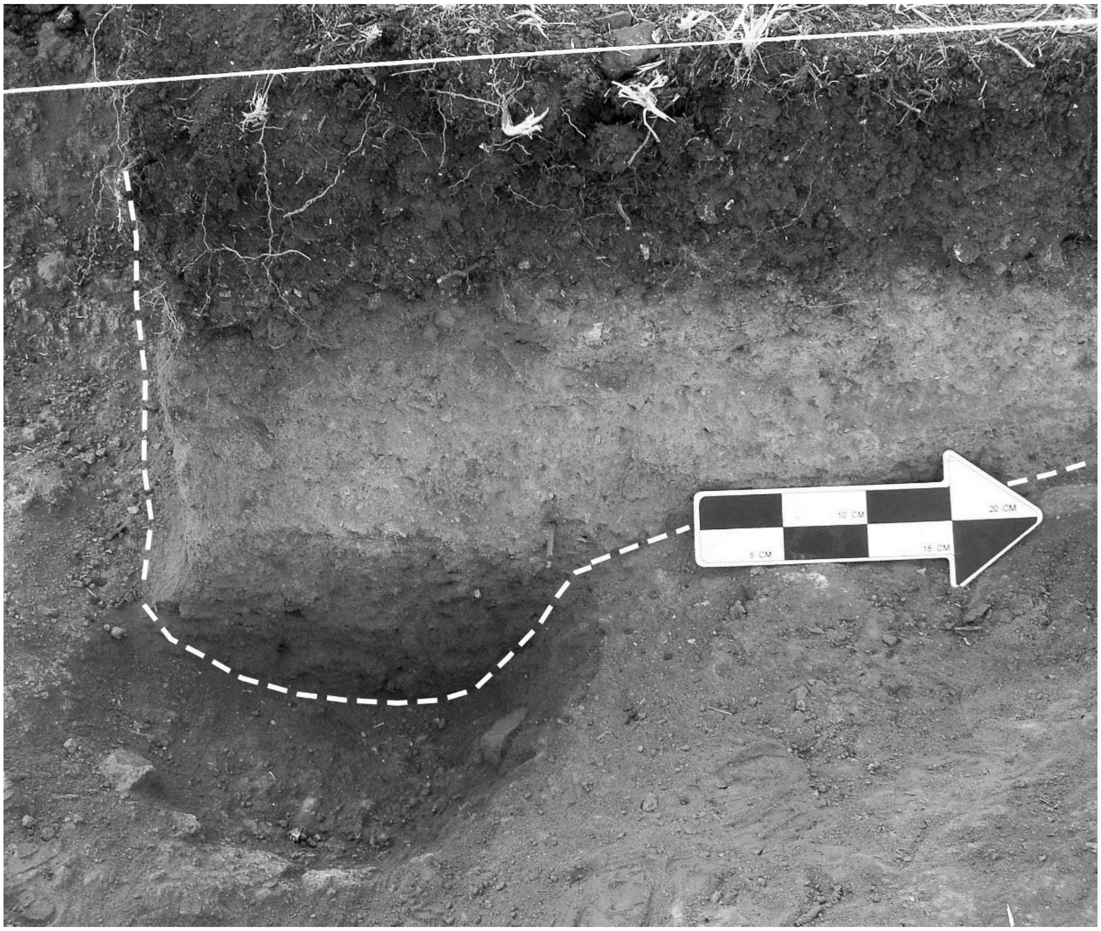

Figure 6.17. Corner side wall of South House units in central hearth. Dashed white line identifies where unit side walls meet unit floor. Note the dark, charcoal-rich soil of the base of the post hole below the lighter ash deposit.

6.2.3 Small Pit Feature

In the southwestern section of the structure a small pit was located and excavated (Figure 6.13). The pit contained some large pieces of fish bone (including a few articulated vertebrae), shell, and small pieces of charcoal. The shell and bone were not burned. It is unclear what function this pit served, but possibly the pit represented the disposal of the refuse of a single meal.

6.3 North House at SCRI-324

The North House depression at SCRI-324 was well defined due in part to the apparent effort in the south portion of the depression to dig out part of the hill to create a flat house floor (Figure 6.18). Flat land in this vicinity is extremely limited, and therefore it was necessary to alter the landscape in order to create flat areas large enough to build the small houses. As this house depression was well defined, a 0.5 meter wide test trench (as was used in House 1 at SCRI-384 and the South House at SCRI-324) was deemed unnecessary. A 3 x 1 meter unit was excavated in the center of the depression. The excavations were then expanded with an additional 3 x 1 meter unit placed adjacent to the first unit, for a total excavated area of 3 x 2 meters. The rim-to-rim diameter of this depression averaged 3.5 meters. Therefore, the total excavated area of 6 m^2 is just under two-thirds of the total 9.6 m^2 area of the house depression. However, the compacted possible house floor layer measured 3.2 m in diameter, and the 6 m^2 of excavated house floor represents three-fourths of the 8 m^2 total floor area. One central post hole was also discovered in the house.

The matrix of the bulk of the fill in this house depression was extremely fine and ashy; much more so than the deposits in any other structure at SCRI-324 or SCRI-384. The ashy nature of the soil coupled with lack of a formal hearth structure made definition of the central hearth difficult. The extremely fine and ashy matrix may be due to several factors, including the deep nature of the depression on all

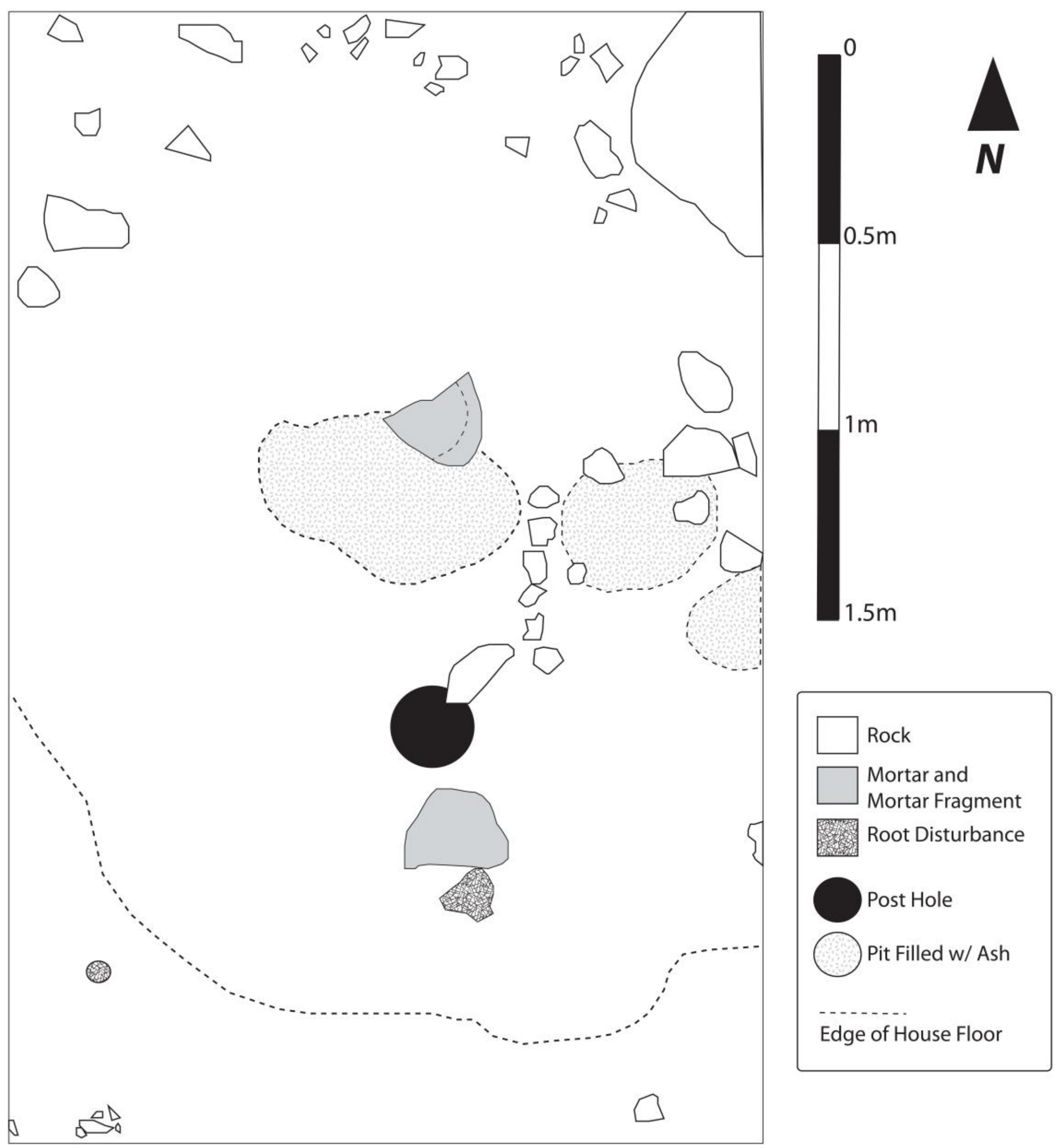

Figure 6.18. Plan view of excavated area of the North House.

sides, which did not allow for any ash from the burned material from the house to wash or erode out of the depression, and location of the depression under a stand of trees and bushes created a fine top soil layer of plant material in various stages of decay. As the matrix was mostly pure ash with little burned shell and bone, it is not believed that the ash was the result of trash disposal including hearth cleanings. The fill in the structure interpreted as a sweat lodge (discussed below) is more consistent with a deposit formed through trash and hearth cleanings disposal.

6.3.1 North House Compacted Possible House Floor Layer

Although the south end of the structure was clearly dug into sterile soil in an attempt to create a flat house surface, the base of the structure still sloped slightly downwards towards the north. The edges of the 3 x 2 meter unit reveal areas of sterile soil that slope up from the compacted possible house floor, creating an arced, sloping bank indicating the edge of the possible floor layer (Figure 6.20). The large stone on the north edge (Figures 6.21 and 6.22) was likely located partially inside of the structure, and large stones to the east of the house depression also likely signal the eastern boundary of the house depression. This structure is a good example of humans working to fit a structure into a desired location that is not ideal. The compacted possible house floor layer was again difficult to discern in this depression. Similar to the other possible house structures excavated at this village, the compacted possible floor layer was not distinct enough in color to be visible in the side walls of the excavated units. Instead the compacted layer just above the sterile deposit, on which most of the artifacts were recovered, was interpreted as the possible house floor layer.

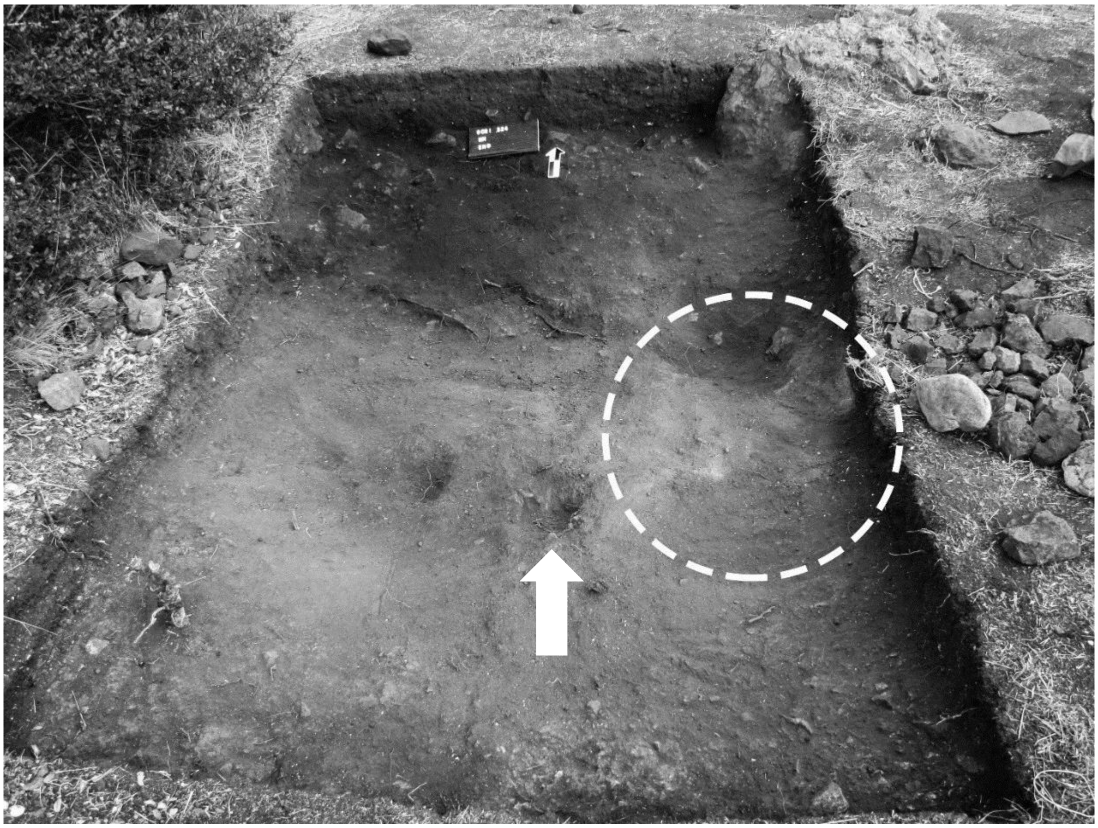

Figure 6.19. View of the North House at SCRI-324 below floor level. Hearth area noted with dashed white line. A post hole was located just above the white arrow. Depression to the left of the post hole is the result of an initial test unit placed in the house depression. The darker soil in the northwest of the unit is the result of rain water accumulation.

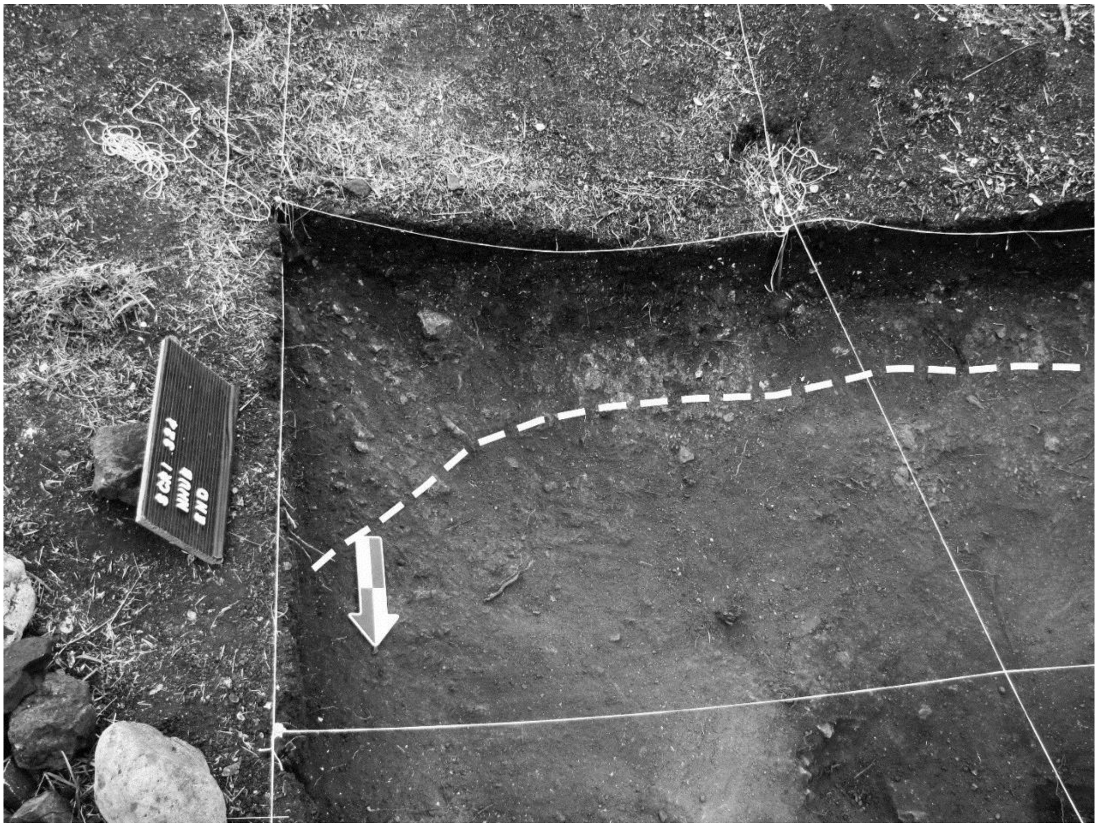

Figure 6.20. Southern extent of the North House compacted possible floor layer with edge identified by dashed white line. Area to the south of the line slopes upward quite abruptly, and the created arc shape identifies the house floor boundary.

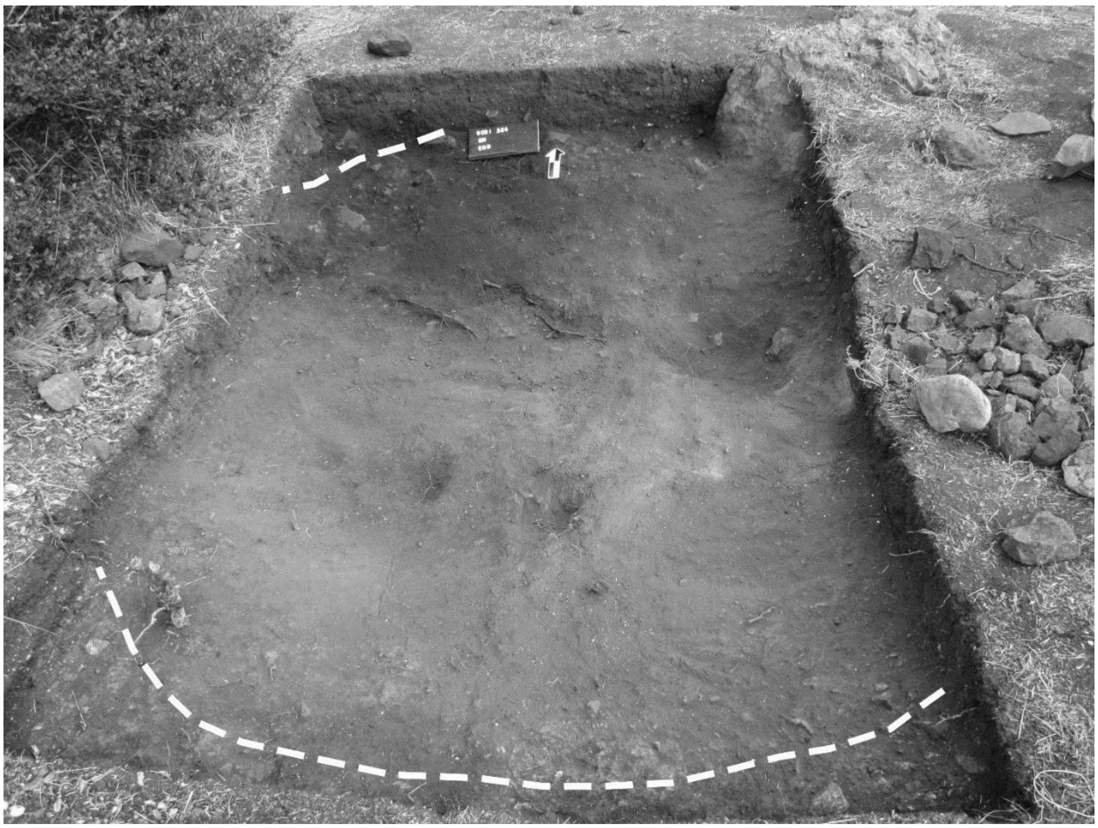

Figure 6.21. Extent of excavations at the North House at SCRI-324. Dashed white lines represent the edge of where the house depression was dug into sterile soil.

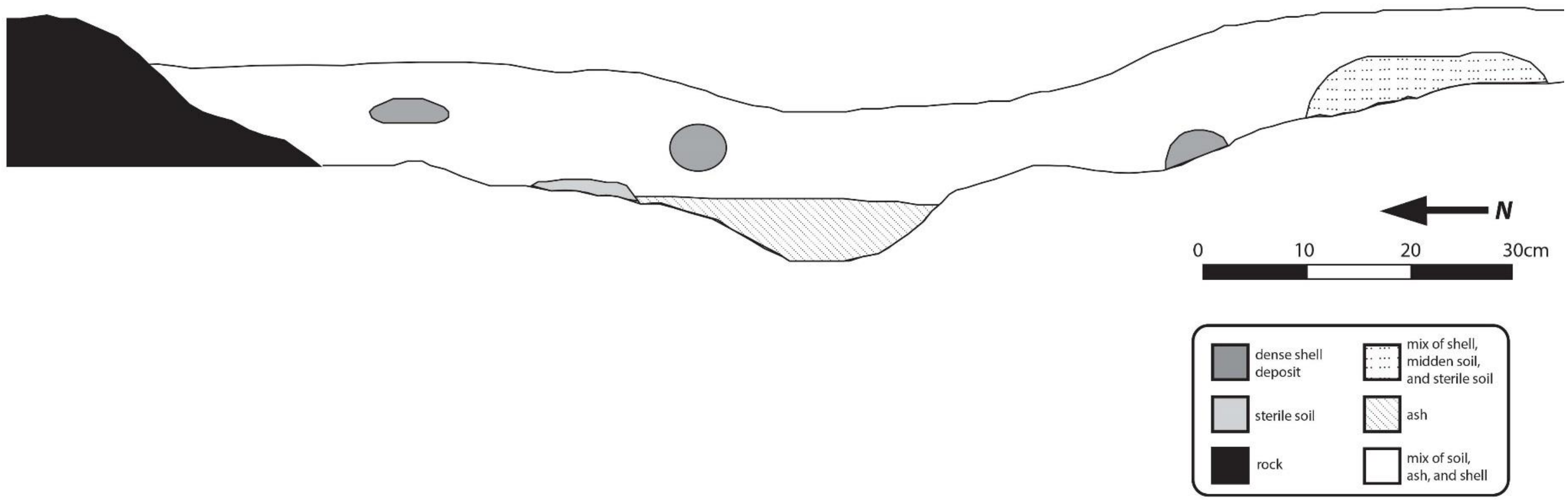

Figure 6.22. East sidewall profile of excavated area of the North House. The level interpreted as a house floor is not visible in the side wall, but was encountered just above the sterile layer.

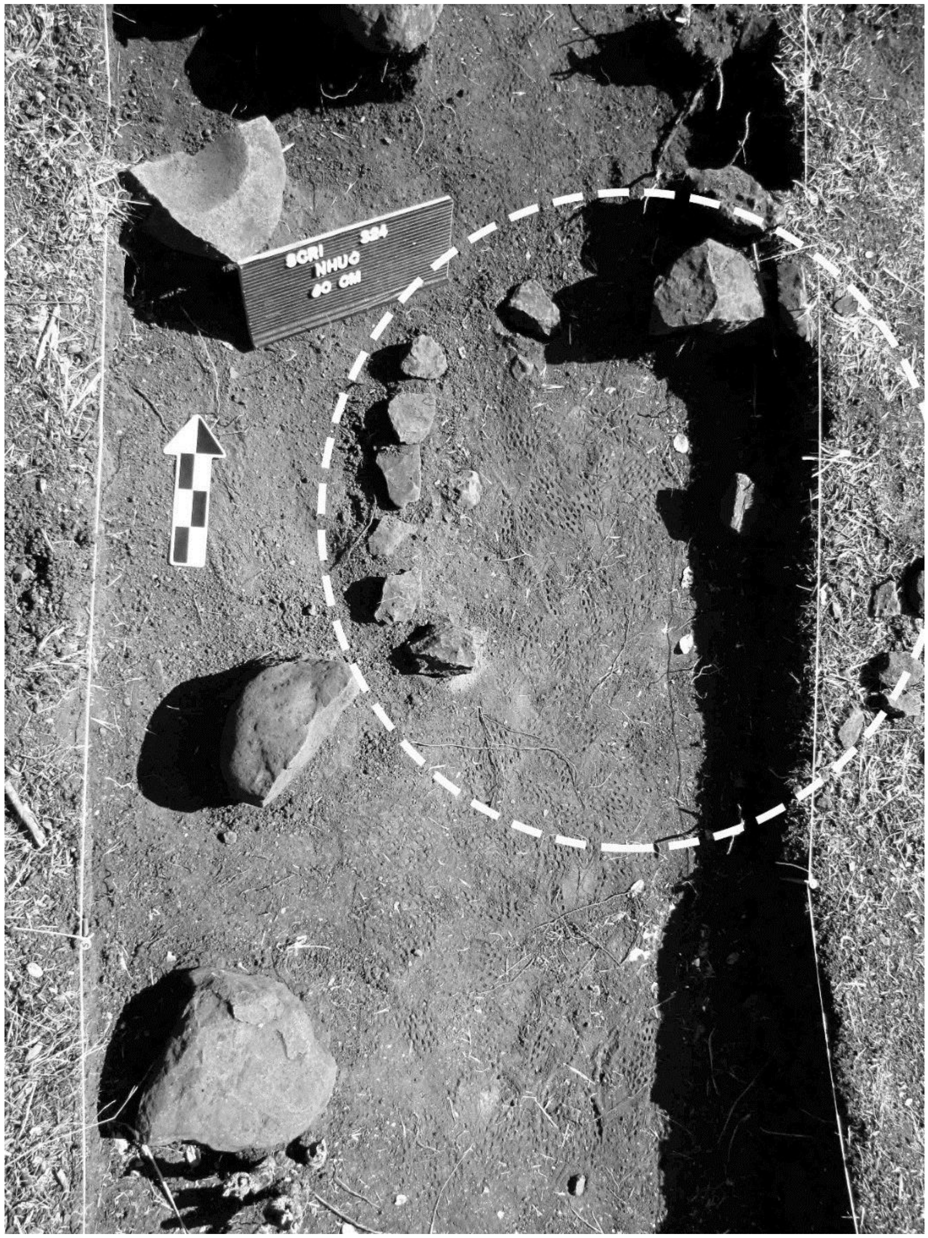

Figure 6.23. Photo of compacted possible floor layer at the North House at SCRI-324 with general hearth area defined by dashed white line. Note the mortar fragment just northwest of the hearth. When turned over, the large stone in the southwest corner of the photo was also found to be a complete mortar.

Figure 6.24. Initial 3 x 1 meter unit in center of the North House at SCRI-324. Unit has been excavated to the compacted possible house floor surface.

6.3.2 Central Hearth

Although difficult to distinguish because of the ashy soil matrix, a feature identified as a central hearth was delineated. At the compacted possible floor layer (approximately 15 to 20 centimeters below the modern surface level) the maximum hearth diameter was 1 meter, and it extended into the unexcavated portion of the house to the east. Several small fire-affected rocks mark the western edge of the hearth (Figures 5.23 and 5.24). Boundaries of the hearth were difficult to discern, and the western central area of the house floor also contained much ash. The base of the ash deposit in the hearth area extended a few centimeters below the level of the possible compacted floor layer.

6.3.3 Central Post Hole

One central post hole was discovered just west of the central hearth at the possible floor level (Figure 6.18). The hole extended through the compacted possible house floor layer by only 5 cm. Small amounts of charcoal were found at the base of the hole, and the combination of this feature, the presence of baked clay fragments, and the extremely ashy soil matrix indicate quite compellingly that this house burned during or after occupation. The photo shows an additional hole to the left of the post hole. This additional depression is the base of a 20 x 20 cm test unit previously excavated to determine the chronology and constituents of the deposit.

6.4 Structure Three: A Semi-Subterranean Structure at SCRI-324

No surface indication was apparent for the presence of the semi-subterranean structure at SCRI-324. The structure was located during excavation of one of the 0.5 x 0.5 meter units selected for excavation using a random numbers table. The initial 0.5 x 0.5 unit revealed part of a large, flat stone that was suspected to be a large metate. Therefore, another 0.5 x 0.5 unit was placed adjacent to the first unit in a position that would allow us to determine if the stone was an artifact. This second unit revealed that although the stone was not a metate or artifact, it was placed next to another large stone in a way that suggested purposeful placement. We then excavated another 0.5 x 0.5 meter unit in line with the other two units in an effort to ascertain why the stones were placed in this manner (Figure 6.25). It was during the excavation of this third 0.5 x 0.5 meter unit that we discovered the level of sterile ground on one side of the line of stones was much deeper than the sterile ground level on the other side of stones. Larger units were then placed to the west of the stone line to determine the cause of the uneven ground surface levels, and it was quickly found that a pit was present and that the stones marked the edge of this pit. The total excavated area was 4.25 m^2, representing approximately half of this structure, which measures 3 m in maximum dimension.

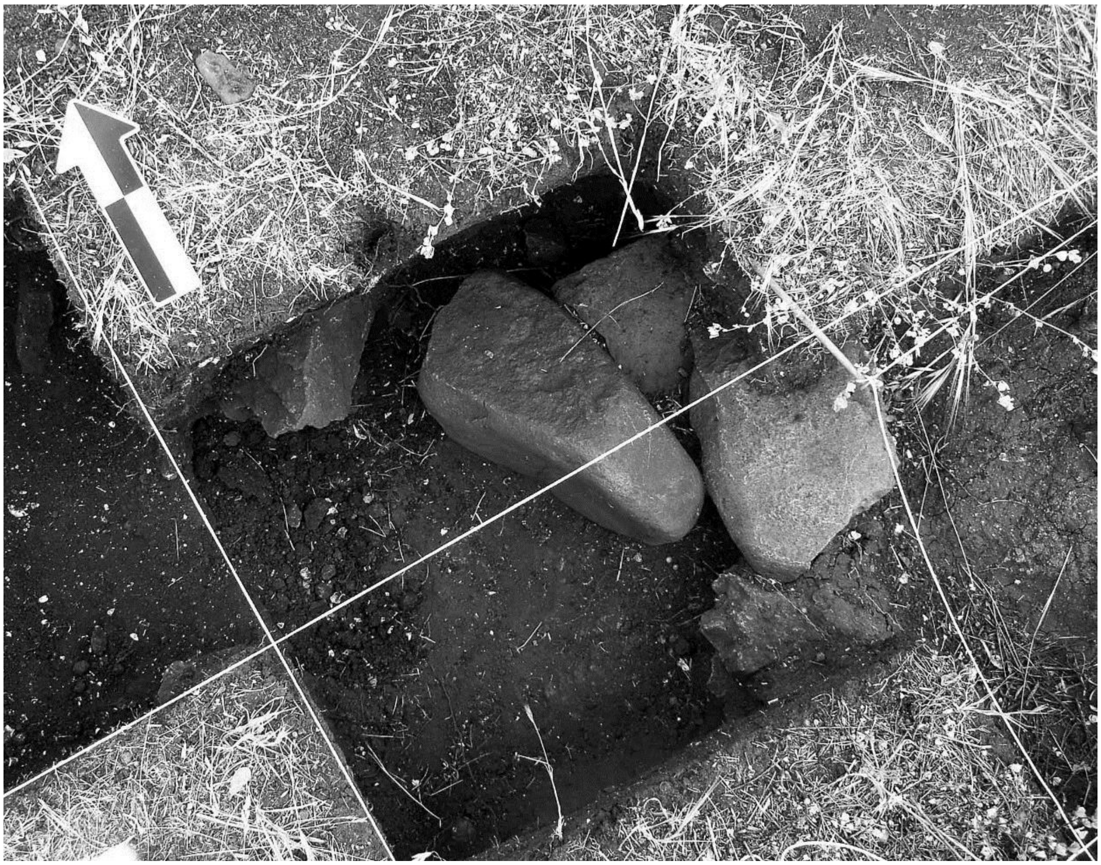

Figure 6.25. Cluster of stones encountered during excavations at SCRI-324. Rocks have been purposefully fit together.

6.4.1 Structure Three Compacted Possible Floor Layer

Because of the semi-subterranean nature of this structure, the sides and edges of this structure are primarily a sterile soil surface with, in the deepest areas of the pit, one to three centimeters of more compacted soil and an ash lens associated with a small central basin hearth. Both the compacted soil layer and the ash lens were discovered at 46 cm in depth. The compacted soil layer was located around the perimeter of the structure's presumed floor area, while the ash lens was in the center of the structure. Directly below the compacted layer was sterile soil, while under the ash lens a small basin hearth was identified. The structure was dug over half a meter into extremely hard, orange clay sterile soil. In several areas of the site I dug into the sterile soil up to 20 cm to verify that no additional occupational layers existed below that soil. Consequently, I can attest that even though the structure is small, substantial time and effort would have been needed to construct this structure. Perhaps if the structure had been dug after a season of heavy rainfall the task may have been easier. The line of stones on the eastern edge of the structure (Figures 6.26 and 6.27) may have served a structural function, assisting in securing the above-ground portion of the structure. In the northeastern area of the structure, the edge can be seen where it was dug slightly into sterile soil, creating an arc (Figure 6.28). The arc of the edge of the structure can also be seen in the southeast quadrant of the excavated area (Figure 629). On the basis of the amount of the floor area exposed, the structure appears to be designed in the shape of a rounded rectangle (Figure

6.30). The slope on the southern edge of the pit is quite abrupt, but the slope on the northern edge is more gradual, suggesting that entrance to the structure was from the north.

Figure 6.26. Rock wall on the eastern edge of the semi-subterranean structure at SCRI-324. Rocks tied with flagging tape had fallen deeper into the pit and were then moved back to their likely location in the formation.

Figure 6.27. Close-up of stone wall on eastern edge of SCRI-324.

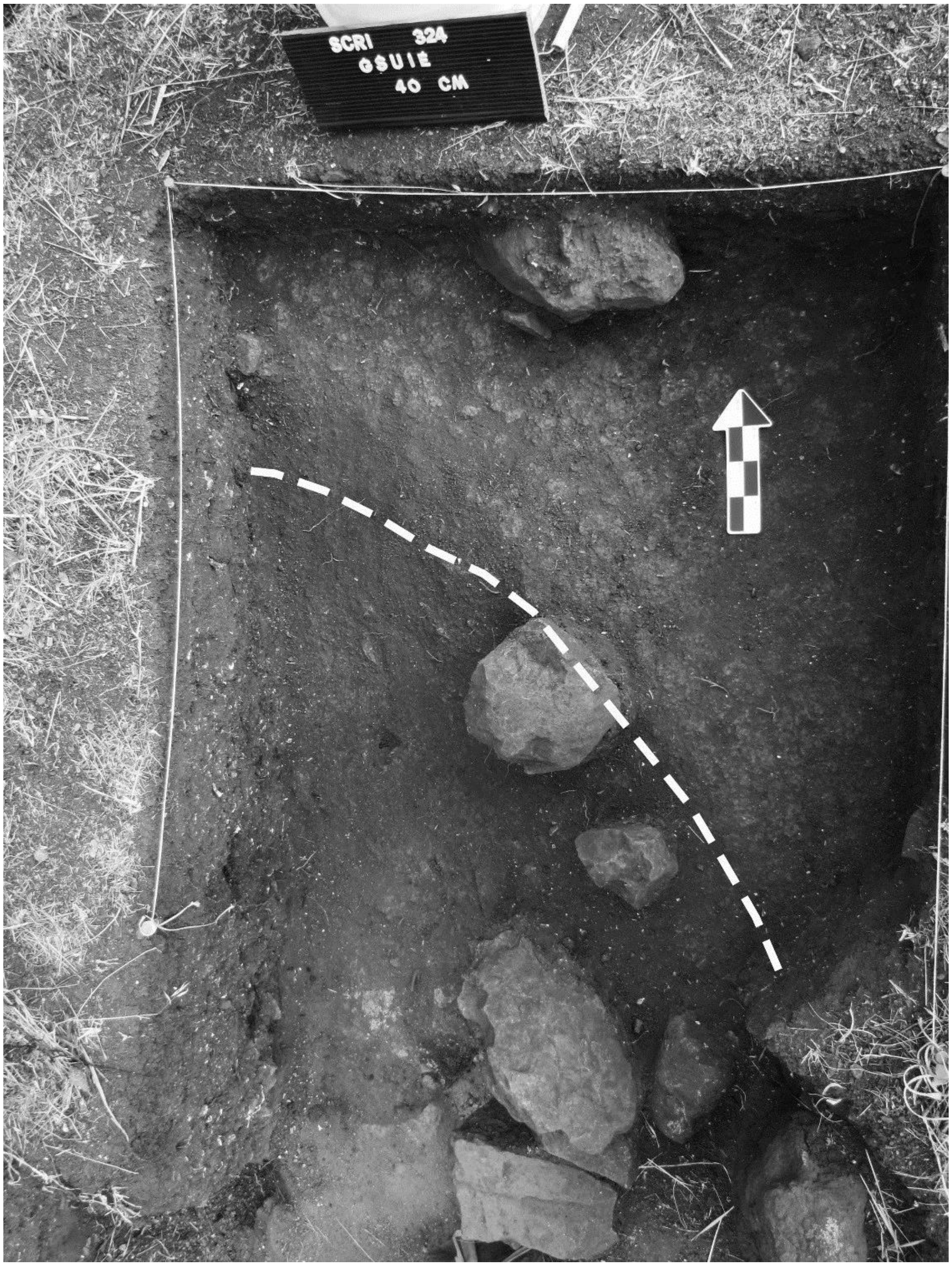

Figure 6.28. Northwestern edge of semi-subterranean structure at SCRI-324 with curved pit edge emphasized with white dashed line.

Figure 6.29. Southeastern edge of semi-subterranean structure at SCRI-324. Dashed white line added to emphasize extent of pit.

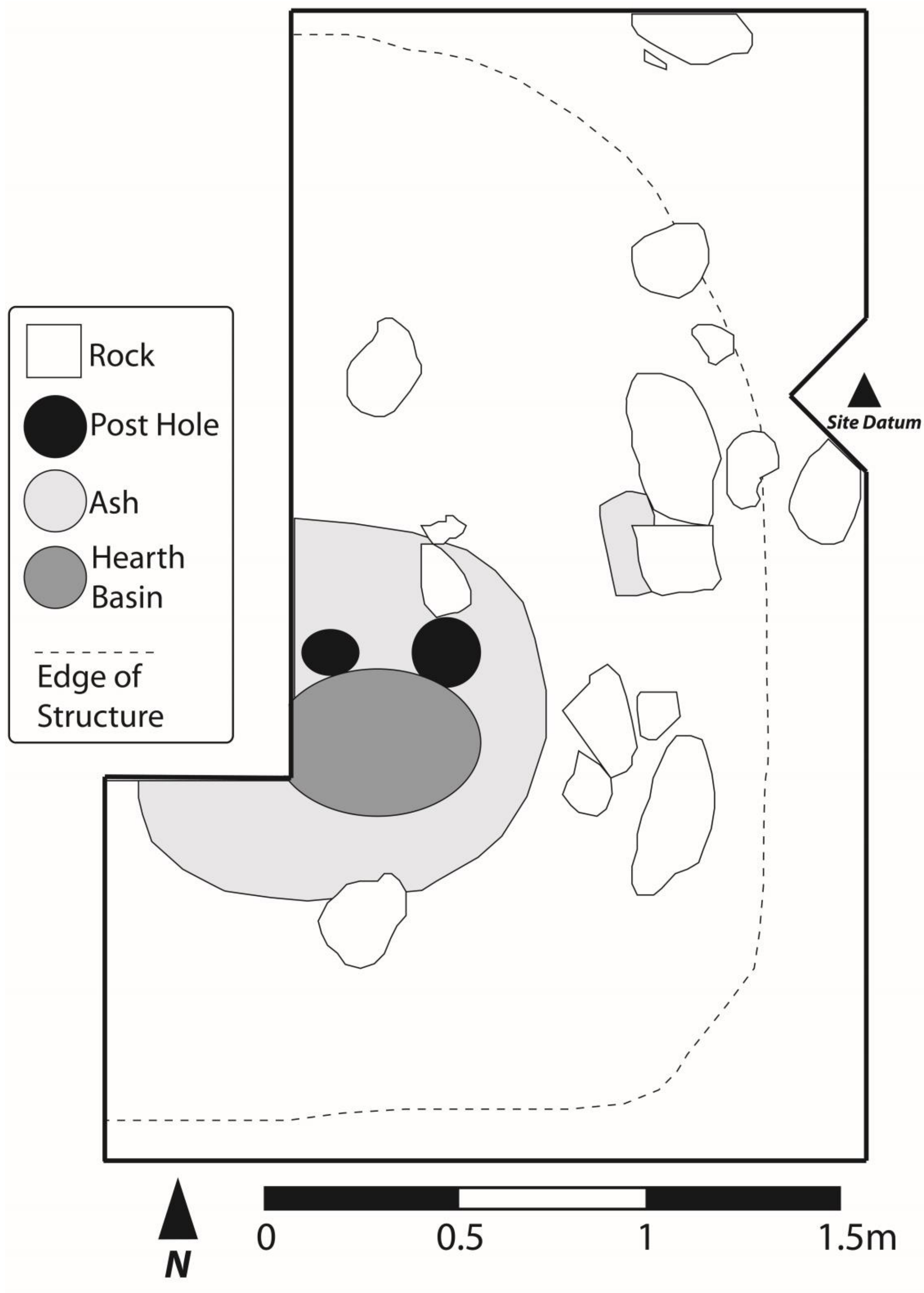

Figure 6.30. Plan view of Structure 3 at SCRI-324.

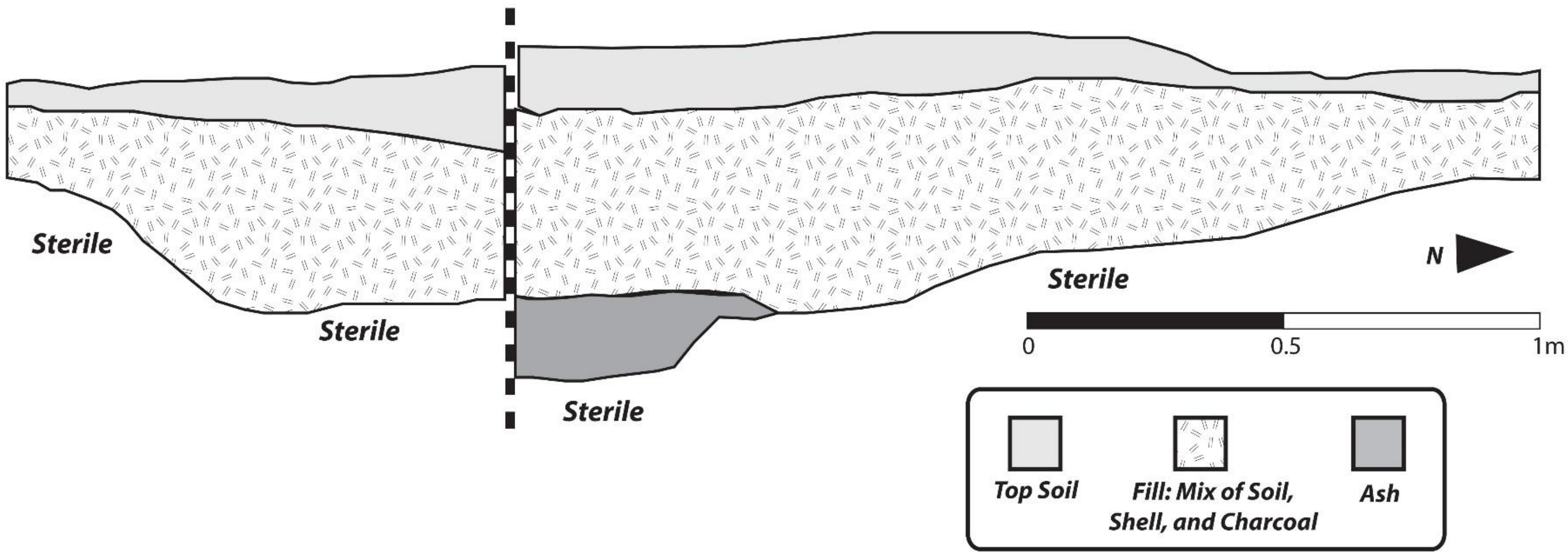

Figure 6.31. Profile drawing of the western side wall in Structure 3 at SCRI-324. Vertical dotted line indicates where the profile is offset by 50 cm due to the need to excavate around existing substantial plant stand.

6.4.2 Central Hearth and Post Holes

The central ash lens was encountered at 46 cm depth, and as the feature was excavated, a small, round, basin likely used as a central hearth was located with two post holes just north of the feature (Figures 6.32 and 6.33). The basin was discovered at 55 cm in depth, was 50 cm in maximum diameter, and extended up to 15 cm to a maximum depth of 70 cm (Figure 6.32). The ash found in the hearth basin was distinct from the ash excavated from the hearth deposits in the other structures. While the ash in the other structures was primarily gray in color with much charcoal, shell, and bone, the ash in this basin was a very light gray/white in color with large patches of pure white ash (Figure 6.32). Additionally, the hearth basin ash contained almost no inclusions of any kind. Many artifacts were found in the ash lens surrounding the hearth basin, including glass beads and abalone ornaments (discussed in the following chapter). Other artifacts were found in the fill of the structure and likely were deposited after the structure was abandoned, but the artifacts found in the ash lens associated with the hearth are interpreted as having been deposited while the structure was in use. The smaller of the two post holes (on the left) measured 14 cm in diameter and extended 8 cm below the possible compacted floor surface to 62 cm below the modern ground surface. The larger of the two post holes (on the right) measured 20 cm in diameter and was sunk 29 cm below the top of the hearth basin to 83 cm below modern ground surface level. Additional post holes could be present in the unexcavated portion of the structure. We excavated as much of the structure as the current vegetation would allow. The remaining portion of the structure is located below a large stand of plants and trees, and would have required much effort to remove and consultation with of a trained arborist.

Figure 6.32. Top of white and light gray ashy hearth feature located just west of the arrow in the semi-subterranean structure at SCRI-324.

Figure 6.33. Small hearth basin (highlighted with white dashed line), with two central postholes in the center of the semi-subterranean structure at SCRI-324.

6.4.3 Structure Abandonment

The semi-subterranean structure was filled in during one or more episodes with a mix of bone and shell refuse, ashy hearth cleaning deposits containing large and small pieces of charcoal, and soil. Some clusters of shell, particularly black abalone and mussel, were found; however, for the most part the matrix was very evenly mixed. The profile of the structure as seen in the western sidewall of the excavation (Figure 6.31) shows an even mix of fill, with no apparent layers or stratification of deposits. An analysis of the time-sensitive artifacts found within the semi-subterranean structure suggests that it was likely out of use prior to site abandonment (Tables 6.1 and 6.2). Table 6.1 lists the time-sensitive artifacts found in each level of Structure 3. Artifact types will be discussed in greater detail in the following chapter, and it should be noted that additional artifacts were found in Structure 3 but are not presented in the table because they cannot be assigned to a particular time period. Table 6.2 indicates that a fairly even mix of Middle/Late and Late period artifacts and Late/Historic and Historic period artifacts were recovered from the 0-10 cm level. The next two levels (10-20 cm and 20-30 cm) were dominated by Middle/Late and Late period artifacts, while the majority of time-sensitive artifacts in the lowest three levels (30-40 cm, 40-50 cm, and 50 cm – sterile) were from the Late/Historic and Historic periods.

The ash lens and compacted possible floor surface became visible at around 46 cm in depth. The deposits from 46 cm to sterile are believed to date to the time of structure occupation, and as these levels are dominated by Late/Historic and Historic period artifacts. The deposits at the bottom of the structure contained a number of H1B Semi-Ground shell disk beads which are known to date to the Late Mission phase of the Historic Period (AD 1800-1816). It is interesting that the 10-20 cm and 20-30 cm levels contain artifacts from a time period prior to assumed structure occupation. As the fill appears to be non-stratified, a possible explanation for the earlier artifacts being found in the fill is that the structure was purposefully filled in after use. The pattern of deposition of time-sensitive artifacts identified in Table 6.2 is consistent with the following scenario of occupation and abandonment of Structure 3.

(1) The artifacts present in the bottom of Structure 3 from 46 cm of depth to sterile soil suggest that the structure was occupied primarily during the Early Historic period.

(2) Because the fill deposit is not stratified and artifacts from earlier time periods are found within the fill, it is possible that the fill was deposited during one capping event in which material from one location of a midden at the site was used to fill in the significant depression left by the semi-subterranean structure. If material from a single midden at the site was used for fill, the more recently deposited midden would be taken from the top of the midden and placed in the bottom of the depression. This would explain why the majority of time-sensitive artifacts found in the 30-40 cm and 40-50 cm levels date to the Late/Historic or Historic period. Because the depression was of significant size, and because

deposits at the site were relatively shallow, residents would have quickly exhausted the top layer of the midden and then used deeper deposits containing artifacts from earlier time periods to complete the capping process. This would result in the observed abundance of Middle/Late and Late period artifacts in the 10-20 cm and 20-30 cm levels.

(3) Finally, the 0-10 cm level contains an almost even mix of artifacts from earlier and later time periods. This finding is consistent with the possibility that the structure was capped prior to site abandonment. If capped before the site was abandoned, the 0-10 cm level would contain some earlier artifacts from the deeper levels of the midden deposit used for fill, and then after the capping event additional Early Historic period artifacts would have continued to accumulate as residents occupied the site for a number of years. An alternate hypothesis would be that the structure was capped at the time the site was abandoned and the additional Late/Historic and Historic artifacts found in the 0-10 cm layer came from another later midden deposit used in the filling of the depression, or they could have made their way into the area through non-purposeful action (e.g., the erosion of surrounding deposits or displacement by humans or animals). However, it seems odd that people abandoning a site would have taken the time to fill in a structure, especially given that in this case they were not simply leaving the site, but likely abandoning the island for the mainland. The more likely

scenario is that residents filled in the structure prior to abandonment because the deep semi-subterranean pit would have presented a hazard to residents who continued to occupy the village.

Level	# of time sensitive artifacts	Time Periods Represented	Artifacts
0-10 cm	8	Middle/Late: 4	4 G1 shell beads
		Late/Historic: 2	2 Canaliño Triangular fused shale projectile points
		Historic: 3	1 H class shell bead, 2 H1A class shell beads
10-20 cm	29	Middle/Late: 13	13 G1 shell beads
		Late: 10	1 Coastal Contracting Stem projectile point, 1 K1 shell bead, 7 K2 shell beads, 1 K3 shell bead
		Late/Historic: 2	2 Malaga Cove projectile points
		Historic: 4	1 H class shell bead, 3 H1A shell beads
20-30 cm	21	Middle/Late: 8	8 G1 shell beads
		Late: 6	1 columella shell ornament, 1 K1 shell bead, 4 K2 shell beads
		Late/Historic: 1	1 E2A1 shell bead
		Historic: 6	1 E3A shell bead, 5 H1A shell beads
30-40 cm	16	Middle/Late: 1	1 G1 shell bead
		Late: 3	2 K2 shell beads, 1 K3 shell bead
		Historic: 12	3 glass beads, 2 H class shell beads, 3 H1A shell beads, 4 H1B shell beads
40-50 cm	45	Middle/Late: 9	9 G1 shell beads
		Late: 4	2 abalone ornaments, 1 K2 shell bead, 1 K3 shell bead
		Historic: 32	6 glass beads, 4 H class shell beads, 11 H1A shell beads, 11 H1B shell beads
50 – sterile (~55) cm	8	Middle/Late: 1	1 G1 shell bead
		Late: 1	1 K2 shell bead
		Historic: 6	3 H1A shell beads, 3 shell H1B beads

Table 6.1. List of time-sensitive artifacts found in Structure 3 by level.

Level	# and % of Artifacts Dating to Middle/Late and Late Time Periods		# and % or Artifacts Dating to Late/Historic and Historic Time Periods	
0-10 cm	4	44%	**5**	**56%**
10-20 cm	**23**	**79%**	6	21%
20-30 cm	**14**	**67%**	7	33%
30-40 cm	4	25%	**12**	**75%**
40-50 cm	9	20%	**36**	**80%**
50- sterile (~55) cm	2	25%	**6**	**75%**

Table 6.2. Number and percentage of time-sensitive artifacts by level. Artifacts have been grouped into two categories: Middle/Late and Late, and Late/Historic and Historic periods. Dark gray emphasizes time periods most represented in each level.

6.4.4 Interpretation of Structure Three

The semi-subterranean nature of Structure 3 along with the presence of a small basin hearth, a hearth deposit lacking in shell and bone refuse, and a stone lining on the perimeter of the structure make it unique in comparison to the other excavated structures at this village. Chumash houses are not known to have been semi-subterranean. Although it would not be unusual for the landscape in a hilly area (such as where the North House at SCRI-324 was built) to be modified in order to prepare a relatively flat floor surface, there is no obvious need to place a house over half a meter into sterile soil in an area that was already relatively level. Storage or roasting pits would have been dug into the ground but would not have included a hearth or posts as are present in Structure 3. Some California Native American groups such as the Pomo engaged in a practice of partially burying young women during menstruation (Loeb 1926), although the Chumash are not known to have engaged in this practice, and the hearth and post holes discovered at the bottom of the structure are not consistent with the partial burial of a woman inside a structure or menstrual hut.

The evidence from Structure 3 suggests that it may have been used as an *‘uqstilulu* (small sweat lodge):

(1) Structure 3 is semi-subterranean. Sweat lodges are the only known semi-subterranean Chumash structure, and the *‘uqstilulu* is known to have been the more common type, although only one other example of a small Chumash sweat lodge has been excavated (Hudson and Blackburn 1986; Strong 1935).

(2) The matrix of the hearth in Structure 3 consists almost purely of light and white colored fine ash. The hearth deposits in the other excavated structures at the village contained ash as well as a significant amount of faunal and other domestic debris. Faunal remains would be uncommon in sweat lodge hearths as these hearths were not intended for cooking. The hearth deposits of previously excavated sweat lodges on the mainland, including the sweat lodges at *Muwu* (Ven-11) (Woodward 1938:141-142), *Mikiw* (SBA-78) (Harrison 1965:153), and Morro Bay (Clemmer 1962:23-26), are described as containing mostly ash with no domestic debris noted.

(3) The rounded rectangular shape of Structure 3 is not consistent with house structures, which are known to be circular in shape. Harrington’s

informants did note that *'uqstilulu* were semi-subterranean as well as semi-circular in shape (Hudson and Blackburn 1986:33).

(4) The line of rocks discovered on the eastern perimeter of Structure 3 does not match any descriptions of previously excavated sweat lodges, although it is consistent with Rogers's description of a structure he observed on northern Santa Cruz Island near Arch Rock and interpreted as a sweat lodge. This "sunken, stone-encircled structure" was estimated to be fourteen feet in diameter with a floor forty inches below the modern ground surface (Rogers 1929:297). And while Rogers's description more closely matches that of a large sweat lodge (*'apayɨk*), it is possible that the practice of using stones to encircle sweat lodges may have been employed on Santa Cruz Island, or the Northern Channel Islands, while the construction of sweat lodges of the mainland did not include this feature. The stones may have provided additional structural support in an island environment where fewer large trees were available for construction materials.

(5) The orientation of Structure 3 with the exit on the north would also be advantageous if the structure were used as a sweat lodge, as people could exit the structure after sweating and directly enter the small perennial stream located on the north and east side of the site. The stream is more accessible in the northern portion of the site, as the path down from the site to where the landform curves around to the east is very steep.

While some pieces of the evidence are more substantial than others, when taken as a whole it appears likely that Structure 3 was an *'uqstilulu*.

6.5 Conclusion

The structures at *Nimatlala* differ significantly from standard construction techniques for Chumash houses (Gamble 1995). For example, the house structures had no apparent post holes around the perimeter but did contain one or more large central posts. To stabilize the exterior of the house structures, rocks and practices such as digging the floor a few centimeters into the ground were employed. The house structures at *Nimatlala* are smaller than typical Chumash houses, so some variation in construction method is to be expected. The semi-subterranean structure is consistent with what is known about the small Chumash sweat lodges, although there is only one other report of an excavated small sweat lodge, and it is from the inland area of the mainland, which is environmentally distinct from the Northern Channel Islands.

CHAPTER SEVEN

The Remnants of Everyday Life: An Analysis of Artifacts from *Nimatlala*

7.0 Introduction

Although all midden constituents are reported for the six 20 x 20 cm column samples excavated from SCRI-324 and-384, only the formal artifacts are included in the following analysis for all other units at the sites. This decision was made because the amount of material excavated during the project was very large and the faunal samples from the column samples are sufficient to characterize the midden deposits at the sites. A cursory study of the faunal remains does not appear to indicate differential access to resources by household, although further analysis would provide more conclusive results.

Formal artifacts from the village are divided into the following categories: glass beads, shell artifacts (fishhooks, beads, and ornaments), bone artifacts (ornaments and worked bone tools), chipped stone artifacts (projectile points, microblades, flakes, and flaked stone tools), and ground stone artifacts (manos, metates, pestles, mortars, perforated stones, beads). The frequency of formal artifact types is evaluated on both the household and community level.

7.1 Column Sample Constituents

Six 20 x 20 cm column samples were excavated with depths varying between 18 and 30 cm. Actual weights of all midden constituents excavated from these column samples are listed in Table 7.1 in grams, while adjusted weights estimated in kilograms per cubic meter are presented in Table 7.2. It should be noted that Test Unit 1 at SCRI-384 was excavated to a depth of 18 cm, but almost no midden material was present. At 18 cm, the roots from nearby trees became too intrusive to allow for further excavation.

Material	SCRI-324 TU1	SCRI-324 TU2	SCRI-324 TU3	SCRI-384 TU1	SCRI-384 TU2	SCRI-384 TU3
Shell	349.11	164.43	488.42	1.45	773.32	166.23
Bone	5.05	2.73	9.04	0.14	12.44	1.47
Charcoal	29.38	4.84	5.49	0	3.08	0.36
Lithics	19.92	0.88	6.65	0	47.17	4.4
Shell Beads	0	0.3	0	0	0	0
Hematite	0	0	0.28	0	0	0
Baked Clay	0	0	0	0	0	2.06

Table 7.1. Actual weights (in grams) of midden constituents excavated from test units.

Material	SCRI-324 TU1	SCRI-324 TU2	SCRI-324 TU3	SCRI-384 TU1	SCRI-384 TU2	SCRI-384 TU3
Shell	29.1	16.4	51.1	0.2	48.3	18.9
Bone	0.4	0.3	1.1	0.02	0.8	0.2
Charcoal	2.4	0.5	0.7	0	0.2	0.04
Lithics	1.7	0.09	0.8	0	2.9	0.5
Shell Beads	0	0.03	0	0	0	0
Hematite	0	0	0.04	0	0	0
Baked Clay	0	0	0	0	0	0.2

Table 7.2. Density of midden constituents in kilograms per cubic meter.

7*.1.1 Shellfish*

Shellfish remains were the most abundant type of material recovered from the test units, with deposits containing up to 48.3 kilograms of shell per cubic meter. However, this deposit could be classified as low-density, as middens on Santa Cruz Island may contain shellfish deposits upwards of 600 kg per cubic meter (Colten 2001). Mussel (*Mytilus californianus*) was the most abundant species with some barnacle (*Balanus*) and abalone (primarily black abalone, *Haliotis cracherodii*). Unsorted small shell fragments that passed through 1/8 inch mesh screens were labeled as “miscellaneous,” although these were primarily mussel fragments. For illustrative purposes, a small amount of identifiable, larger shell fragments not of mussel, barnacle, or abalone were added to the miscellaneous category if they would account for less than one percent by weight of the entire shell assemblage. Figures 7.1a-c illustrate the proportions by weight of the shellfish types excavated from the test units. As most of the miscellaneous shell is comprised of small mussel shell fragments, it is clear that the assemblage is dominated by mussel shell. Rick (2007a:109) also reported a dominance of *Mytilus californianus* among the shellfish remains from the Early Historic period village of *Tuqan* on San Miguel Island. At Tuqan, black turban (*Tegula funebralis*) was the second most abundant shell type, though barnacle and black abalone ranked third and fourth, respectively, in abundance.

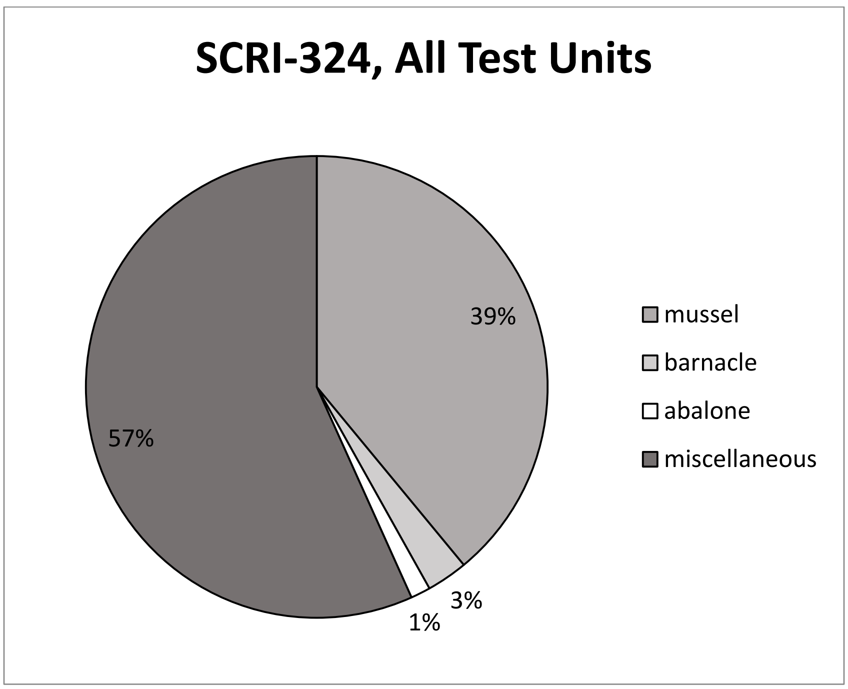

Figure 7.1a. Proportions of shellfish constituents for three test units at SCRI-324 by weight.

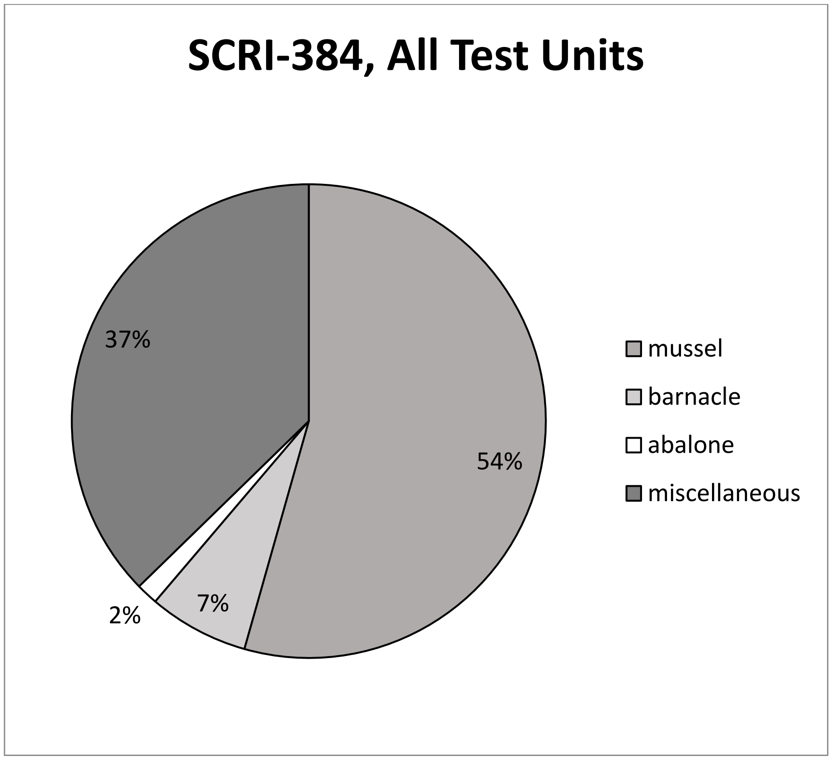

Figure 7.1b. Proportions of shellfish constituents for three test units at SCRI-384 by weight.

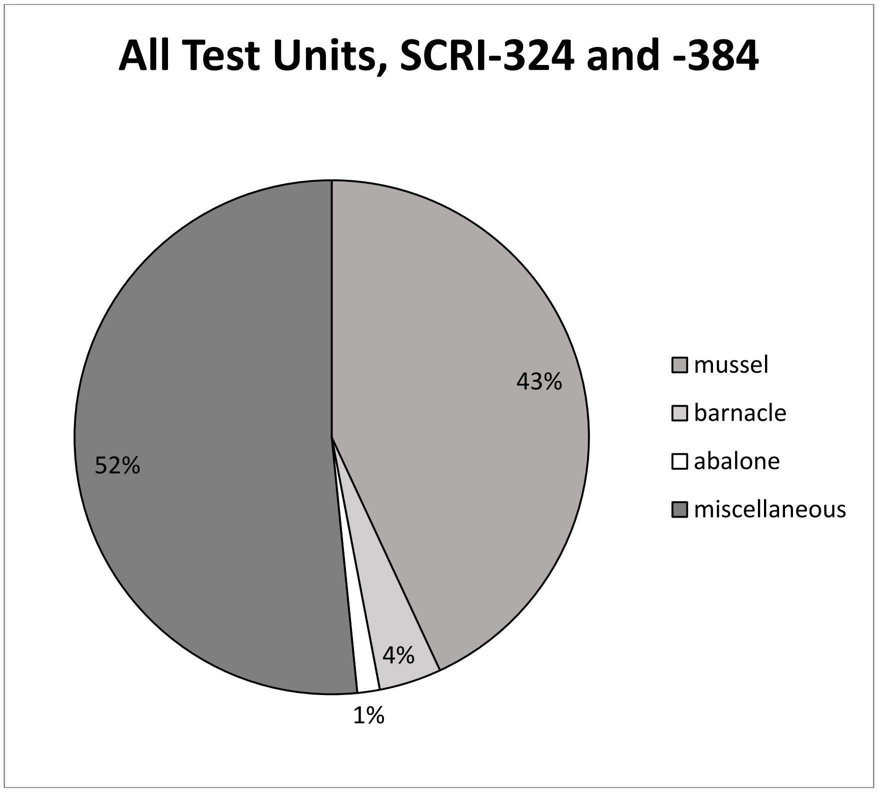

Figure 7.1c. Proportions of shellfish constituents for six test units at SCRI-324 and -384 by weight.

7.1.2 Bone

Bone fragments from the test units were classified as mammal, fish, or bird bone. Almost all of the mammal bone is from sea mammals or is too highly fragmented to differentiate between terrestrial and sea mammal. Figures 7.2a-c illustrate the proportions of bone type by weight for site SCRI-324, site SCRI-384, and sites SCRI-324 and -384 combined. Mammal bone dominates the assemblage when evaluated by weight.

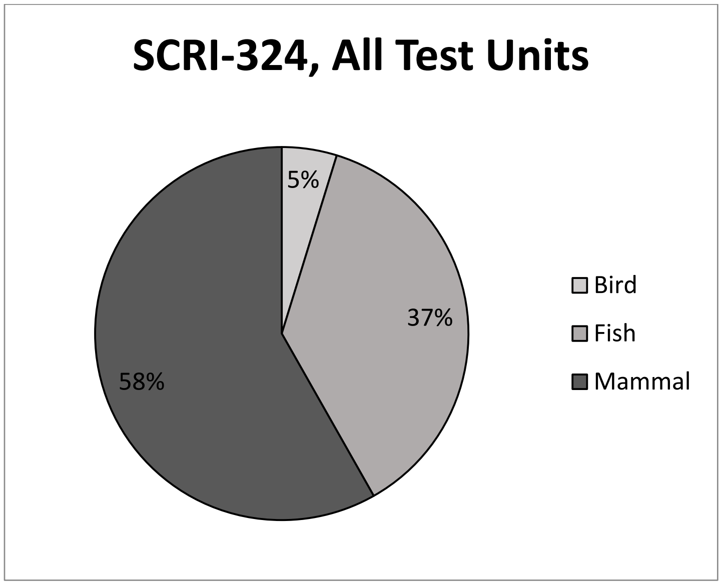

Figure 7.2a. Proportions of bone recovered from three test units at SCRI-324 by weight.

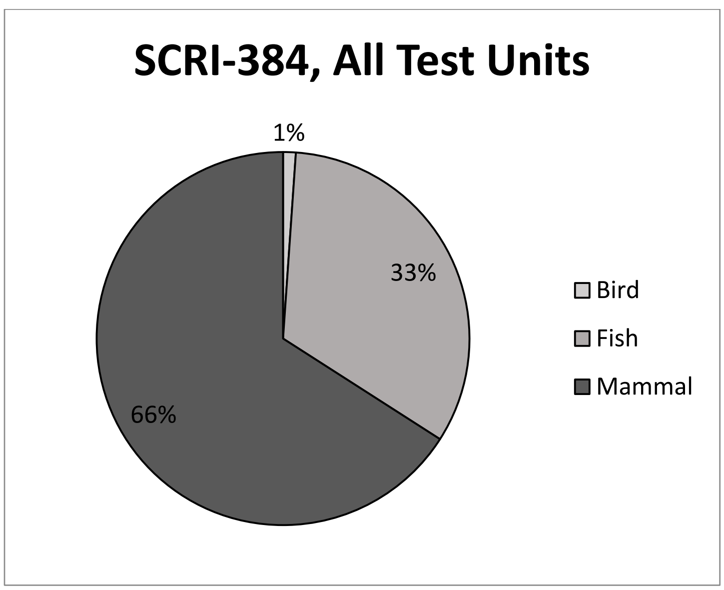

Figure 7.2b. Proportions of bone recovered from three test units at SCRI-384 by weight.

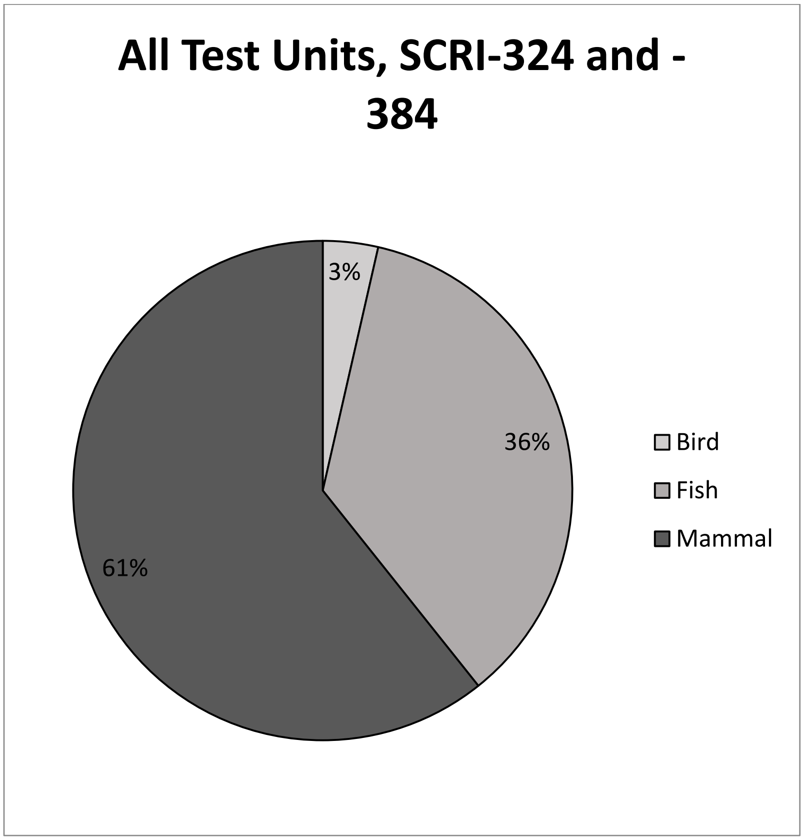

Figure 7.2c. Proportions of bone recovered from six test units at SCRI-324 and -384 by weight

7.1.3 Dietary Reconstruction from Faunal Constituents by Meat Weight

Converting the bone and shell weights to meat-weight estimates allows for a determination of the relative ranking of the importance of classes of fauna to the diet of village residents. Colten (2001) evaluated faunal dietary components for multiple time periods from deposits at SCRI-191, SCRI-192 (*Shawa*), SCRI-330 (*L'akayamu*) and SCRI-474 using the meat-weight conversion factors presented in Table 6.3. Therefore, the same conversions were used to estimate meat-weight for the deposits at *Nimatlala*.

Taxon	Meat-Yield Multiplier	Reference
Shellfish	0.332	Glassow and Wilcoxon (1988)
Mammal	24.2[a]	Glassow and Wilcoxon (1988)
Fish	27.7	Tartaglia (1976)
Bird	15.0	Ziegler (1975)

[a] This is the conversion multiplier for marine mammal, but it is used because most of the bone classified here as mammal bone is marine mammal bone.

Table 7.3. Meat-weight conversion factors.

The Late and Early Historic period faunal deposits at *Nimatlala* appear to be somewhat different from the Late and Historic period faunal deposits analyzed collectively from SCRI-191, -192, -330, and -474 (Colten 2001:203). At *Nimatlala*, meat from shellfish was consumed at almost double the rate identified in the combined deposits from SCRI-191, -192, -330, and -474 (Table 7.4). When we evaluate the contribution of mammals, fishes, and birds (Table 7.5) to the diet, the residents of *Nimatlala* consumed much more mammal, much less fish, and about the same amount of bird when compared to the residents from the other Santa Cruz Island villages. Because the data are reported collectively for SCRI-191, -192, -330, and -474, it is not possible to compare whether deposits from the individual sites/villages may be more similar to the findings from *Nimatlala*. Also, a more complete analysis of the faunal material from *Nimatlala* may provide a different picture of village diet than is provided from the six small test units.

Faunal Type	Historic Period SCRI-191, -192, -330, & -474	Late Period SCRI-191, -192, -330, & -474	Late/Historic Period SCRI-324, & -384
Shellfish	25%	23%	44%
Fish, Mammal, Bird	75%	77%	56%

Table 7.4. General dietary faunal reconstruction with percentage estimated from meat weight. Data from SCRI-191, -192, -330, and -474 is from Colten (2001:203). Data from SCRI-324 and -384 is from the six 20 x 20 cm test units excavated during this project.

Bone Type	Historic Period SCRI-191, -192, -330, & -474	Late Period SCRI-191, -192, -330, & -474	Late/Historic Period SCRI-324, & -384
Mammal	13.12	13.79	33
Fish	60.2	62.1	22
Bird	1.6	0.9	1

Table 7.5. General dietary reconstruction from bone with percentage estimated from meat weight. Data from SCRI-191, -192, -330, and -474 is from Colten (2001:203). Data from SCRI-324 and -384 is from the six 20 x 20 cm test units excavated during this project.

7.2 Glass Beads

With the exception of a few unidentifiable metal fragments found in the North House at SCRI-324, glass beads are the only items of European manufacture found at the village that date to Chumash occupation of the site. A few pieces of plastic, glass, and a nail were also found, but these pertain to recent activities at the sites. The excavations at *Nimatlala* yielded 78 glass beads. Before the establishment of the Santa Barbara Presidio in 1782 and the Spanish missions in the region, only a limited number of glass beads circulated in the Santa Barbara Channel region (King 1990). These beads were traded to the Chumash by a small number of explorers that visited the region during the two hundred years or so before the founding of Spanish settlements. Once the settlements were established, many more glass beads were distributed (King 1990). Typically the glass beads found in the region are attributed to production centers in Venice, Italy (King 1990); however, large quantities of glass beads were being produced not only in Italy but also in Bohemia, the Netherlands, and Czechoslovakia beginning in the 17th century (Karklins 1982; Kidd 1979). Most beads found on the Northern Channel Islands likely made their way to the islands after 1782. Although historic records from the Santa Barbara Presidio track orders of European goods to the Presidio, they do not detail the specific types of beads imported (Duggan 2004; Perissinotto 1998). The beads, therefore, are only temporally significant in dating sites generally to the early Historic period (Graesch 2001).

Several schemes have been used in the analysis of glass-bead assemblages from California. In an effort to be regionally consistent, the method used here is similar to that employed by Graesch (2001) in his analysis of the 229 glass beads from Jeanne Arnold's excavations on Santa Cruz Island. Kidd and Kidd's (1970) typology is employed, as it is widely accepted and more detailed than Karklins' (1994) and Ross's (1997) typologies. It should be noted that there is some shape variability allowed within all of these classification schemes, particularly in terms of cylindrical beads, which can have lengths less than, equal to, or greater than the bead width. Only one bead from the collection fell outside of Kidd and Kidd's classification, although it could be assigned to a bead class. Similar to Graesch (2001), length and diameter was measured to the nearest 0.01 mm, diaphaneity was recorded, and the Pantone Color System was employed to classify the color of each bead. Many beads exhibited a heavy layer of patina, and Graesch's method of removing an area of patina, moistening the bead with water, and backlighting the bead was followed in order to assess the original color of the bead. Additionally the hole diameter was measured for each bead.

7.2.1 Glass Bead Types

The collection of glass beads from *Nimatlala* contains 78 beads that fall into four bead classes and 23 varieties (Table 7.6). Because of the small size of glass trade beads, and the use of 1/8" screens during excavations, it is expected that some of the beads may have passed through the screens, and therefore not all beads were recovered from excavated areas. At SCRI-324 and SCRI-384 a combined total of 22.5 m^2 was excavated and therefore the density of glass beads found during excavations is 3.5 per m^2. All of the glass beads in the collection were manufactured using the drawn glass method in which a bubble of molten glass is drawn out into a long tube and may later be divided and cut into beads (Kidd and Kidd 1970:48). Kidd and Kidd's (1970) **Class I** beads are monochromatic tube beads. Five beads of this type were recovered: two are simple monochromatic dark navy blue tube beads and the other three are red and were squared and twisted during drawing to create more angular shapes. The most common beads from the collection were **Class II** beads (n=72). Class II beads are made using Class I beads. Through a reheating process, Class I beads are rounded and molded to create Class II beads (Kidd and Kidd 1970:53). A variety of shapes from circular to cylindrical were noted among the Class II beads from SCRI-324 and SCRI-384, and colors included white, black, green, blue, red, pink, and purple. All were simple, monochromatic, and undecorated. No **Class III** beads were identified in the collections, but these types of beads are similar to Class I beads in manufacture, although they are made from multiple layers of glass and the layers may be different colors and types of glass (Kidd and Kidd 1970:53). The final bead in the collection is a **Class IV** bead. Class IV beads are made using Class III beads. Through a reheating process, Class III beads are molded and rounded to create Class IV beads. The one Class IV bead in the collection is polychrome with a redwood colored glass layer on top of an apple green glass layer.

Figure 7.3. Glass beads from SCRI-324 and -384. From left to right: Type Ic2 in dark red; Type Ic in red; Type Ia14 in navy blue; Type IIa47 in purplish blue; Type IIa47 in purplish blue; Type IIa37 in light blue; Type IIa23 in green; and Type IIa26 in green. Scale in centimeters.

Type	Structure, Layering, Generic Color	Pantone Color	Diaphaneity	Size			#
				Diameter	*Length*	*Hole Diam.*	
Ia14	monochrome, navy blue	281	translucent	3.5-3.6	4.2-5.0	1.1-1.2	2
Ic	monochrome, red	179	translucent	3.3	2.6	2.1	1
Ic2	monochrome, red/dark red	179,181	translucent	2.6-3.9	3.9-6.7	1.9-2.4	2
IIa7	monochrome, black	426	opaque	4.1	2.6	1.9	1
IIa11	monochrome, white		opaque	2.2	1.4	0.5	1
IIa23	monochrome, green	334,339	translucent	4.3-4.5	3.7	1.9	2
IIa24	monochrome, light green/ green	332,339	translucent	3.1-4.4	2.4-3.9	1.2-1.7	5
IIa26	monochrome, light green/ green/ dark green	327,328,330,334,335,339	translucent	2.6-3.5	1.4-2.5	0.8-1.4	16
IIa27	monochrome, light green/ green	333,334	translucent	2.9-3.5	2.7-3.3	1.1-1.2	2
IIa33	monochrome, light aqua blue	304	translucent	4.0	1.1	1.4	1
IIa34	monochrome, light blue/ light aqua blue	283,297	translucent	3.3-3.8	3.0-3.4	1.0-1.6	2
IIa35	monochrome, light aqua blue/ aqua blue	291,297,298,299,304,306	translucent	2.4-3.6	1.7-4.6	0.8-1.1	9
IIa36	monochrome, light blue	177	translucent	4.7	2.9	1.5	1
IIa37	monochrome, light blue	278,292	translucent	2.8-5.2	1.8-4.6	1.1-2.0	3
IIa39	monochrome, light blue/ light aqua blue/ purplish blue	272,283,284,285	translucent	2.7-3.5	2.1-3.1	0.8-1.2	4
IIa40	monochrome, blue	287,301	translucent	4.3-5.2	3.3-3.5	1.2-1.7	3
IIa41	monochrome, blue	286,293	translucent	3.4-3.7	2.3-4.0	1.2-1.8	2
IIa43	monochrome, light blue/ blue/ navy blue	278,286,294,301	translucent	3.1-3.6	2.2-3.0	0.8-1.4	6
IIa45	monochrome, light purplish blue	270,271	translucent	3.2-3.5	2.2-2.4	1.0	2
IIa46	monochrome, purplish blue	265	translucent	3.1	2.3	0.8	1
IIa47	monochrome, light navy blue/ purplish blue	265,272	translucent	2.9-4.9	2.1-4.6	0.8-2.4	10
IIa58	monochrome, pink	183	translucent	3.0	2.2	1.2	1
IVa5	polychrome, redwood and apple green	159	translucent	3.5	2.6	1.4	1

Table 7.6. Classes and varieties of glass beads found at SCRI-324 and SCRI-384. Type is based on Kidd and Kidd (1970) and all measurements are in millimeters.

7.2.2 Glass Bead Colors

Most of the beads in the collection are simple and monochromatic. The color variability among the beads derives from seven basic colors: blue, green, purple, red, pink, white, and black. Blue beads (n=36) and green beads (n=24) are most numerous, followed by purple beads (n=12) and a small number of red (n=3), black (n=1), white (n=1), and pink (n=1) beads. The one polychromatic glass bead was assigned the color green as the green layer of the bead was thicker than the red layer. The distribution of glass bead colors at *Nimatlala* is similar to Graesch's (2001:277) findings from SCRI-240, -192, and -330.

7.2.3 Glass Beads by Structure

When beads are analyzed by structure, interesting patterns emerge (Tables 7.7 and 7.8). While the least volume was excavated from House 1 at SCRI-384, the largest number of beads was recovered. The density of glass beads at House 1 was 7.1 beads per m^2, which is over twice the average density of glass beads found for the entire 22.5 m^2 of excavated area during the project. Half (n=13) of the total beads from this structure were found in the ashy central hearth deposit. The North House and South House at SCRI-324 both contained twelve varieties of glass beads. The density of glass beads in the North House is 3.8 per m^2, which is in line with the average for the entire site, while the density in the South House is 2.8 per m^2, which is slightly below the site average. The North House also contained the most color variety and was the only structure to contain a majority of green glass beads.

Structure 3 contained the fewest glass beads (n=9), but all the beads found in this structure were located in or near the central hearth basin. This is not surprising given that the hearth basin is located in the lowest point of the structure and the floor of the structure is quite sloped.

House 1 SCRI-384	S. House SCRI-324	N. House SCRI-324	Structure 3 SCRI-324
Ic2:2	IIa23:1	Ic:1	Ia14:2
IIa24:1	IIa24:3	IIa11:1	IIa7:1
IIa26:7	IIa26:1	IIa23:1	IIa24:1
IIa27:1	IIa27:1	IIa26:8	IIa35:1
IIa33:1	IIa35:2	IIa35:1	IIa40:1
IIa34:2	IIa36:1	IIa39:2	IIa43:1
IIa35:5	IIa39:2	IIa40:1	IIa47:1
IIa37:3	IIa40:1	IIa41:2	
IIa43:2	IIa43:1	IIa43:1	
IIa47:1	IIa45:2	IIa46:1	
	IIa47:4	IIa47:3	
	IIa48:1	IVa5:1	

Table 7.7. Glass bead varieties and number of each variety by structure at SCRI-324 and SCRI-384. Types are from Kidd and Kidd (1970).

Structure	# of beads	Varieties	Colors	Density per m^2
House 1, SCRI-384	25	10	Blue - 56% Green - 36% Red - 8%	7.1
South House SCRI-324	20	12	Blue - 35% Green - 30% Purple - 30% Pink- 5%	2.8
North House SCRI-324	23	12	Green - 44% Blue - 26% Purple - 22% White - 4% Red - 4%	3.8
Structure 3 SCRI-324	9	7	Blue - 67% Black - 11% Green - 11% Purple - 11%	2.1
Total for SCRI-324 and -384	**78**	**23**	**Blue - 46%** **Green - 31%** **Purple -15%** **Red - 4%** **Pink - 1.3%** **White - 1.3%** **Black - 1.3%**	**3.5**

Table 7.8. Number, variety, color, and density of glass beads at SCRI-324 and SCRI-384 by structure.

7.3 Shell Artifacts

The most common type of shell artifact found in excavations at SCRI-324 and -384 was shell beads, with over 600 specimens of both needle-drilled and stone-drilled varieties. Additionally, six fishhook fragments in different stages of manufacture were recovered along with six shell ornaments of a variety of shell taxa and styles.

7.3.1 Shell Fishhooks

Six shell fishhook fragments in various stages of manufacture were recovered: one from House 1 at SCRI-384, one from the South House at SCRI-324, three from the North House at SCRI-324, and one from Structure 3 at SCRI-324 (Figure 7.4, Table 7.9). Five of the fishhook fragments are of mussel (*Mytilus californianus*) shell and one is of red abalone (*Haliotis rufescens*). Three out of the six fragments are burned (Table 7.9). Although the fishhook fragment from Structure 3 was not burned, it was found in at the bottom of the ashy central hearth basin deposit. The hearth material may not have been hot enough to affect the fragment. The fragment from Structure 3 and both of the mussel shell fishhook fragments from the North House appear to have broken during manufacture. Particularly specimen "F" appears to be from a broken fishhook blank and definitely not a fragment of a completed hook, although the edges exhibit purposeful grinding. The fragment from House 1 at SCRI-384, the fragment from the South House at SCRI-324, and the red abalone fragment from the North House were likely finished prior to being broken.

Identifier	Structure and Site	Level	Length (cm)	Width (cm)	Thickness (cm)	Fragmentation	Material	Modification
A	**House 1, SCRI-384**	10-20	2.4	1.7	0.55	midsection fragment, mostly missing	shell, *Mytilus cal.*	burned
B	**South House, SCRI-324**	20-sterile	2.43	1.3	0.41	midsection fragment, Mostly missing	shell, *Mytilus cal.*	—
C	**North House, SCRI-324**	40-50	2.4	0.57	0.28	midsection fragment, mostly missing	shell, *Haliotis ruf.*	—
D	**North House, SCRI-324**	floor	3.8	1.5	0.52	proximal fragment, approx. ½ present	shell, *Mytilus cal.*	burned
E	**North House, SCRI-324**	floor	3.4	1.2	0.4	midsection fragment, mostly missing	shell, *Mytilus cal.*	burned
F	**Structure 3, SCRI-324**	50-sterile	2.5	1.4	0.53	midsection fragment, mostly missing	shell, *Mytilus cal.*	—

Table 7.9. Shell fishhook fragments from SCRI-324 and -384.

Structure and Site	Level	Length (cm)	Width (cm)	Thick. (cm)	Hole Diam. (cm)	Frag.	Material	Mod.	Time Period King (1990)
North House, SCRI-324	Floor	3.0	1.25	0.87	0.4	whole	shell, *Hinnites mul.*	burned	? L1b-L3 (AD 1250-1804)
North House, SCRI-324	50-60	0.98	0.75	0.22	0.11	whole	shell, *Balanus*		?
North House, SCRI-324	50-60	—	—	0.07	0.14	fragment, mostly missing	shell, *Haliotis*	asphaltum	? Late (AD 1150-1804)
Structure 3, SCRI-324	20-30	3.17	0.65	0.56	0.15	fragment, mostly present	shell, gastropod columella		L2b (AD 1650-1782)
Structure 3, SCRI-324	40-50	1.26	1.19	0.19	0.21, 0.16	whole	shell, *Haliotis*		L3 (AD 1782-1804)
Structure 3, SCRI-324	40-50	1.42	1.19	0.17	0.2, 0.16	whole	shell, *Haliotis*		L3 (AD 1782-1804)

Table 7.10. Shell ornaments from SCRI-324 and -384.

Figure 7.4. Shell fishhooks from SCRI-324 and -384. All are made of *Mytilus californianus* with the exception of the one on the right which is made of *Haliotis rufescens.* Letters correspond to Table 7.9. Scale in centimeters.

7.3.2 Shell Ornaments

A total of six shell ornaments was recovered, three each from both the North House and Structure 3 at SCRI-324 (Table 7.10). Two of the ornaments from the North House are quite unusual. The first is a large pendant made from the hinge giant rock scallop (*Hinnites multirugosus*) shell (Figure 7.5). Hinges of fresh shells are bright purple in color, although the example found at *Nimatlala* has been burned and has lost its color. The specimen exhibits the characteristic natural cylindrical groove present on the hinge of rock scallop shells. Until recently the manufacture of beads and pendants made of giant rock scallop shell was believed to be restricted to the Late and Early Historic periods (King's L1 through L3 or AD 1150-1804) (King 1990). Such beads are rare, although several scholars, including Gifford (1947:45-

45), Harrington (1928:160-162), Holmes (1883:225-227), and King (1990:192-193), have identified examples from sites on the Northern Channel Islands and along the Santa Barbara mainland coast, with a few extremely rare examples found outside of the Santa Barbara Channel region (King 1990:192-193). Recently Braje, Rick, and Erlandson (2008) AMS dated a giant rock scallop pendant from SMI-608, two rock scallop beads from SMI-657, and another rock scallop bead from SMI-162. The pendant was found to date to 8290-8160 BP, while a bead from SMI-657 dates to 6180-6020 BP, and the bead from SMI-162 dates to 450-330 BP. The dating of these artifacts reveals that giant rock scallop shell artifacts have a much greater time depth in the Santa Barbara Channel region than was previously believed.

Giant rock scallop artifacts from the Protohistoric and Early Historic periods have been considered markers of high social status. Many of the giant rock scallop beads in collections are from burial lots with a great variety of beads, most of which are identified as the most exclusive bead types (King 1990:193). At the Medea Creek Cemetery (LAN-243) the giant rock scallop beads were found only in a specific area of the cemetery. King interpreted this association as an indication that burials in the area were individuals related to hereditary political leaders (King 1990:193). Because new AMS-dating of giant rock scallop artifacts has determined some of these artifacts were from earlier time periods before sociopolitical complexity was present in the region, Braje et al. (2008:229) warn against interpreting these artifacts as markers of high status. The pendant found in the North House made from the hinge of a giant rock scallop is unique, and no similar artifact is known to have been found in the region. Therefore, in the context of this project, the artifact is considered to be unusual but not necessarily an indicator of elite status. Based on the radiocarbon dates obtained from the sites and the artifacts obtained during excavations, it is assumed that the pendant dates to King's (1990) L1b to L3 periods (AD 1250-1804), to which most of the large giant rock scallop beads are attributed.

Figure 7.5. Back (left) and side (right) views of the giant rock scallop pendant from the North House at SCRI-324. Scale in centimeters.

The second unusual ornament from the North House is small and made of barnacle (*Balanus* sp.). No examples of barnacle ornaments have been reported in other archaeological studies from the Chumash region (Gifford 1947; King 1990). The artifact contains one conically drilled perforation (Figure 7.6). It has been worked into a rectangular shape, and at least three of the edges have been lightly ground. Because barnacle ornaments have not been identified previously, and because barnacle shell fragments sometimes have natural perforations, this pendant was almost passed over. This ornament serves as a reminder to be open to the unexpected when sorting midden constituents. As no chronology exists for barnacle ornaments, it is uncertain when the ornament was made or in use.

Figure 7.6. Barnacle pendant from the North House at SCRI-324.

The final ornament from the North House was a highly fragmented section of a small, thin, circular abalone ornament. The fragment contains one perforation, and asphaltum residue is present on both faces of the ornament. Asphaltum was a common fixative and may have been employed to attach the ornament to a stone or bone object. The ornament is too fragmented to make a determination of the time period of production, although similar artifacts are dated by King (1990) to AD 1150-1804.

The ornaments found in Structure 3 at SCRI-324 were of more common types. The first, a pendant made from the interior spire (columella) of a small gastropod shell, is almost whole except for a portion of the bottom of the pendant that has broken off (Figure 7.7). The pendant was found in the fill of the possible sweat lodge in the 20-30 cm level. Like many columella beads and ornaments, it appears that asphaltum was used to fill in the grooves. Most of the asphaltum is now gone, but spots of residue remain in the grooves. According to King (1990:165), columella pendants have been found only in contexts associated with Phase L2b (AD 1650-1782). These dates are in line with the radiocarbon dates and other artifacts obtained from the site. Columella pendants have been found with burials at SRI-60 (village of *Hichimin*), LAN-243 (the Medea Creek Cemetery near the village of *Yegeu*), and LAN-227 (also known as Century Ranch and a likely satellite of the village of *Talepop*), and the pendants have not been reported outside of the area occupied by Chumash groups (King 1990:165; 2000).

Figure 7.7. Columella ornament from Structure 3 at SCRI-324. Scale in centimeters.

The final two ornaments found in Structure 3 were both abalone ornaments that look like two-holed buttons, and they were found near each other by the central hearth basin. The first (Figure 7.8) is circular in shape. The second is of a rounded rectangular shape (Figure 7.8). Abalone buttons and ornaments pertain to all time periods in this region; however, these two ornaments most closely resemble those illustrated in King (1990:255) that date to the L3 period (AD 1782-1804). The ornaments are also very similar to other abalone ornaments that date to slightly earlier time periods.

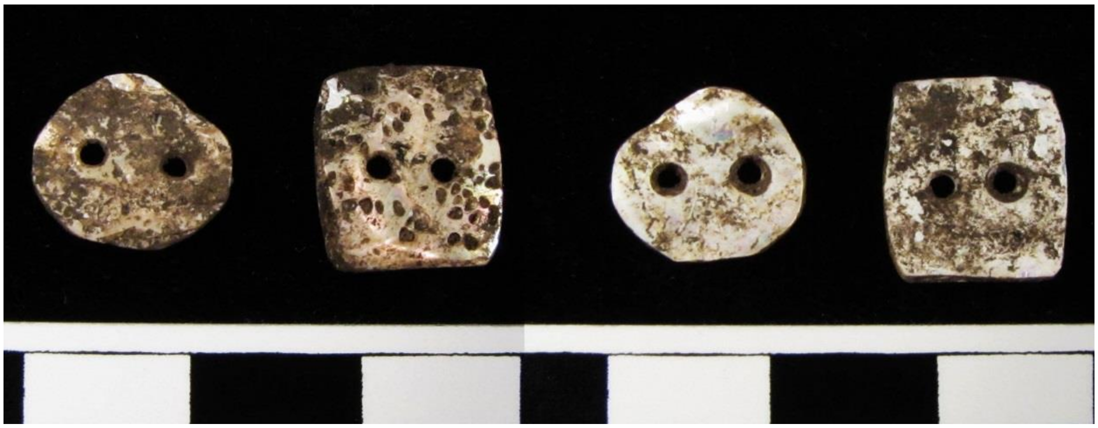

Figure 7.8. Dorsal (left) and ventral (right) views of the two abalone ornaments found in the possible sweat lodge at SCRI-324. Scale in centimeters.

7.3.3 Shell Bead Types

With 625 specimens found at SCRI-324 and-384, shell beads are by far the most common shell artifact type found at *Nimatlala.* Analysis was completed using Milliken and Schwitalla's (2012) classification scheme, as well as Bennyhoff and Hughes (1987) and King's (1990) typologies. For all beads, diameter of the bead and hole, as well as thickness were measured with digital calipers. All beads were measured by the author for the sake of continuity of measurement and all shell bead measurements are presented in the appendix. Beads of abalone (n=25), mussel (n=6), clam (n=4), and olivella (n=581) were recovered from the SCRI-324 and -384. The shell material of another nine beads is unidentifiable due to burning and damage. The olivella shell bead assemblage contains beads of eight classes and nineteen types. Some bead types are temporal markers, and the assemblage further refines and verifies the period of occupation at both the sites and structures at *Nimatlala.*

The density of shell beads varied slightly between structures and sites (Table 7.11). For all excavated areas at the two sites (both inside and outside of structures), the density of shell beads per square meter is 27.8. The three structures at SCRI-324 all contained relatively similar densities of shell beads, with the South House containing 28.7 beads per m^2, the North House containing 25.3 beads per m^2, and Structure 3 containing 29.6 beads per m*2*. However, House 1 at SCRI-384 contained a higher density, with 36.6 beads per square meter. This same structure contained the highest density of glass beads. All three of the houses contain similar diversity of bead types, but the beads from the structure identified as a possible sweat lodge are much less diverse.

Area	**# of beads**	**Olivella Bead Classes**	**All Shell Bead Types**	**Density per m^2**
House 1, SCRI-384	128	5	18	36.6
South House SCRI-324	208	6	19	28.7
North House SCRI-324	152	6	18	25.3
Structure 3 SCRI-324	126	4	12	29.6
Total for SCRI-324 & -384	**625**	**8**	**26**	**27.8**

Table 7.11. Shell bead types and densities recovered from different areas of SCRI-324 & -384.

Shell Bead Type	*House 1*	*South House*	*North House*	*Structure 3*	*Other Units*	**TOTALS**
Unidentifiable	0.3 (1)	0.8 (6)	0.3 (2)	—	—	0.4 (9)
Abalone	3.1 (11)	0.8 (6)	0.5 (3)	1.2 (5)	—	1.1 (25)
Mussel	1.4 (5)	0.1 (1)	—	—	—	0.3 (6)
Clam	—	0.1 (1)	0.3 (2)	0.2 (1)	—	0.2 (4)
Olivella: Unid	1.4 (5)	1.4 (10)	1.3 (8)	1.9 (8)	0.7 (1)	1.4 (32)
Olivella: A1A	0.3 (1)	0.4 (3)	0.2 (1)	—	—	0.2 (5)
Olivella: C2	—	—	0.2 (1)	—	—	0.04 (1)
Olivella: E1A1	—	0.3 (2)	—	—	—	0.1 (2)
Olivella: E1B1	—	—	0.3 (2)	—	—	0.1 (2)
Olivella: E1B2	—	—	0.2 (1)	—	—	0.04 (1)
Olivella: E2A1	0.3 (1)	—	—	0.2 (1)	—	0.1 (2)
Olivella: E3A	—	—	0.3 (2)	0.2 (1)	—	0.1 (3)
Olivella: F4	—	0.1 (1)	—	—	—	0.04 (1)
Olivella: G (unid)	—	0.1 (1)	—	—	—	0.04 (1)
Olivella: G1	12.0 (42)	5.1 (37)	6.5 (39)	8.7 (37)	4.0 (6)	7.2 (161)
Olivella: G4	0.3 (1)	—	—	—	—	0.04 (1)
Olivella: G5	0.3 (1)	—	—	—	—	0.04 (1)
Olivella: G6	1.7 (6)	0.1 (1)	—	—	—	0.3 (7)
Olivella: H (unid)	0.9 (3)	2.1 (15)	1.0 (6)	1.9 (8)	0.7 (1)	1.5 (33)
Olivella: H1A	6.3 (22)	7.3 (53)	4.8 (29)	6.4 (27)	1.3 (2)	5.9 (133)
Olivella: H1B	2.3 (8)	4.4 (32)	3.0 (18)	4.2 (18)	0.7 (1)	3.4 (77)
Olivella: H2	0.9 (3)	0.8 (6)	0.3 (2)	—	—	0.5 (11)
Olivella: J1	1.7 (6)	2.1 (15)	1.2 (7)	—	—	1.2 (28)
Olivella: K1	0.6 (2)	0.7 (5)	1.2 (7)	0.5 (2)	—	0.7 (16)
Olivella: K2	2.6 (9)	1.5 (11)	2.7 (16)	3.5 (15)	—	2.3 (51)
Olivella: K3	0.3 (1)	0.3 (2)	1.0 (6)	0.7 (3)	—	0.5 (12)
TOTALS	**36.6(128)**	**28.7(208)**	**25.3(152)**	**29.6(126)**	**7.3(11)**	**27.8 (625)**

Table 7.12. Density and number of shell beads by type. Figures displayed are in the format: density per m^2 (actual number found). Density is calculated based on number of beads divided by the total excavated area per structure.

Only 35 non-olivella beads were recovered (Table 7.12). These beads were abalone epidermis beads, mussel shell beads, and clam shell beads, and the types of these beads recovered from the excavation date to all phases of the Late period as well as into the Early Historic period (AD 1150-1804). House 1 at SCRI-384 contains significantly more abalone and mussel beads than any other structure, although no clam beads were found in the house.

All of the olivella beads are believed to be of the local species, *Olivella biplicata*. Each type of olivella bead found during the course of excavations is briefly described below.

A1 Simple Spire Lopped beads are almost complete shells with the spire removed and then ground. Five of these beads were recovered during the excavations, and all are of the smaller A1a type, which King (1990:228, 239) suggests date from the Middle Period through Phase 1 of the Late Period in the Santa Barbara Channel region (1400 BC – AD 1782). This bead type is commonly found in Late period assemblages of mixed bead lots, and given that only five were recovered, it is assumed that they likely date to the Late period occupation of the village.

Only one **C2 Split Drilled** bead was found, and it was recovered from the North House at SCRI-384. Class C beads are made from a large section of an olivella shell; usually a quarter to a half of a complete shell. These beads have variable shelves (interior shell column whorl) and the edges are then usually ground smooth. They may date to the Middle (800 BC- AD 1150) and Middle/Late Transition (AD 1150-1300) periods in mixed lots with other Class C beads. As this is the only Class C bead found at the village, and the majority of beads found date to the Late and Early Historic periods, this bead may have been deposited at the site at the beginning of the Late period.

Ten **Class E Lipped** beads were identified. This bead type is made from the area of the shell at the boundary of the shell wall and inner lip (callus margin). Beads of this type are further differentiated by the breadth of the lip. This bead class is a good temporal marker. with the class as a whole dating from Phase 2A of the Late period into the Historic period (AD 1500-1800+). The specific types are even further confined temporally.

Two **E1A1 Round Thin-Lipped, Normal Variant** beads were found in the South House at SCRI-324. These are round beads with more than half of the bead including the thick shell callus. They can also nest with other beads of the same type when strung (Bennyhoff and Hughes 1987:127), and are markers of the beginning of Phase 2A of the Late period (AD 1500-1600).

Two **E1B1 Oval Thin-Lipped, Normal Variant** beads were found in the North House at SCRI-324. These beads are almost identical to the E1A1 round beads, but are oval in shape. These beads are markers of the latter part of Phase 2A of the Late period (AD 1600-1700) (Milliken and Schwitalla 2012:34).

One **E1B2 Oval Thin-Lipped, Lipless Variant** bead was discovered in the North House at SCRI-324. This bead was cut from the same part of the shell but does not contain any of the thick callus portions of the shell. This bead is also a marker of the latter part of Phase 2A of the Late period (AD 1600-1700) (Milliken and Schwitalla 2012:34).

Two **E2A1 Full Thick-Lipped, Normal Variant** beads were recovered: one from House 1 at SCRI-384 and the other from Structure 3 at SCRI-324. These beads cannot be nested into each other due to a fold in one area of the rim. These beads were in use during Phase 2B of the Late period into the Historic period (AD 1650-1800+) (Bennyhoff and Hughes 1987:128).

The last type of Class E beads found during the excavations at *Nimatlala* is type **E3A Full Large-Lipped** beads. Three beads of this type were identified: two from the North House and one from Structure 3 at SCRI-324. These beads are large, made from half of a shell, and retain a lip with significant folding on one side. Bennyhoff and Hughes (1987:128) find these beads to be Historic period (AD 1782+) markers.

Only one Class F bead, an **F4 Smooth Saddle**, was found at the village, in the South House at SCRI-324. The F4 type is new to Milliken and Schwitalla's (2012) classification scheme and is oval to rectangular in shape with edges that have been ground very smooth. Saddle beads are made from the wall of the shell, have small perforations, and a four-sided edge preparation (Milliken and Schwitalla 2012:40). This bead type dates to the Middle period (1400 BC-AD 1150).

With 171 specimens identified, <u>**Class G Saucer**</u> beads were the most common class of beads found at the village. One bead was damaged and not identifiable to type. The majority of the beads in this class were **G1 Tiny Saucer** beads, with a total of 161 beads recovered: 42 from House 1, 37 from the South House, 39 from the North House, 37 from Structure 3, and 6 from test units. These beads are small and circular, and they are made from the wall of the main body of shell. They are drilled conically or biconically using stone microblade drills. Unfortunately, these beads are poor temporal markers as they were manufactured throughout the Middle and Late periods (1400 BC-AD 1782). A few other types of Class G beads were identified. One **G4 Ground Saucer** was found in House 1 at SCRI-384 and dates to Phase 2 of the Middle period (800 BC-AD 300). One **G5 Oval Saucer** was also found in House 1 and dates to the Middle period (1400 BC-AD 1150). Additionally, seven **G6 Irregular Saucer** beads were found: six in House 1 and one in the South House at SCRI-324. The G6 beads date to the Middle period (1400 BC-AD 1150). Eight of the nine G4, G5, and G6 beads were found in House 1 at SCRI-384. These beads are known to date to the Middle period and may have been deposited during the earlier occupation of site SCRI-384 identified through radiocarbon dating to 380-40 BC (2 sigma calibrated date).

Class H Needle-Drilled Disks are the second most common class of beads found in the assemblage from *Nimatlala*. These beads are made from the wall of the shell and have small perforations drilled using metal needles obtained from non-native explorers and settlers. Class H beads date to the Historic period, with different types representing short time periods from the 1770s to 1830s. Due to damage and burning, 33 specimens can be assigned only to Class H, with no further classification possible.

H1A Ground Disks were recovered from all structures and in test units at sites SCRI-324 and -384. These beads are small and circular and have been ground around the whole perimeter of the bead. The assemblage contains 133 of this type which date to the Early Mission phase of the Historic period (AD 1770-1800), athough they may date as late as 1816 (King 1990; Milliken and Schwitalla 2012:57).

H1B Semi-Ground Disks are similar in size and shape to H1A Ground Disks, but the edges have not been completely ground. Generally the H Class beads became less thoroughly finished through time, and the H1B Semi-Ground disks date to the Late Mission phase of the Historic Period (AD 1800-1816) but could have been manufactured as early as 1790 (King 1990; Milliken and Schwitalla 2012:57). During excavations, 77 beads of this type were recovered from all structures and in the test units located outside of the structures.

H2 Rough Disks were also found in the collection, with 11 specimens recovered from House 1 at SCRI-384 and the South and North Houses at SCRI-324. These disks have chipped edges with little to no grinding apparent. The H2 Rough Disk beads are markers of the Terminal Mission phase of the Historic period (AD 1816-1834) (King 1990: Bennyhoff and Hughes 1987:135).

Also found in the assemblage were 28 **J1 South Coast Wall Disks**, which are disks made from the shell wall and have small perforations drilled by chert microblade drills. The beads of this type in the collection were found in House 1 at SCRI-384 and the South and North Houses at SCRI-324 and date to the Mission Period (AD 1770-1834) (Milliken and Schwitalla 2012:59).

The last class of olivella beads in the collection is the **Class K Callus Beads**, which were made from the thick callus material of the shell. All three types of Class K beads were identified in the assemblage. **K1 Cupped** beads are thick, circular, and symmetrical beads. A total of 16 specimens of this type were found in all structures at SCRI-324 and -384. In southern California these beads date to Phase 1 of the Late Period (AD 1150-1500) (Milliken and Schwitalla 2012:61). **K2 Bushing** beads are thin (between 1.2-2.0 mm in thickness) callus beads often used as bushings inside the large perforations of other types of beads (Bennyhoff and Hughes1987:137). King (1990) identifies these beads as Small Cups and Small Cylinders. In the assemblage 51 beads of this type were recovered from all structures at SCRI-324 and -384. This bead type dates to the Late Period (AD 1150-1782) in Southern California, although they are most common in Phase 2 of this period (AD 1500-1782) (Milliken and Schwitalla 2012:62). **K3 Cylinders** are also callus beads and are small and circular. Within the collection 12 beads of this type were identified and found in all structures at SCRI-324 and -384. This bead type is also considered a marker of Phase 2 of the Late period (AD 1500-1782) (Milliken and Schwitalla 2012:63).

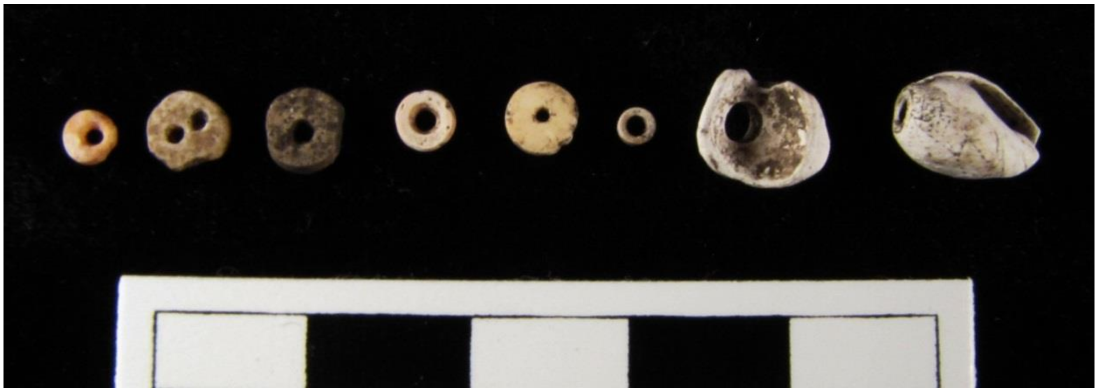

Figure 7.9. Shell bead types from SCRI-324 and -384. From left to right: red abalone epidermis bead with one hole; red abalone epidermis bead with one hole drilled through and a partially drilled second hole; mussel bead; olivella G1 tiny saucer; H1a needle-drilled ground disk, olivella K3 cylinder; olivella E2A1 full thick-lipped normal variant; and olivella A1a simple spire lopped. Scale in centimeters.

7.3.4 Shell Bead Spatial and Temporal Distributions

When the density of shell beads per structure or area is calculated (Table 7.12) we see that the densities of specific bead types within the three houses at the village are similar, with the exception of House 1 at SCRI-384, which has a higher density of abalone and mussel beads as well as a higher density of G1 olivella beads. Structure 3 at SCRI-324 contains fewer types of beads, but the densities of bead types present are similar to the densities found in the houses.

In an effort to explore the temporal data provided by the analysis of beads from the excavations at the village, a chronology of bead deposition was created. Because some bead types are difficult to place temporally, this tool is not without fault; however, it does serve to identify broad trends in site occupation. It should be noted that to create this chronology all Class A1 beads were assigned a Late period date, although they are also known to have been manufactured during the Middle

Period. Given that the majority of beads and artifacts found at the sites date to the Late Prehistoric and Early Historic periods, and coupled with the radiocarbon dates obtained from the two sites, the five Class A beads were placed into the Late period category. The small number of specimens would not significantly skew the chronology. The G1 type beads that are not specific to a time period were similarly placed into the Late period. If a bead type such as the abalone, mussel, and clam shell beads were not specifically associated with a certain phase of a given period, then the total number of beads of that type was evenly distributed between phases of the period. The total number of beads for each structure and time period was identified, and then the density of beads per square meter for each structure by time period was calculated (Table 7.13).

The distribution of bead types in the structures through time suggests that all were occupied contemporaneously. For each structure, Early Mission period (AD 1782-1800) beads were found in the highest densities. If we assume that beads were deposited at a generally constant rate, then it would seem that occupation of *Nimatlala* was most intense during the Early Mission period. Even if we looked more broadly at deposition of beads during the Late and Protohistoric periods (Late period phases 1 and 2: AD 1150-1782) versus the Mission periods (Early, Late and Terminal: AD 1782-1834), we find that in the excavated areas at sites SCRI-324 and -384 beads were deposited at a rate of only 0.3 beads per year during the Late and Protohistoric periods, whereas they were deposited at a rate of 6.6 per year during the Mission periods (Table 7.13). It is also pertinent to mention that shell bead production slowed during the Mission period as traditional trade networks began to disintegrate with the resettlement of the Chumash into the missions. Therefore the higher rate of shell bead deposition during the Mission periods is especially meaningful. Even if we stretched the data and proposed that all of the Late Period beads were deposited at the sites during the Protohistoric period, these beads would still have entered the archaeological record only at the rate of 0.8 beads per year. Multiple lines of evidence suggest that either the number of occupants at the village, the frequency of village occupation, or the duration of village occupation was greatest during the Early Historic period (AD 1782-1834).

Time Period	Number of Beads	Years in Time Period	Rate Deposited per Year
Late and Protohistoric	218	632	0.3
Protohistoric *(including Late Period beads)*	218	282	0.8
Mission	344	52	6.6

Table 7.13. Rate of bead deposition by time period for excavated areas of SCRI-324 and -384.

Despite a noted decline in the density of beads dating to the Late (AD1800-1816) and Terminal (AD 1816-1834) Mission periods (Figure 7.10), beads dating specifically to these time periods were found at the sites. While the mainland missions recorded the first Island Chumash baptism in 1783, the majority occurred between 1814-1816, with the last recorded in 1822 (Johnson 1982b). *Nimatlala* was therefore likely occupied until the last of the Chumash residents left Santa Cruz Island. None of the baptisms, however, recorded a neophyte as having come from this village. Either the residents of the village were not baptized or they did not list the village as their “home” village. The bead chronology suggests that at least some *Nimatlala* residents survived the measles epidemic that occurred between 1805 and 1807, which killed several hundred Islanders and quelled plans for a mission to be founded on Santa Cruz Island (Tapis 1807, cited in Johnson 1982b:63).

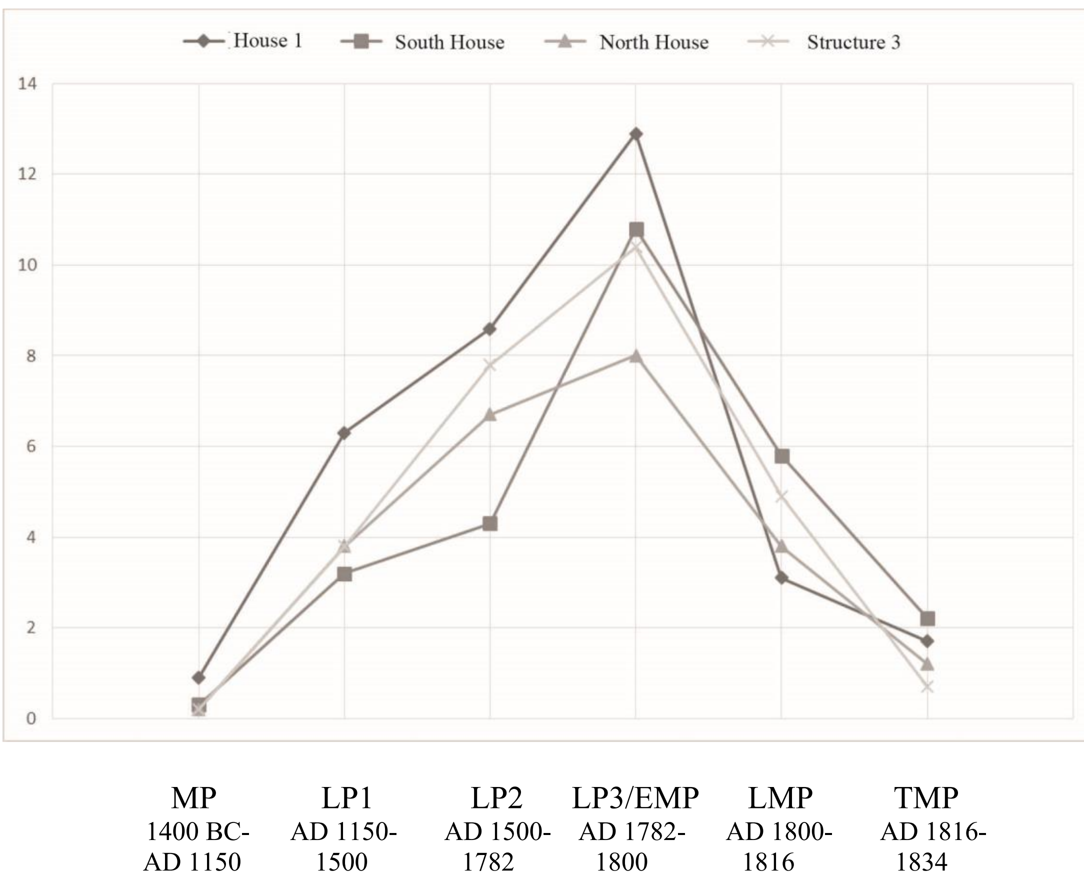

Figure 7.10. Density of beads per square meter by time period for each structure.

7.4 Bone Artifacts

Few examples of bone artifacts were found in the excavations at sites SCRI-324 and -384. One small shark tooth pendant was recovered from the North House at SCRI-324 (Figure 7.11). This pendant likely dates to Phase 2 of the Late period or to Protohistoric period (AD 1500-1800) (King 1990:248). Additionally, a few fragments of worked bone were found throughout the site. A number of these worked fragments were bird bone and included highly polished tubes such as the illustrated example (Figure 7.12), also from the North House. A sea mammal rib fragment (Figure 7.13) was also found, and exhibits canid gnaw marks.

Figure 7.11. Dorsal (left) and ventral (right) views of a shark tooth pendant found in the North House at SCRI-324. Scale in centimeters.

Figure 7.12. Polished bird bone tube from the North House at SCRI-324. Scale in centimeters.

Figure 7.13. Sea mammal rib fragment with canid gnaw marks. Scale in centimeters.

7.5 Flaked Stone Artifacts

The assemblage of flaked stone artifacts from *Nimatlala* includes projectile points, microblades, stone drills, cores, other flaked stone tools, as well as numerous flakes.

7.5.1 Projectile Points

The collection of projectile points from SCRI-324 and -384 contains 32 specimens: 11 whole and 21 fragmented projectile points. Twenty-three of the projectile points were classified by type, while nine are too fragmented to categorize. Identifications were made according to Justice's (2002) typology, as this is the most recent, comprehensive, and detailed discussion of California projectile points. Three types of projectile points were found: Coastal Contracting Stem points (Figure 7.14), Malaga Cove Leaf points (Figure 7.15), and Canaliño Triangular points (Figure 7.16).

The **Coastal Contacting Stem** cluster consists of a number of contracting stem point types found in coastal and central California, including Vandenberg Contracting Stem, Año Nuevo Long Stem, Point Sal Barbed, Channel Islands Barbed, Houx Contracting Stem and Excelsior points (Justice 2002). They likely functioned as spear and harpoon tips, and also as knife blades (Justice 2002). These points typically exhibit triangular blades with a contracting stem that may either be pointed or wide and squared-off at the end (Justice 2002). Points from *Nimatlala* likely date to the Late period. Many suggest that these points date as early as 2500 BC and continued to be in use until about AD 500 (Erlandson et al. 1992; Glassow

1996; Jones 1993; Justice 2002; Moratto 1984), although this time sequence does not necessarily apply to all Coastal Contracting Stem types. For example, at CA-SLO-2 at Diablo Canyon, Coastal Contracting Stem points are common in the most recent levels of the deposit which date to the Late Period, but the same levels also contain Canaliño and Malaga Cove points (Justice 2002:257).

Within the Coastal Contracting Stem cluster identified by Justice (2002) the specimens from *Nimatlala* do not fit into one type. Instead, they most closely share characteristics with both the Vandenberg and Año Nuevo types. Of the five Coastal Contracting Stem points found at *Nimatlala*, four are made of Santa Cruz Island blond chert and one appears to be made of Monterey chert from a different source. Santa Cruz Island blond chert is a form of Monterey chert found only on this island. Monterey chert not of the Island blond type is also found on Santa Cruz Island, but is not immediately distinguishable from Monterey chert found on the mainland or other islands.

Figure 7.14. Coastal Contracting Stem projectile points from SCRI-324. From left to right: point from the floor level of the South House; point from Structure 3 fill; point from the floor level at the North House. Scale in centimeters.

Malaga Cove Leaf points are small leaf-shaped points named for the Malaga Cove site (LAN-138) located at the Santa Monica Bay, and they vary in shape from true leaf–shaped, to teardrop, to bi-pointed (Justice 2002). These points are generally associated with the Middle and Late periods, and Justice (2002) provides an AD 500-1300 time span for these points, although Harrison (1965) reported Malaga Cove leaf points at the Historic period Chumash village of *Mikiw* (SBA-78), and ethnographic arrows tipped with this type of point were collected in Southern California during the 1790s (Justice 2002:363-364). This suggests that these types of projectile points continued to be manufactured into the Early Historic period, although the great bulk of points of this type come from contexts dated to the Late

Prehistoric period. During the course of excavations at *Nimatlala*, three Malaga Cove Leaf points were recovered, and all three are of Monterey chert.

Figure 7.15. Malaga Cove Leaf points from SCRI-324. From left to right: point from Structure 3 fill; point from the North House; point from the Structure 3 fill. Scale in centimeters.

Canaliño Triangular points are part of the Western Triangular Cluster of points and are elongated in shape, typically exhibiting a concave base (Justice 2002). In some publications these points have been described as "swallow tailed" (Wedel 1941; Lathrap and Hoover 1975:32). These points date from around AD 1300-1500 to perhaps as late as the 1830s (Justice 2002). The Canaliño Triangular points are the most abundant type of points at the site, and they are also the most commonly occurring points at other Chumash Historic period villages such as the mainland coastal towns of *Mikiw* in Santa Barbara County (Harrison 1965:112) and *Shisholop* in Ventura County (Greenwood and Browne 1969). Canaliño Triangular points were made of several materials, including chert, fused shale, obsidian, and even European porcelain and glass during the Early Historic period (Lathrop and Hoover 1975:29; Harrington 1933:81-82). Fused shale was commonly used to create these points; it is a metamorphic stone similar to obsidian in that it has a glassy, often translucent appearance. Fused shale is not known to occur naturally on the Channel Islands, and the closest source of the material is in Grimes Canyon near Moorpark in Ventura County. Fifteen Canaliño Triangular points were excavated, with 14 specimens made of fused shale and one of obsidian. Obsidian is also not naturally occurring on the Channel Islands and would have been imported from a mainland source. The one obsidian point was found in the South House at SCRI-324 and was broken into two pieces. The two pieces were found in different units and levels, but during analysis it was found that they fit together and were part of the same point. Although Canaliño Triangular points typically are not very large, the specimens in the collection from *Nimatlala* are quite small. One specimen (Figure 7.16) is smaller than one centimeter in both length and width. This point is finished on all sides, but may have been reworked from a portion of a larger point that had broken. Several others may also have been reworked from larger points. It is interesting that the residents of

Nimatlala chose to rework these points until very little material remained instead of simply fashioning new points from the readily available local chert.

Figure 7.16. Canaliño Triangular fused shale points from SCRI-324 and -384. From left to right: the smallest specimen, from the fill of Structure 3; point from the trench through House 1; point from the trench through the South House; point from the fill of Structure 3; point from the house floor of the South House; point from the North House. Scale in centimeters.

The sample of projectile points from *Nimatlala* contains an interesting lithic use pattern. Because the sample is small, there is not a high degree of confidence that the pattern is meaningful. The three projectile point types found at the village appear to be strongly associated with a distinct lithic material. Of the 15 Canaliño Triangular points 100% were manufactured from exotic materials and all but one (93%) of the points are of fused shale. All three of the Malaga Cove Leaf points are of Monterey chert, which occurs naturally on Santa Cruz Island. Of the five Coastal Contracting Stem points, all but one (90%) of the points were made of Santa Cruz

Island blond chert. All of the Coastal Contracting Stem points were made of locally available lithic material.

The lack of obsidian and fused shale debitage at the site suggests that the Canaliño Triangular points were not made at *Nimatlala*, although they may have been rejuvenated or modified at the village. It should also be noted that obsidian and fused shale pressure flakes are typically very small, and therefore some may not have been recovered due to the use of 1/8" mesh screens for processing material. It is also possible that Canaliño Triangular points were manufactured on the mainland and then transported in their finished state to the islands, or that the points were attached to arrows on the mainland and that the arrows were traded to the Island Chumash. However, archaeological data from Island Chumash villages is currently not sufficient to evaluate this claim. It is curious that the residents of *Nimatlala* preferred to rework Canaliño Triangular points down to the smallest form possible rather than produce a new point from locally available chert, which they used to manufacture a great variety of other types of projectile points, stone tools, and microblades. Further analysis of this projectile point type from previously excavated collections may elucidate the manufacture and use of these points among the Island Chumash.

When the projectile point assemblage is analyzed by structure (Tables 7.14-7.18), it is the North House at SCRI-324 that contained the greatest density of points, with 2.2 per square meter. The assemblage from this house also contained the lowest percentage of points made of exotic materials of all three houses excavated.

Conversely, the South House at SCRI-324 had the lowest density of projectile points among the three houses, but also had the highest percentage of projectile points made of exotic materials. Of the five projectile points found in the possible sweat lodge, none were found on the floor of the structure; they all were found in the fill.

Structure	Density per m^2	% Made of Exotic Material	% Made of Local Material
House 1 SCRI-324	1.4	80%	20%
South House SCRI-324	1.1	87.5%	12.5%
North House SCRI-324	2.2	69%	31%
Structure 3 SCRI-324	1.4	50%	50%

Table 7.14. Density and material type of projectile points from SCRI-324 and -384 by structure.

Level	Material Type & Color	Fragmentation[a]	Heat[b]	Measurements[c] (cm)	Weight (g)	Type (Justice 2002)	Time Period (Justice 2002)
0-10	**fused shale**, black	**FMP**, missing base		2.3 x 1.2 x 0.4	0.9	**Canaliño Triangular**	**Late/Historic**
0-10	**fused shale**, reddish gray	**W**		1.3 x 1.0 x 0.2	0.2	**Canaliño Triangular**, slight concave base	**Late/Historic**
10-20	**Monterey chert**, Santa Cruz Island blond	**FMP**, missing base		2.6 x 1.2 x 0.4	1.4	**?** Probably **Coastal Contracting Stem**	**Late/ Protohistoric**
10-20	**fused shale**, gray	**FMP**, in manufacture	**B**	1.6 x 0.8 x 0.3	0.4	**?**	**?**
10-20	**fused shale**, black	**FMP**, in manufacture		1.9 x 1.2 x 0.3	0.6	**Canaliño Triangular**, concave basal notch	**Late/Historic**

[a] fragmentation abbreviations: FMP= fragment, mostly present; FMM=fragment, mostly missing, W=whole
[b] heat abbreviations: H=evidence of heating; B=evidence of burning/severe or prolonged exposure to heat
[c] measurements given in length x width x thickness

Table 7.15. Projectile points from House 1 at SCRI-384.

Level	Material Type & Color	Fragmentation[a]	Heat[b]	Measurements[c] (cm)	Weight (g)	Type (Justice 2002)	Time Period (Justice 2002)
0-10 & Level 4	**obsidian**, black	**FMP**, broken in 2		1.8 x 1.0 x 0.2	0.4	**Canaliño Triangular,** concave base	**Late/Historic**
20-30	**fused shale**, gray	**W**		1.9 x 1.0 x 0.3	0.4	**Canaliño Triangular**, slight concave base	**Late/Historic**
Level 3/ Floor	**fused shale**, grayish black	**W**		1.9 x 0.9 x 0.3	0.4	**Canaliño Triangular**, slight concave base	**Late/Historic**
Level 3/ Floor	**fused shale**, gray	**FMP**, missing tip	**H**	1.7 x 1.0 x 0.4	0.4	**Canaliño Triangular,** concave base	**Late/Historic**
Level 3/ Floor	**fused shale**, gray	**FMP**, broken in 2	**B**	2.2 x 1.3 x 0.3	0.5	**Canaliño Triangular,** concave base	**Late/Historic**
Level 3/ Floor	**fused shale**, gray	**FMM**, midsection frag		1.6 x 1.3 x 0.3	0.7	**?**	**?**
Level 3/ Floor	**fused shale**, black	**FMM**, midsection frag	**H**			**?**	**?**
Level 3/ Floor	**Monterey chert**, tan and gray	**FMP**, broken stem		3.0 x 2.1 x 0.5	3.0	**Coastal Contracting Stem,** wide leaf shape with wide contracting stem	**Late**

[a] fragmentation abbreviations: FMP= fragment, mostly present; FMM=fragment, mostly missing, W=whole
[b] heat abbreviations: H=evidence of heating; B=evidence of burning/severe or prolonged exposure to heat
[c] measurements given in length x width x thickness

Table 7.16. Projectile points from the South House at SCRI-324.

Level	Material Type & Color	Fragmentation[a]	Heat[b]	Measurements[c] (cm)	Weight (g)	Type (Justice 2002)	Time Period (Justice 2002)
29-50	**fused shale**, black, red and gray	**FMM**, tip fragment		1.0 x 0.8 x 0.3	0.2	**?**	**?**
29-50	**fused shale**, black, red and gray	**FMM**, tip fragment		1.2 x 0.8 x 0.2	0.2	**?**	**?**
33-50	**fused shale**, grayish red	**FMP**, split vertically		1.7 x 1.0 x 0.3	0.3	**Canaliño Triangular**	**Late/Historic**
33-50	**fused shale**, light gray	**FMP**, missing tip		1.9 x 1.1 x 0.4	0.7	**Canaliño Triangular**, concave base	**Late/Historic**
40-50	**fused shale**, gray	**FMM**, tip fragment		1.3 x 0.9 x 0.3	0.3	**?**	**?**
40-50	**fused shale**, black and gray	**W**		2.2 x 1.3 x 0.4	0.7	**Canaliño Triangular**, concave base	**Late/Historic**
45-50	**Monterey chert**, Santa Cruz Island blond	**FMP**, missing base	**H**	2.0 x 1.1 x 0.4	0.7	**?** Probably **Coastal Contracting Stem**	**Late**
50-60	**Monterey chert**, tan and gray w/cortex	**W**		5.1 x 1.6 x 0.5	3.7	**Malaga Cove Leaf**	**Late/ Protohistoric**
50-60	**Monterey chert**, dark gray w/ tan cortex	**FMM**, tip fragment	**H**	1.3 x 1.7 x 0.5	0.8	**?**	**?**
50-floor	**fused shale**, grayish black	**FMP**, base fragment	**H**	1.4 x 1.1 x 0.4	0.6	**Canaliño Triangular**, concave base	**Late/Historic**
floor	**fused shale**, black and gray	**FMM**, tip fragment	**H**	1.5 x 1.0 x 0.4	0.3	**?**	**?**
floor	**fused shale**, red	**W**		2.0 x 1.0 x 0.2	0.3	**Canaliño Triangular,** strange curvature	**Late/Historic**
mortar pedestal	**Monterey chert**, Santa Cruz Island blond	**W**		2.9 x 1.3 x 0.4	1.2	**Coastal Contracting Stem**	**Late**

[a] fragmentation abbreviations: FMP= fragment, mostly present; FMM=fragment, mostly missing, W=whole
[b] heat abbreviations: H=evidence of heating; B=evidence of burning/severe or prolonged exposure to heat
[c] measurements given in length x width x thickness

Table 7.17. Projectile points from the North House at SCRI-324.

Level	Material Type & Color	Fragmentation[a]	Heat[b]	Measurements[c] (cm)	Weight (g)	Type (Justice 2002)	Time Period (Justice 2002)
0-10	**fused shale**, red	**W**		1.8 x 1.1 x 0.3	0.2	**Canaliño Triangular**, concave base	**Late/Historic**
0-10	**fused shale**, grayish black	**FMM**, tip fragment		0.9 x 0.6 x 0.2	0.1	**?**	**?**
0-10	**fused shale**, reddish gray	**W**		1.0 x 0.8 x 0.2	0.1	**Canaliño Triangular**, concave base	**Late/Historic**
10-20	**Monterey chert**, black & tan w/cortex	**W**		3.4 x 1.1 x 0.4	1.5	**Malaga Cove Leaf**	**Late/Protohistoric**
10-20	**Monterey chert**, translucent brown with black streaks	**FMP**, missing tip		2.8 x 1.5 x 0.3	1.2	**Malaga Cove Leaf**, small concave basal notch	**Late/Protohistoric**
10-20	**Monterey chert**, Santa Cruz Island blond	**W**		2.9 x 1.8 x 0.6	3.0	**Coastal Contracting Stem**	**Late**

[a] fragmentation abbreviations: FMP= fragment, mostly present; FMM=fragment, mostly missing, W=whole
[b] heat abbreviations: H=evidence of heating; B=evidence of burning/severe or prolonged exposure to heat
[c] measurements given in length x width x thickness

Table 7.18. Projectile points from Structure 3 at SCRI-324.

7.5.2 Chert Microblades and Microdrills

A total of 465 microblade and microdrill fragments and complete specimens was recovered from SCRI-324 and -384. The Chumash fashioned small drills from microblades, and it is thought that these tools were primarily used to drill holes in shell beads (Arnold 1987). Two main types of these blades and drills are found: either triangular or trapezoidal in cross-section. Middle period lithic assemblages on the Northern Channel Islands contain predominantly trapezoidal microblades and drills whereas triangular microblades and drills dominate Late and Historic period assemblages (Arnold 1987). Most of the specimens recovered during excavations at *Nimatlala* were fragments; therefore, both microdrill and microblade fragments were not separated into categories for analysis. One hundred and thirty-nine specimens (30% of the total sample) were determined to be microdrills. It is likely that more of the specimens were used as drills but fragmentation of the specimens prevents identification. It is assumed that the intent in producing microblades was to create microdrills as an end product. All were made of chert (both Santa Cruz Island blond and other Monterey chert), although most fragments were too small and the materials too similar to differentiate. The assemblage of microblades and microdrills from SCRI-324 and-384 is dominated by the triangular type (Figure 7.17), which is consistent with the Late and Historic period occupation of the village. It is possible that the trapezoidal microblades and microdrills could date to terminal Middle period occupation, although it is not uncommon for Late and Historic period deposits to contain a small number of trapezoidal specimens. Microblade and microdrill fragments (as opposed to whole specimens) comprised the bulk of the collection, with mid-section fragments being the most common type of fragment found (Figure 7.18).

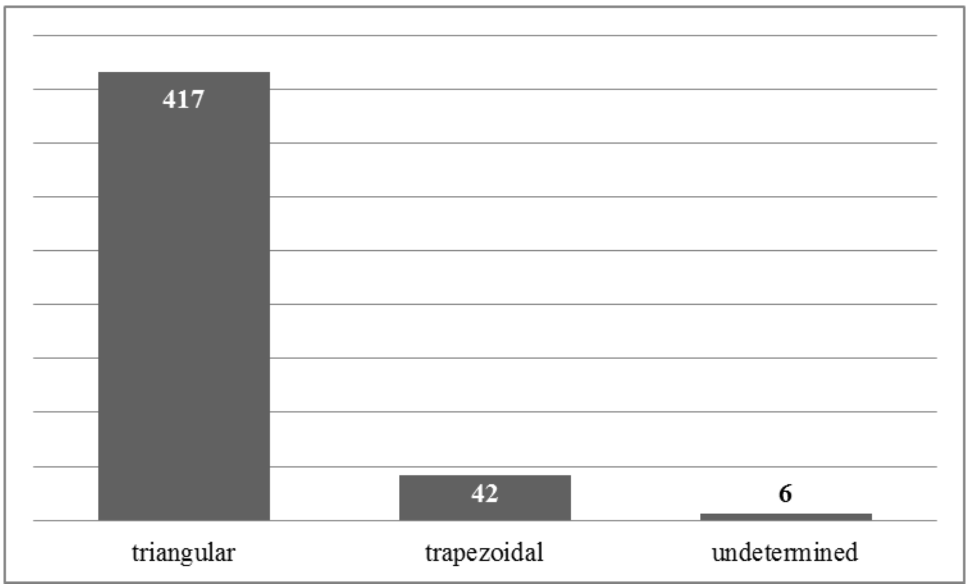

Figure 7.17. Types of microblades and microdrills found at SCRI-324 and -384.

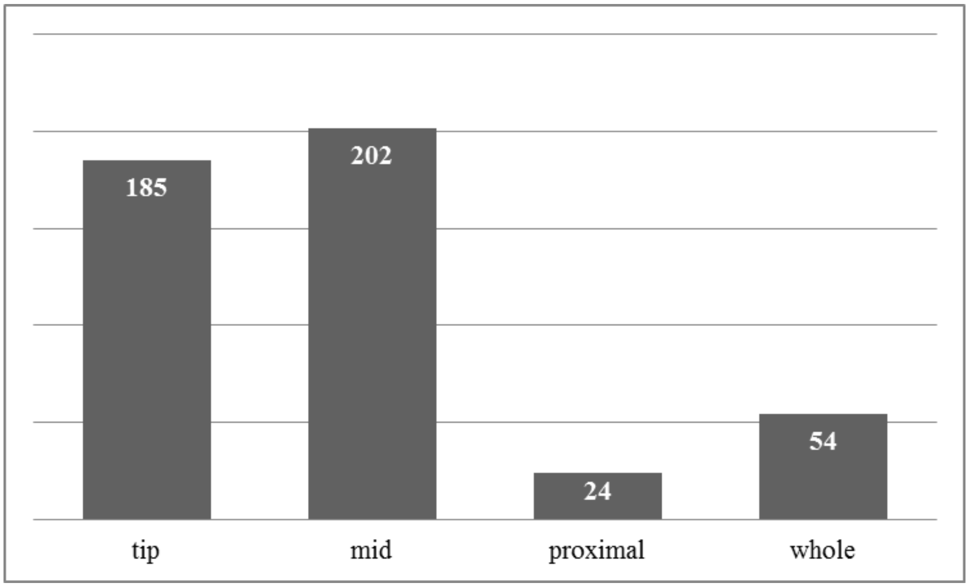

Figure 7.18. Types and number of microblade and microdrill fragments and whole specimens recovered from SCRI-324 and -384.

The density of microblade and microdrill fragments was determined for each structure and area at SCRI-324 and -384 (Figure 7.19). Although Structure 3 contained the highest density of these tools, only 35 out of the 158 total specimens (or 22%) were recovered from deposits deep enough to be associated with the floor of this structure. The majority was therefore found in the fill of this structure and may have been cleaned out from other structures and areas before being deposited in the fill. While the structure interpreted as a possible sweat lodge contained an obvious fill deposit, fill in the house depressions was difficult to determine. Typically house depressions excavated during this project contained an obvious layer of top soil and then a layer of fill that was extremely difficult to discern from the floor level. Some of the microblades and drills found in the house depressions could have been deposited after the houses were abandoned, but for the purposes of this research it was impossible to determine which artifacts were definitively from the fill and which were found in the floor deposits. House 1 at SCRI-384 contained an extremely low density of microdrills and microblades, which is especially interesting given that this structure contained the highest density of shell beads. The residents of this structure appear not to have concentrated on the production of shell beads although this did not effect their access to the beads.

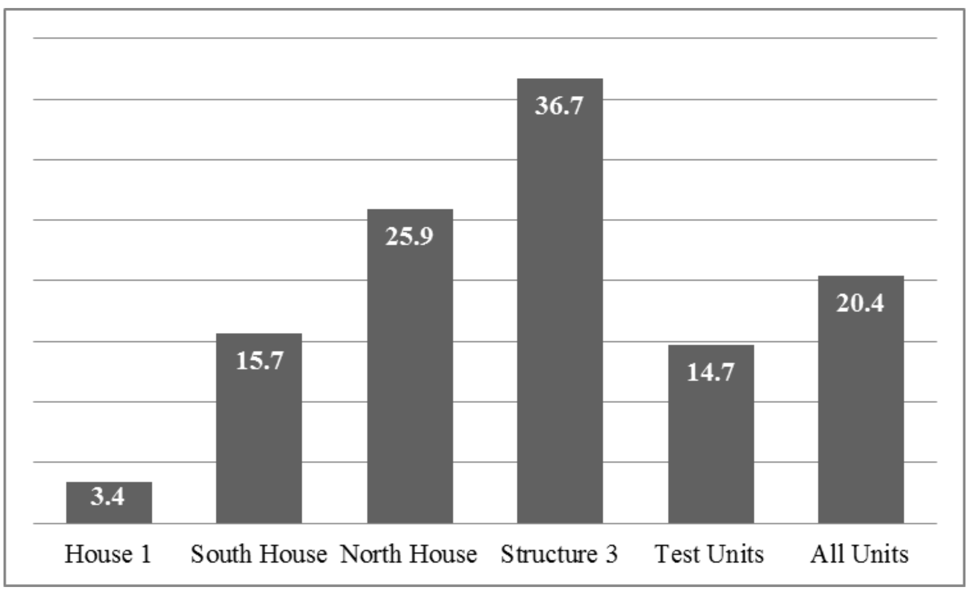

Figure 7.19. Density of microblades and microdrills per square meter for structures and areas of SCRI-324 and -384.

7.5.3 Flakes

A total of 2,669 stone flakes were cataloged. The material type of each flake was determined, and the density per structure and area was calculated (Table 7.19). Flakes were divided into three categories based on material type: chert, non-chert, and exotics. Chert flakes, including those of Monterey chert and Santa Cruz Island blond chert were most prevalent, comprising 74% of the sample. The non-chert category, which made up 26% of the assemblage, included flakes made of basalt, granite, and other volcanics, as well as a few flakes of an inferior quartzite. Only seven small flakes of imported exotic materials were identified, including five obsidian and two fused shale flakes. These imported flakes represent less than 1% of the collection of flakes excavated from the village. The density of flakes was greatest in the North House at SCRI-324, although only House 1 at SCRI-384 and the South House at SCRI-324 contained flakes of obsidian and fused shale. The majority of flakes in Structure 3 were excavated from the fill and not from the floor deposit of the structure. The length and width of each flake was measured to the nearest half centimeter (Table 7.20). Flakes measuring less than one centimeter in both length and width comprised over 40% of the assemblage, suggesting a focus on tool finishing and rejuvenation.

Structure/Area	Density Per m^2	% Chert	% Non-Chert	% Exotic
House 1 SCRI-384	134.3	66%	32%	2%
South House SCRI-324	97.9	82%	17%	1%
North House SCRI-324	158.2	78%	22%	0%
Structure 3 SCRI-324	110.6	83%	17%	0%
Other Areas SCRI-324 & -384	46.7	77%	23%	0%
ALL AREAS SCRI-324 & -384	118.6	74%	26%	0%

Table 7.19. Density and material type of flakes from SCRI-324 and -384.

	House 1			So. House			No. House			Structure 3			Other Areas			
Size (cm)	Chert	Non-chert	Exotics	Chert	Non-chert	Exotics	Chert	Non-chert	Exotics	Chert	Non-chert	Exotics	Chert	Non-chert	Exotics	TOTALS
< 1 x 1	122	59	4	200	40	3	360	60	-	229	32	-	42	9	-	1160
.5 x 1.5	12	8	-	12	3	-	21	10	-	11	1	-	2	-	-	80
.5 x 2	-	1	-	1	4	-	4	5	-	2	1	-	-	-	-	18
.5 x 2.5	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	2
1 x 1.5	28	44	-	131	27	-	144	41	-	52	12	-	3	-	-	482
1 x 2	13	10	-	38	10	-	29	22	-	8	3	-	-	-	-	133
1 x 2.5	2	4	-	11	4	-	5	4	-	6	3	-	-	1	-	40
1 x 3	1	-	-	1	2	-	1	-	-	-	-	-	-	-	-	5
1 x 3.5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
1.5 x 1.5	17	15	-	24	16	-	39	14	-	19	4	-	-	-	-	148
1.5 x 2	23	12	-	35	13	-	44	10	-	13	3	-	-	-	-	153
1.5 x 2.5	8	2	-	17	6	-	23	4	-	8	2	-	2	1	-	73
1.5 x 3	4	3	-	3	6	-	4	1	-	3	2	-	-	-	-	26
1.5 x 3.5	1	-	-	1	1	-	4	2	-	2	-	-	-	-	-	11
1.5 x 4	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	2
1.5 x 4.5	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
2 x 2	10	2	-	12	4	-	10	4	-	4	3	-	2	-	-	51
2 x 2.5	8	9	-	14	10	-	8	8	-	8	-	-	2	-	-	67
2 x 3	3	5	-	9	7	-	4	2	-	6	4	-	1	-	-	41
2 x 3.5	-	1	-	4	5	-	4	2	-	2	-	-	-	-	-	18
2 x 4	1	2	-	-	2	-	1	2	-	-	-	-	-	-	-	8
2 x 4.5	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	2
2 x 5.5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
2.5 x 2.5	4	-	-	3	2	-	4	-	-	4	-	-	-	-	-	17
2.5 x 3	3	4	-	1	5	-	9	3	-	1	1	-	-	-	-	27
2.5 x 3.5	1	3	-	1	3	-	8	2	-	3	2	-	-	1	-	24
2.5 x 4	-	-	-	-	2	-	1	3	-	2	-	-	-	-	-	8
2.5 x 4.5	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	3
2.5 x 5	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
3 x 3	1	2	-	1	3	-	1	-	-	1	1	-	-	-	-	10
3 x 3.5	2	2	-	1	1	-	3	1	-	3	-	-	-	-	-	13
3 x 4	1	1	-	1	-	-	3	-	-	-	-	-	-	1	-	7
3 x 4.5	1	1	-	1	1	-	-	-	-	1	1	-	-	1	-	7
3 x 5	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
3 x 6	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
3.5 x 3.5	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	2
3.5 x 4	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
3.5 x 4.5	1	1	-	-	-	-	-	1	-	-	2	-	-	-	-	5
3.5 x 5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
3.5 x 5.5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
3.5 x 6	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
4 x 4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2
4 x 4.5	-	-	-	-	-	-	1	2	-	-	-	-	-	1	-	4
4 x 5	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
4 x 5.5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
4 x 6	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
4.5 x 5	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
4.5 x 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
5 x 5.5	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
5 x 6	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1

Table 7.20. Frequency of flakes at SCRI-324 and -384 by size and material.

7.5.4 Other Flaked Stone Tools

A total of 62 other flaked stone tools were recovered during excavations and include bifaces, cores, drills, scrapers, utilized flakes, and miscellaneous flake tools (Table 7.21). Two of the chert cores identified are microblade cores; one from House 1 at SCRI-384 and one from the South House at SCRI-324. House 1 at SCRI-384 also contained the densest deposit of stone tools, with over double the density per square meter of the other houses at the village. The majority (87%) of the flaked stone tools were made of chert (Figure 7.20), with the remaining 13% split evenly between quartzite and other unidentified non-chert materials.

Tool Type	House 1	South House	North House	Structure 3	Other Areas	***TOTALS***
Biface	2	--	1	--	--	***3***
Core	3	8	2	1	1	***15***
Drill	4	--	1	1	--	***6***
Scraper	4	4	3	--	2	***13***
Utilized Flake	4	4	3	--	2	***13***
Misc. Flake Tool	3	2	4	3	--	***12***
TOTALS	***20***	***18***	***14***	***5***	***5***	***62***
Density per m^2	***5.7***	***2.5***	***2.3***	***1.2***	***--***	***2.8***

Table 7.21. Number, types, and density of other flaked stone tools from SCRI-324 and -384 by structure and area.

7.6 Ground Stone Artifacts

Ground stone artifacts recovered during excavations include polished stone fragments of serpentine, stone beads, perforated stone fragments, mortars, a pestle, mano fragments, and unidentified ground stone fragments (Table 7.22). It is uncertain what use the polished stones may have had. Four serpentine beads were also recovered (Figure 7.21) and all four beads show evidence of heat or burning and are of the type believed to date to the L1 period (AD 1150-1500) (King 1990). Two small perforated stone fragments were found in the North House at SCRI-324. These are both burned and were found near the central hearth of the house, and both fragments likely were from the same artifact. Perforated stones, often called "doughnut stones" are known ethnographically to have been used as weights for digging sticks, which the Chumash may have used to collect corms such as those of blue dicks (*Dichelostemma capitatum*) for roasting and eating. Blue dicks are currently present at and near the village, although their distribution in the vicinity during the Late and Historic periods is currently unknown.

Three mortars with small grinding surfaces were recovered from site SCRI-324. One was found on the surface of the site eroding down the steep hill to the south. The other two were found in the North House: one on the surface (Figure 7.22) and the other partially buried. The one complete pestle (Figure 7.23) recovered from the site was also from SCRI-324 and was located on the surface eroding from the deposit in the old road cut in the north section of the site. Additionally, four possible mano fragments were identified, with one from the surface of SCRI-324, two from the North House at SCRI-324, and one from House 1 at SCRI-324. Although the densest deposit of ground stone artifacts was found in House 1 at SCRI-384, the greatest number was found in the North House at SCRI-324. The deposit in this house contained the most ground stone artifacts.

Ground Stone Type	House 1	South House	North House	Structure 3	Other Areas	***TOTALS***
Polished Stone Frags.	3	6	--	--	--	***9***
Polished Stone Beads	2	1	1	--	--	***4***
Unid. Ground Stone Frags.	4	3	11	1	--	***19***
Perforated Stone Frags.	--	2	--	--	--	***2***
Mortars	--	--	2	--	1	***3***
Pestle	--	--	--	--	1	***1***
Mano Frags.	1	--	2	--	1	***4***
TOTALS	***10***	***12***	***16***	***1***	***3***	***42***
Density per m^2	***2.9***	***1.7***	***2.7***	***0.2***	***--***	***1.9***

Table 7.22. Number, types, and density of ground stone tools from SCRI-324 and -384 by structure and area.

Figure 7.20. Serpentine stone beads from SCRI-324 and -384.

Figure 7.21. Pestle from SCRI-324.

Figure 7.22. Mortar from the surface of the North House at SCRI-324.

7.7 Discussion

When the densities of all artifact types are plotted by structure (Figure 7.24 and Table 7.23) it becomes clear that most artifacts are distributed relatively equally. All households had access to the same materials, technology, and artifact types, although some may have chosen to focus efforts on different activities. This is particularly visible when House 1 at SCRI-384 is compared with the North House at SCRI-324. For example, among all houses excavated, House 1 contains the highest density of glass beads, shell beads, flaked stone tools, and ground stone, while the North House contains the greatest density of shell fishhooks, projectile points, flakes, and microblades and drills. The South House at SCRI-324 holds the middle ground, often registering neither the highest nor lowest density of artifact types. Residents of the village appear to have engaged in similar activities when occupying the possible sweat lodge and occupying their homes. And when the possible sweat lodge was abandoned, it appears that residents may have filled in the area with deposits from around the site as well as material generated during the cleaning of their houses and hearths. The next chapter explores the residents, activities, structures, and occupation of *Nimatlala* in greater detail.

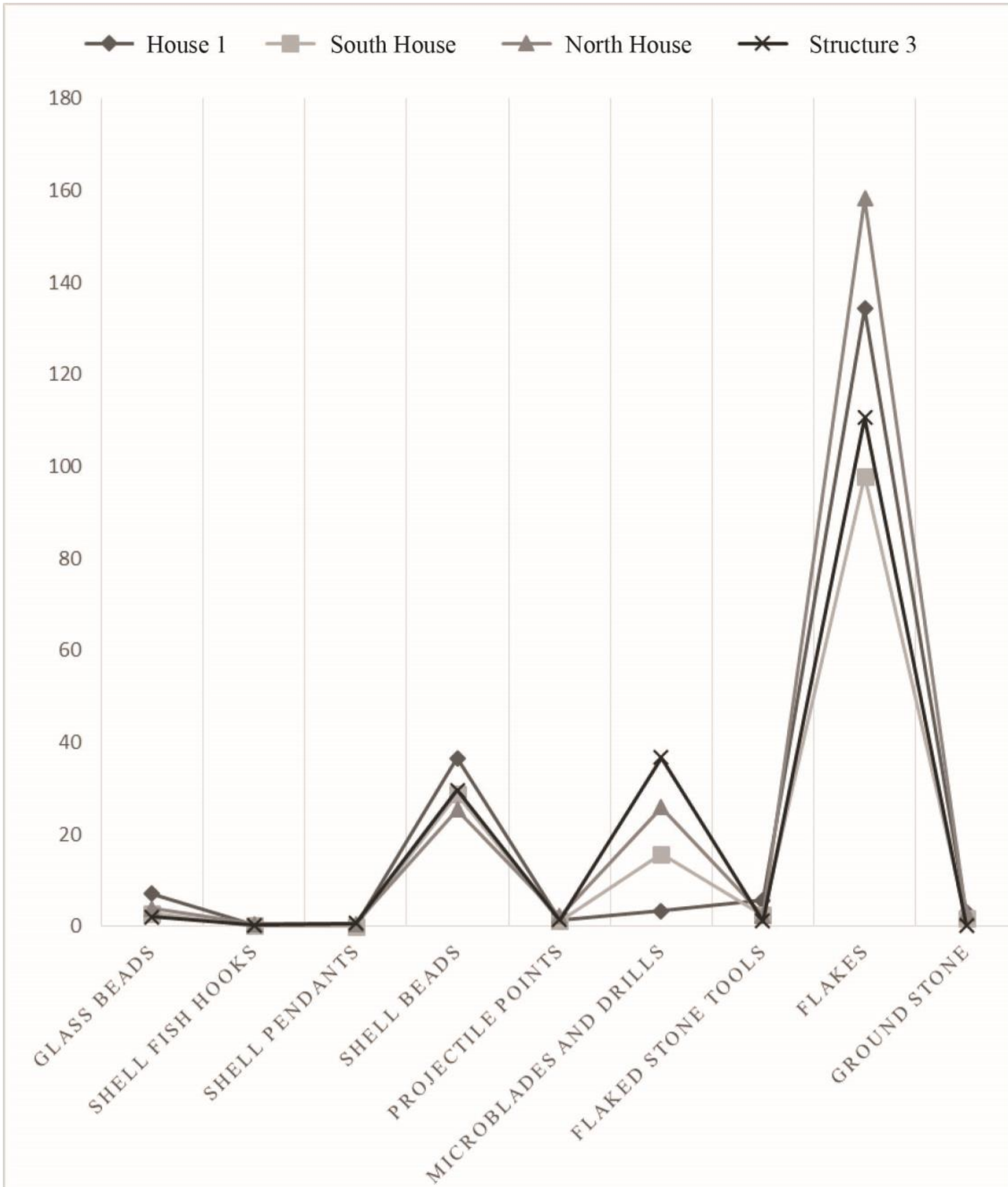

Figure 7.23. Densities of artifact classes per square meter by structure.

Artifact Class	***House 1 SCRI-384***	***S. House SCRI-324***	***N. House SCRI-324***	***Structure 3 SCRI-324***	***All Areas***
Glass Beads	**7.1**	2.8	3.8	2.1	3.5
Shell Fishhooks	0.3	0.1	**0.5**	0.2	0.3
Shell Pendants	—	—	0.5	**0.7**	0.3
Shell Beads	**36.6**	28.7	25.3	29.6	27.8
Projectile Points	1.4	1.1	**2.2**	1.4	1.4
Microblades and Drills	3.4	15.7	25.9	**36.7**	20.4
Flaked Stone Tools	**5.7**	2.5	2.3	1.2	2.8
Flakes	134.3	97.9	**158.2**	110.6	118.6
Ground Stone	**2.9**	1.7	2.7	0.2	1.9

Table 7.23. Densities of artifact types by structure and for all excavated deposits. The highest density in each category is in bold.

CHAPTER EIGHT

Conclusion: Interpreting *Nimatlala*

8.1 *Nimatlala* in Summary

Excavations at SCRI-324 and-384 reveal *Nimatlala* was a small Island Chumash village located in the Central Valley of Santa Cruz Island and occupied intermittently from the Late Prehistoric period through the Early Historic period. The village was not centralized; rather, it was spread out in three or more sites on both sides of the Central Valley drainage, with structures built in areas where relatively flat, well-drained land was available. This region of the island offered a year-round supply of fresh water, access to a variety of plant food resources, shelter from the windy coast, and a central location with overland access via ridge lines to the other Santa Cruz Island villages. Due to the nature of currents and canoe travel, it was likely often more efficient to travel by foot between villages than paddle a canoe around the Island. Additionally, it is not known if all residents had access to canoes. The village was strategically located between the two large villages of *Xaxas* on the North Coast and *Liyam* on the South Coast. Travel time between *Nimatlala* and each of these villages would have been less than an hour, and midden constituents indicate frequent trips to the coast and a diet of maritime resources including shellfish, fish, and sea mammals. Ground stone artifacts found at the sites indicate that plant food resources were also an important dietary component.

Although the depths of the deposits at *Nimatlala* clearly indicate that the village was not permanently occupied, residents did invest in the construction of thatched houses and what appears to have been a small sweat lodge, indicating an intent to spend significant amounts of time at the village. Residents engaged in production of shell beads, manufacture of stone tools, gathering of plants, hunting of sea mammals, fishing, and collection of shellfish. Shell-bead analysis indicates the most intense occupation of the village occurred during the Early Mission period (AD1500-1782), although the village continued to be occupied into the Terminal Mission period (AD1816-1834) until about 1822, when the remaining Chumash on the island were removed to the mainland missions. No neophytes were recorded as residents of *Nimatlala*, indicating perhaps the ephemeral occupation of the site, or that residents of this particular village did not enter the mission system or seek to be baptized. However, the memory of the village persisted and the name and general location of the site was provided by Chumash informants and recorded by Juan Esteban Pico in 1884, over sixty years after the village was abandoned.

This village was generally forgotten by anthropologists and not included on maps of Historic Island villages because no neophytes were recorded as having lived in *Nimatlala*, because the sites and structures are small and decentralized, and because village sites on the Channel Islands are all assumed to be located on the coast due to the reliance on maritime resources for subsistence. Archaeological investigations at *Nimatlala* provide valuable insight into the settlement system and organization of Island Chumash households and communities during the Late Prehistoric and Early Historic periods.

We now return to the research questions posed at the onset of this project in light of the data gathered during the course of investigations at *Nimatlala*.

8.2 What Was the Time Span of Occupation at *Nimatlala*?

Radiocarbon dating, supported by the presence of time-sensitive artifacts, firmly places the occupation of *Nimatlala* from the beginning of the Late period (AD 1300) through the Early Historical period (AD 1782-1834). A few Middle period artifacts found at the site could place initial occupation a bit earlier, although they may have been deposited during the Middle-Late Transitional period (AD 1150-1300). Radiocarbon dating also indicates that SCRI-384 was occupied for a brief time at the beginning of the Middle period, around 200 BC. The structures at the sites, including the possible sweat lodge, all date to the Late Prehistoric and Early Historic periods. More importantly, the chronology of occupation derived from the artifact assemblages (particularly the shell beads) from each excavated structure suggests that the structures were all occupied contemporaneously (see Figure 6.10). Because the structures appear contemporaneous, we can therefore reasonably make the assumption that the sites represent a village group, and not simply houses occupied one at a time over a few hundred years.

8.3 If Occupied For More Than One Time Period, Was There a Change in the Intensity of Occupation Over Time?

The deposition rate of time-sensitive shell beads suggests that *Nimatlala* saw an increase in intensity of occupation from the Late period to the height of occupation during the Early Mission period (AD 1782-1800) (Figure 7.10). The increase in intensity could be the result of either more people occupying the village, or the same number of residents deciding to occupy the village more frequently or for longer intervals of time. These findings are an unexpected result. From their analysis of 215 radiocarbon dates from the Northern Channel Islands, Erlandson et al. (2001) concluded that Chumash populations on the Northern Channel Islands likely started to decline due to introduced disease almost immediately after contact with seafaring explorers in 1542. Their data also suggest that Island Chumash populations may have briefly recovered between AD 1650 and 1700, only again to decrease dramatically as a result of Mission Period epidemics after 1750 (Erlandson et al. 2001).

Johnson (2011) has challenged this finding, noting that archaeologists do not radiocarbon date occupational layers indiscriminately; rather, they test layers in which time-sensitive artifacts are not found. Archaeologists would not radiocarbon date more recent layers in which glass beads, items of European manufacture, or time-sensitive olivella beads are found. Therefore, the index of radiocarbon dates upon which Erlandson et al. (2001) base their findings does not accurately reflect the number of known Protohistoric and Historic period occupational components

(Johnson 2011:43-44). The intensity of occupation at *Nimatlala* seems to increase steadily up until AD 1800, after which a drastic decline occurs. There are not enough data to construct a clear picture of why *Nimatlala* saw a steady increase in intensity of occupation until AD 1800. One possibility could be simply that Protohistoric period pandemics did not occur on the Islands and *Nimatlala* saw increased use through time as the population grew steadily. It seems unlikely, however, that the Islanders did not experience a population decline due to introduced diseases before AD 1800. A more likely scenario (discussed below) is that *Nimatlala* possibly served as a temporary residence for smaller groups of people seeking refuge from communities decimated by disease.

8.4 Was the Village Occupied on a Permanent or Temporary Basis?

The density of deposits, as well as the size of the sites and structures, suggest that *Nimatlala* was occupied only periodically. Midden deposits outside of structures at SCRI-324 and -384 range from 1 to 30 centimeters thick, while deposits in houses range from 40 to 50 centimeters in thickness. The deepest deposit was in the semi-subterranean structure where deposits reached over 60 centimeters in depth. Other Late and Historic period village sites on Santa Cruz Island contain much deeper deposits: *Shawa* (SCRI-192) has Late and Early Historic period deposits extending to depths greater than 2.5 m in some areas of the site (Arnold 2001:45); *L'akayamu* (SCRI-330) contains Late and Early Historic period deposits to a depth of over 2.7 m (Arnold 2001:46-47); and SCRI-240, the primary site at *Xaxas*, is more than 5 m deep, with Late and Early Historic period deposits measuring just over 2 meters in depth (Arnold 1987; Arnold 2001:48-49). Shell is the most abundant material in midden deposits at *Nimatlala*, and deposits contain up to 48.3 kilograms of shell per cubic meter. The density of shellfish remains at permanent Late and Early Historic period village sites are much denser. For example, the mussel shell alone at SCRI-330 at *L'akayamu* is reported at 390 kg per cubic meter (Arnold 2001:48). Even if residents were consuming a significant amount of plant foods, the density of cultural materials and depth of deposits at *Nimatlala* do not support the hypothesis that the village was occupied permanently for over 650 years.

The house depressions at *Nimatlala* range between 3 and 4 m in diameter. While a few house depressions of this size are noted in the maps from site record forms for other Early Historic period village sites on the Northern Channel Islands, they are relatively rare. Typically the house depressions at Early Historic period Chumash villages range from 5 to over 12 meters in diameter (Gamble 1991). Additionally, the houses at *Nimatlala* were constructed differently than others that have been excavated in the region. Houses on the mainland (Gamble 2001), as well as those on the Northern Channel Islands (Arnold ed. 2001; Orr 1968; Rick 2007b), are typically constructed with posts around the exterior of the house floor, with some smaller posts sometimes found in the house floor to support partitions or sleeping platforms. None of the houses at *Nimatlala* was found to contain post holes around the exterior of the floor. Instead, all had at least one central post hole located curiously close to the central hearth of each structure. Only one example of a previously excavated structure in the region exhibits similar construction technique. The house excavated by Olson at Willows (SCRI-496) and illustrated in Figure 5.8 contained post holes in the center of the structure with only two posts around the exterior of the structure. These two exterior posts were of whale bone and appeared to mark the doorway.

At *Nimatlala*, the South House at SCRI-324 contained evidence of multiple central post holes, although some were clearly no longer in use, as the holes were located below the central hearth. It is possible that exterior posts were used to construct the houses, but the post holes were small and no longer visible. It is unknown whether the central posts located during excavation were original to the structures or were added later to provide support to an older, sagging structure. If the central posts were original to the structures, it is possible that they more closely resembled a single post tent structure instead of the typical semi-hemispherical thatched Chumash house. The location of the central posts so close to the central hearth would be dangerous, as it would likely be easy to set the entire structure on fire. The risk of fire could be mitigated if the post was frequently replaced with fresh wood, or if the post was sealed with a layer of mud, which could serve to repel both fire and insects. The majority of the cooking may also have occurred at large, communal hearths, such as the one identified at adjacent site SCRI-801 (Perry and Delaney-Rivera 2011). Posts were not exclusively used in house construction. They would have also been used in the construction of wind breaks, shades, half-houses, and fences. Because the post holes discovered during this project were found inside of circular features that appear to be house depressions, it seems likely that they would have supported the small structures in some way, even though the placement of many of the posts is unusual.

Regardless of construction technique, the houses at *Nimatlala* could shelter only a small number of people, suggesting occupation by either small nuclear families or couples. If the village was occupied during seasons of little rain, perhaps some residents chose to sleep out in the open air instead of inside the structures. Artifacts found at the sites attest to the wide variety of activities which occurred at the village, and there is no evidence that the site was occupied by work parties comprised of only men or only women. By the Protohistoric and Early Historic periods, the Chumash had a general division of labor by gender. Men were primarily responsible for open-water fishing and sea mammal hunting (Blackburn 1975; Landberg 1965). Women, along with young children, processed much of the food and collected both wild plants and shellfish (Landberg 1965; Walker and Hollimon 1989). Both men and women produced shell beads and tools (Arnold 1987; Heizer 1955). As the remnants of all of these activities were found at the village, it is likely that men, women, and children resided at the sites.

The semi-subterranean structure appears to fit ethnographic descriptions of the small type of sweat lodge used by residents of a village for sweating, and not for the spiritual and elite practices and ceremonies associated with the larger sweat lodges. Although Rogers (1929) describes two sweat lodges on Santa Cruz Island, and assuming my interpretation is correct, this would be the first small sweat lodge to be recorded on the Northern Channel Islands. Only one other possible small sweat lodge has been excavated in Chumash territory, and it was recorded by Strong (1935) during his excavations at the Mathews site in the Cuyama River Valley in the Interior Chumash region.

The construction and maintenance of house structures at the village indicate that residents were planning to spend a significant amount of time at the village. In order to build the houses at SCRI-324, the landscape required modification in order to create a large enough, relatively flat space upon which to build the house. Although the floors of each structure are extremely difficult to identify, it appears that each floor was located directly on top of a sterile compacted silt layer, suggesting that the area where each structure was to be built was first cleared and prepared. The post holes at the site indicate that posts were approximately 20 cm or more in diameter. This would have required the felling of large trees. The decision to construct a sweat lodge and dig the structure 50 cm into hard, sterile clay also suggests residents planned to stay for awhile. Therefore, while *Nimatlala* does not appear to be a permanently occupied village, it does seem to be more than just a short-term camp site. A number of possibilities as to what type of settlement *Nimatlala* may represent are discussed later in this chapter.

8.5 How Was *Nimatlala* Organized Spatially?

Nimatlala was not centrally organized, with structures and activity areas instead scattered throughout a general vicinity and with structures placed in areas where limited flat land was available. The landscape was also modified when necessary to create a level base on which to build a house. Although some villages on the Northern Channel Islands were organized in a more centralized manner, others were not, and it seems appropriate to envision a village as a general, geographically designated locality with activity areas scattered across the landscape resulting archaeologically in dispersed middens of variable density. Currently, *Nimatlala* is known to be comprised of three archaeological sites, SCRI-324, -384, and -801. Additional sites within the village boundaries will likely be located and recorded in the future.

8.6 Was the Village a Primary or Satellite Village?

As *Nimatlala* was not a permanent village, it appears likely that it could be a satellite of one or more villages that were occupied year-round. While it seems likely that the village was not a primary village, the function of the community remains unknown. The possibility that the site served as a satellite village is further discussed below.

8.7 Did Households Organize Labor Independently or Communally?

This question is difficult to answer with the existing evidence. The large hearth located at SCRI-801 and the construction of a sweat lodge at SCRI-324 both suggest that some activities at the village may have been organized communally. Evidence of craft production in the structures appears to suggest households were producing shell beads, microblades, and other stone tools independently. Additionally, there is little evidence of craft production occurring outside of the structures. Each household was involved in the complete manufacturing process of these items, as tools and craft items in all stages of manufacture were found at each house. Members of households produced craft items part-time while also participating in the procurement of subsistence resources, and they would therefore be considered independent specialists, rather than the full-time attached specialists common in more complex societies that produce craft items full-time (Arnold and Munns 1994; Brumfiel and Earle 1987; Kennett 2005:212-213).

For the Chumash, Arnold and Munns (1994:487) have suggested that attached specialists are those who produce items that are controlled through transportation and distribution by elites, while independent specialists maintain control over the distribution of their goods. We do know that not all Island Chumash owned their own canoe, so travel between the Northern Channel Islands and the mainland may have been restricted. However, we also do not know how goods were sold or distributed between communities even on the same island. At *Nimatlala* it does not appear that any one household dominated distribution of craft goods or had greater access to resources. The households likely had the ability to trade with other islanders for food, materials, or other goods, and in that way had at least some control over the goods they produced.

8.8 Did Households Have Equal or Differential Access to Resources?

In terms of access to raw materials and exotic goods such as fused shale and glass beads, all households appear to have relatively equal access to resources. And while access to general categories of food resources (e.g., shellfish, sea mammals, fish, and plant resources) appears to be relatively equal, future analysis of all faunal remains from the collections will be able to determine if households had differential access to high ranked food resources. Perry and Delaney-Rivera (2011) found high status animals such as swordfish and dolphin in the communal hearth feature at SCRI-801, and therefore we know that the community as a whole had access to these high status food resources. Perhaps certain members of the community had greater access to these resources, and an analysis of the faunal remains from each household should be able to determine if there was differential access.

8.9 Possible Interpretations of Village Function

Given the evidence presented above, three interpretations of the function of *Nimatlala* appear most likely: (1) *Nimatlala* was a gathering place for island communities to hold fiestas or other events, (2) *Nimatlala* was a temporary refuge where smaller groups resettled during times of disease or other social and/or environmental stress (3) *Nimatlala* was a seasonally occupied satellite of one or more of the permanently occupied island village communities. Although a determination of the function of the village is not possible at this time, each possibility is thoroughly considered. Future research is needed to have a clearer understanding as to how this village functioned within the settlement system and social landscape of the Island Chumash.

8.9.1 Nimatlala as an Island Community Gathering Location

In 1805, padre Estevan Tapis wrote his official report for the years 1803-1804. In this report, Tapis observed that islanders from Santa Rosa and Santa Cruz Islands would gather together for fiestas (Johnson 1982b:78). During these fiestas, most of the population of these two islands would gather together for a short time for ceremonies and feasting. Many ethnographic sources detail both Chumash feasting events and ceremonies. Ceremonial occasions included births, the naming ceremonies for children, the beginning of adolescence, drinking *toloache,* marriages, illnesses and recoveries, wakes, the birthday of the chief, the appearance of rattlesnakes in spring time, the completion of fall harvest, and summer and winter solstices (Blackburn 1976:233). Sources list the *Hutash* ceremony in early fall that celebrated the end of piñon harvest, and the *Kakunupmawa* ceremony near the winter solstice when debts were settled, as the most important ceremonies (Blackburn 1976; Hudson et al. 1977; Hudson and Underhay 1978).

Nimatlala was certainly a central geographic location for Santa Cruz Island with easy access overland for all Santa Cruz Island communities. Santa Rosa communities would clearly need to travel by *tomol* to Santa Cruz Island, but as the population of Santa Cruz Island was likely greater than Santa Rosa Island, it may have made sense to hold the fiesta on Santa Cruz Island. Additionally, the Central

Valley would be an ideal gathering place for larger groups as it offered the most secure source of fresh water, and the space to spread out along the Central Valley drainage. If *Nimatlala* was a gathering place for fiestas, it would be likely that other ephemeral structures might have been built throughout the Central Valley. Additionally, if ceremonies were included in the festivities, evidence of a larger ceremonial sweat lodge could be expected. The ash lens found at SCRI-801 contained bones of swordfish and dolphin, and Perry and Delaney-Rivera (2011:118) have interpreted as evidence of a feasting event. Future investigations at *Nimatlala* could reveal similar additional deposits that may more clearly identify the area as a site where feasting took place.

8.9.2 Nimatlala as a Refuge from Disease or Other Colonial-Era Social and /or Environmental Stress

One plausible interpretation of *Nimatlala* is that the village served as a temporary settlement for residents of larger villages during or after outbreaks of disease. Because the village was more spread out and had a much lower population than many of the other coastal villages, perhaps disease would spread less rapidly in this location. The smaller-than-average size of the structures at *Nimatlala* could reflect familial or household groups that had been reduced in size due to deaths from introduced diseases. Although perhaps coincidental, it also appears possible that the measles epidemic that occurred between 1805 and 1807 (Johnson 1982b:61-63) may have been partially responsible for the sudden drop in site use between AD 1800 and

1816. It may have been impossible to escape this significant measles epidemic, even at this smaller village.

Dramatic climatic events were also taking place during this era. Drought in the region was severe between the years 1782 and 1795, with consecutive years of dry conditions identified for the years 1794-1795, 1805-1813, and 1821-1825 (Larson et al. 1994:289). From 1769 to 1834 there appears to have been a period of prolonged, increased sea-surface temperatures that decreased marine productivity (Larson et al. 1994:289). An extreme El Niño event in 1815-1816 is cited as a causal factor prompting the Island Chumash to migrate to mainland missions (Larson et al. 1994:289).

Occupation of *Nimatlala* began to decline rapidly after about AD 1800, although it appears the village was not completely abandoned until around the time when the remaining Chumash left Santa Cruz Island in the 1820s. The investigations at the village appear to support Rogers's (1929) assertion that these interior residential sites may have served as refuge for the last Chumash occupants of the island. The significant layer of fill found in the possible sweat lodge structure suggests that this structure had fallen into disuse prior to site abandonment. The fill in this structure was non-stratified, containing a mixture of midden with shell, bone, lithic, ash, and charcoal refuse. While artifacts recovered from the hearth of the possible sweat lodge suggest its use into the Early Historic period, artifacts found in the fill date to the entire span of village occupation. All of the house structures appear to have burned, although it is uncertain whether they were destroyed before, at, or after abandonment. It is also uncertain whether the structures were intentionally burned or the result of accident or natural causes. Henshaw's consultants described that structures were often burned after the death of the inhabitant, but there is no evidence that suggests the houses were intentionally burned in this instance (Heizer 1955).

8.9.3 Nimatlala as a Satellite Community

Evidence from *Nimatlala* suggests that some of the Island Chumash may have been semi-sedentary during the Late Prehistoric and Early Historic periods. The Chumash in all regions were hunter-gatherers, and like other hunter-gatherer groups their lifestyle would require some mobility to take advantage of important resources occurring both seasonally and year-round across the region. Scholars working with Northern and Inland Chumash data on the mainland have long recognized a semi-sedentary settlement pattern for these groups in which diet relied heavily on terrestrial resources (Horne 1981; Landberg 1965; Jones et al. 2007). In Northern Chumash territory much of the coast is not easily accessible, and therefore more focus on terrestrial resources was common. The Inland Chumash region was expansive, and people were more mobile to take advantage of water sources and seasonally occurring resource patches across this expansive landscape (Glassow 1979; Horne 1981). On the Northern Islands and in the Channel Mainland region the Chumash relied heavily on maritime resources (Landberg 1965; Gamble 2008; Kennett 2005). Generally aquatic hunter-gatherers are believed to be more sedentary than terrestrial hunter-gatherer groups due to the higher productivity and dietary value of marine resources relative to terrestrial resources, as well as access to boat technology that allowed for more efficient procurement of resources (Ames 2002:19-20; Batten 1998).

Explorer accounts dating from the 16th century to the 18th century, prior to establishment of missions in Chumash territory, list some villages that were abandoned due to possible raiding and inter-village violence, but also villages that may have been only seasonally occupied. For example, in 1587 Unamuno's expedition came across an abandoned village in the Northern Chumash region near Morro Bay in which the houses were newly constructed (Wagner 1929:147). No reason for abandonment was obvious, but perhaps the houses had recently been constructed in anticipation of a seasonal move. In the interior mainland region, villages were sometimes abandoned in the summer due to the failure of fresh water supplies (Bolton 1931:459-460). Landberg (1965:90) also suggests some of the small mainland coastal villages were temporary and served as satellite summer fishing camps that were populated during seasons when fishing was most productive. Future investigation of organics from excavations at SCRI-324 and -384 and oxygen isotope studies of shell or fish otoliths in the collections may lead to an indication of the seasonality of occupation at the village.

If *Nimatlala* was a temporary village site, occupied intermittently or seasonally, the residents of the village were likely semi-sedentary, spending significant time away from their home village procuring food resources, trading, and engaging in other activities consistent with a hunter-gatherer lifestyle. Geographically, *Nimatlala* is almost equidistant between the village of *Xaxas* on the North Coast of the island, and *Liyam* on the South Coast of the island. This location suggests that *Nimatlala* could be satellite of either one or both of these large villages. Coastal access would have been necessary for the residents of *Nimatlala* as shellfish, fish, and sea mammal comprised a significant portion of their diet. The central location of the village made it relatively easy for residents of all other known Early Historic villages on the island to access. Travel via the north ridge would allow for access within a day to the villages on the Northern side of the island, as well as the quarries on the eastern end of the island. Travel on the south ridge would also allow for access within one day to the villages on the south side of the island. The villages on the west end of the island could also be reached within one day by traveling through the Central Valley.

8.10 Directions for Future Research

While investigations at the village have provided some answers, it has also raised more questions. While *Nimatlala* was likely an intermittently occupied village, it is unknown if the village is an anomaly, or if other Early Historic period villages on the Northern Channel Islands were occupied in a similar manner. The large villages may be identified with some certainty as permanent villages, but there are a number of small villages which may have also served as villages occupied for intermittent, shorter periods of time. The location of some of the Early Historic period villages on the Northern Channel Islands remains undetermined. An effort should be made, when possible, to locate and confirm the village sites using testing protocols to gather material for radiocarbon dating and the collection of time-sensitive artifacts.

If we are interested in learning more about how the Chumash lived and organized themselves on a daily basis, then more household archaeology projects should be planned. Small-sale testing may be sufficient for establishing simple presence/absence of occupation of houses during specific time periods, but the excavation of larger sections of house floors is necessary to establish an understanding of household and community interactions. It is also important to recognize that most Chumash did not belong to an elite class, and therefore the study of everyday activities of households and communities is necessary in order to gain a more complete understanding of Chumash culture and history. Additionally, the excavation of portions of additional house floors may be useful in determining how uniform methods of house construction were, especially in areas where material for house posts and thatching was scarce.

Most importantly, I hope that the next time an archaeologist comes across a cluster of small house depressions in the interior of one of the Northern Channel Islands, they do not repeat my mistake and automatically assume that the site dates to the an earlier time period.

8.11 *Nimatlala* in the Context of Colonial California

Although mobility in the Early Historic period may have been less than in previous time periods, some of the Island Chumash continued to move across the land and sea collecting and trading food and materials, and creating and maintaining social and economic networks. The Chumash lived, adapted, and persisted through the Colonial period in California, which was plagued by violence, disease, removal from homelands, and immeasurable loss. *Nimatlala* offers the incredible opportunity to observe the remains of everyday life in a village occupied from the time of initial contact with Europeans through the 1820s when the Chumash were removed from the Northern Channel Islands.

These remnants of daily activities allow us to see the history of the village that was occupied with increasing intensity until about 1800, when site use dropped off significantly until the village was abandoned in the 1820s. Residents continued to participate in traditional activities such as bead making, stone tool manufacture and maintenance, and the hunting and gathering of the same foods that had sustained their ancestors over the past 13,000 years. Although households at the village may have concentrated on certain activities more than others, as is suggested by the unequal densities of certain artifact types, all households appear to have had access to trade goods sourced from both the Mainland Chumash and the Spanish. The community continued to trade with Mainland Chumash groups until the trade routes were too disrupted from the resettlement of Chumash populations into missions. The artifacts also tell a story of the incorporation of some new materials into daily life, such as glass trade beads and iron needles. Iron needles traded to the Chumash were used to drill holes in shell beads, and even though the residents of the village had access to glass beads, they continued to manufacture olivella shell beads until the time that the village was abandoned. The later beads begin to show evidence that less and less time was spent manufacturing these items, but the beads continued to be produced nevertheless.

In spite of the estimated 90% population loss from 1769 to 1900 (Cook 1978) and the removal of the Island Chumash from their homelands, the memories of the island communities and traditional ways persisted, as is evident in the recollections of both ethnographic consultants such as Juan E. Pico and Fernando Librado, and the Chumash descendants living today. Culture is created, maintained, and transformed in routine acts, performed on a daily basis. While these acts are being performed, they may seem simple and insignificant, yet over the span of months and years, they shape our identity and determine both what we remember and how we will be remembered.

WORKS CITED

Altschul, Jeffrey H., Richard S. Ciolek-Torrello, and Jeffrey A. Homburg
1991 *Playa Vista Archaeological and Historical Project: Research Design*. Statistical Research Technical Series No. 29. Tucson.

Ames, Kenneth M.
2002 Going by Boat: The Forager-Collector Continuum at Sea. In *Beyond Foraging and Collecting: Evolutionary Change in Hunter-Gatherer Settlement Systems*, edited by B. Fitzhugh and J. Habu, pp. 17-50. Kluwer/ Plenum Press, New York.

Ames, Kenneth M. and Herbert D. G. Maschner
1999 *Peoples of the Northwest Coast: Their Archaeology and Prehistory*. Thames and Hudson, London.

Applegate, Richard B.
1974 Chumash Placenames. *The Journal of California Anthropology* 1(2):187-205.

1975 An Index of Chumash Placenames. Papers on the Chumash. *San Luis Obispo Archaeological Society Occasional Paper* 9:21-46.

Archibald, Robert
1978 Indian Labor at the California Missions: Slavery or Salvation? *The Journal of San Diego History* 24(2):172-182.

Arnold, Jeanne E.
1987 *Craft Specialization in the Prehistoric Channel Islands, California*. University of California Press, Berkeley.

1990 An Archaeological Perspective on the Historic Settlement Pattern on Santa Cruz Island. *Journal of California and Great Basin Anthropology* 12(1):112-127.

1992 Complex Hunter-Gatherer-Fishers of Prehistoric California: Chiefs, Specialists, and Maritime Adaptations on the Channel Islands. *American Antiquity* 57:60-84.

1995 Transportation Innovation and Social Complexity among Maritime Hunter-Gatherer Societies. *American Anthropologist* 97:733-747.

1997 Bigger, Crowded Creekbanks: Environmental Stresses in Perspective. *American Antiquity* 62:337-339.

2001 The Channel Islands Project: History, Objectives, and Methods. In *The Origins of a Pacific Coast Chiefdom: The Chumash of the Channel Islands*, edited by J.E. Arnold, pp.21-52. University of Utah Press, Salt Lake City.

2007 Credit Where Credit is Due: The History of the Chumash Oceangoing Plank Canoe. *American Antiquity* 72:196-209.

Arnold, Jeanne E. (editor)
2001 *The Origins of a Pacific Coast Chiefdom: The Chumash of the Channel Islands*. University of Utah Press, Salt Lake City.

2004 *Foundations of Chumash Complexity*. Cotsen Institute of Archaeology, Los Angeles.

Arnold, Jeanne E. and Julienne Bernard
2005 Negotiating the Coasts: Status and the Evolution of Boat Technology in California. *World Archaeology* 37:109-131.

Arnold, Jeanne E., Elizabeth L. Ambos, and Daniel Larson
1997a Geophysical Surveys of Stratigraphically Complex Island California Sites: New Implications for Household Archaeology. *Antiquity* 71:157-168.

Arnold, Jeanne E., Roger H. Colten, and Scott Pletka
1997b Contexts of Cultural Change in Insular California. *American Antiquity* 62:300-318.

Arnold, Jeanne E. and Terisa M. Green
2002 Mortuary Ambiguity: The Ventureño Chumash Case. *American Antiquity* 67(4):760-771.

Arnold, Jeanne E. and Ann Munns
1994 Independent or Attached Specialization: The Organization of Shell Bead Production in California. *Journal of Field Archaeology* 21:473-489.

Ashmore, Wendy and Richard R. Wilk
1988 *Household and Community in the Mesoamerican Past*. University of New Mexico, Albuquerque.

Batten, David C.
1998 Transport and Urban Growth in Preindustrial Europe: Implications for Archaeology. *Human Ecology* 26(3):489-516.

Beebe, Rose M. and Robert M. Senkewicz (editors)
2001 *Lands of Promise and Despair: Chronicles of Early California, 1535-1846*. Heyday Books, Berkeley.

Beeler, Madison S. and Kathryn A. Klar
1977 Interior Chumash. *Journal of California Anthropology* 4(2):287-305.

Bennyhoff, James A. and Richard E. Hughes
1987 Shell Bead and Ornament Exchange between California and the Western Great Basin. *Anthropological Papers of the American Museum of Natural History* 64(2):79-175.

Benson, Arlene
1997 *The Noontide Sun: The Field Journals of the Reverend Stephen Bowers, Pioneer California Archaeologist*. Ballena Press, Menlo Park, California.

Bernard, Julienne
2004 Status and the Swordfish: The Origins of Large-Species Fishing Among the Chumash. In *Foundations of Chumash Complexity*, edited by J.E. Arnold, pp. 25-52. Cotsen Institute of Archaeology, Los Angeles.

Binford, Lewis R.
1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45(1):4-20.

1983 *In Pursuit of the Past: Decoding the Archaeological Record*. University of California Press.

Blackburn, Thomas C.
1975 *December's Child: A Book of Chumash Oral Narratives*. University of California Press, Berkeley.

1976 Ceremonial Integration and Social Interaction in Aboriginal California. In *Native Californians: A Theoretical Retrospective*, edited by L.J. Bean and T.C. Blackburn, pp. 225-243. Ballena Press, Socorro, New Mexico.

Bolton, Herbert E.
1916 *Spanish Exploration in the Southwest, 1542-1706*. Charles Scribner's Sons, New York.

1927 *Fray Juan Crespí, Missionary Explorer*. University of California Press, Berkeley.

Bourdieu, Pierre
1972 *Outline of a Theory of Practice*. Cambridge University Press, Cambridge.

Braje, Todd J., Torben C. Rick, and Jon M. Erlandson
2008 AMS Radiocarbon Dating of Giant Rock Scallop (*Hinnites Multirugosus*) Artifacts from San Miguel Island, California. *Radiocarbon* 50(2):223-231.

Brown, Alan K.
1967 The Aboriginal Population of the Santa Barbara Channel. *University of California Archaeological Survey Report No. 69*. Berkeley.

Brown, Alan K. (translator and editor)
2001 *A Description of Distant Roads: Original Journals of the First Expedition into California, 1769-1770 by Juan Crespí*. San Diego State University Press, San Diego.

Brown, James A.
1985 Long-Term Trends to Sedentism and the Emergence of Complexity in the American Midwest. In *Prehistoric Hunter-Gatherers: The Emergence of Cultural Complexity*, edited by T.D. Price and J.A. Brown, pp. 201-223.

Brumfiel, Elizabeth M. and Timothy K. Earle (editors)
1987 *Specialization, Exchange, and Social Complex Societies*. Cambridge University Press.

Byrd, Brian F.
1994 Public and Private, Domestic and Corporate: The Emergence of the Southwest Asian Village. *American Antiquity* 59(4):639-666.

Callaghan, Catherine A.
1991 Encounter with John P. Harrington. *Anthropological Linguistics* 33(4):350-356.

Cannon, Aubrey and Dongya Y. Yang
2006 Early Storage and Sedentism on the Pacific Northwest Coast: Ancient DNA Analysis of Salmon Remains from Namu, British Columbia. *American Antiquity* 71(1):123-140.

de Certeau, Michel
1984 *The Practice of Everyday Life*. University of California Press, Berkeley.

Clemmer, John S.
1962 Archaeological Notes on a Chumash House Floor at Morro Bay. Central California Archaeological Foundation, Report for Pacific Gas and Electric Company, Sacramento, California.

Cohen, Mark N.
1981 Pacific Coast Foragers: Affluent or Overcrowded? In *Affluent Foragers: Pacific Coasts East and West*, Volume 9, edited by S. Koyama and D.H. Thomas, pp. 275-295. Senri Ethnological Studies.

Coleman, Chris D. and Karen Wise
1994 Archaeological Field Research by Los Angeles County Museum: Channel Islands Biological Survey 1939-1941. In *The Fourth California Islands Symposium: Update on the Status of Resources*, edited by W.L. Halvorson and G.J. Maender, pp. 183-192. Santa Barbara Museum of Natural History, Santa Barbara.

Collins, Paul W.
2011 Bird Checklist. Channel Islands. Channel Islands National Park, (National Park Service, U.S. Department of the Interior). http://www.nps.gov/chis/naturescience/upload/bird-list-all-final.pdf.

Colten, Roger H.
2001 Ecological and Economic Analysis of Faunal remains from Santa Cruz Island. In *The Origins of a Pacific Coast Chiefdom*, edited by J.E. Arnold, pp. 199-220. University of Utah Press, Salt Lake City.

Cook, Sherburne F.
1978 Historical Demography. In *Handbook of North American Indians, Vol. 8, California*, edited by Robert F. Heizer, pp. 91-98. Smithsonian Institution Press, Washington, D. C.

Cook, Sherburne F. and Robert F. Heizer
1965 The Quantitative Approach to the Relation between Population and Settlement. *University of California Archaeological Survey Reports No. 64*. Berkeley.

Cook, Sherburne F. and Cesare Marino
1988 Roman Catholic Missions in California and the Southwest. In *Handbook of North American Indians, Vol 4: History of Indian-White Relations*, pp. 472-480. Smithsonian Institution Press, Washington, D. C.

Craig, Steve, and Chester King
1977 Site Record Forms for SCRI-324 and SCRI-384. Records on File at the Central Coast Information Center, University of California, Santa Barbara.

Crowell, Aron L.
1997 *Archaeology and the Capitalist World System: A Study from Russian America*. Plenum Press, New York.

Curet, Antonio L.
2003 Issues on the Diversity and Emergence of Middle-Range Societies of the Ancient Caribbean: A Critique. *Journal of Archaeological Research* 11: 1-42.

DeLong, Robert L. and Sharon R. Melin
2000 Thirty Years of Pinniped Research at San Miguel Island. In *The Fifth California Islands Symposium*, edited by D. R. Brown, K. C. Mitchell, and H.W. Chaney, pp 401-406. U.S. Department of the Interior Minerals Management Service, Pacific OCS Region.

Dietler, John
2003 The Specialist Next Door: Microblade Production and Status in Island Chumash Households. Unpublished Master's Thesis, Department of Anthropology, University of California, Los Angeles.

Dugan, Marie C.
2004 *The Chumash and the Presidio of Santa Barbara: Evolution of a Relationship, 1782-1823*. Santa Barbara Trust for Historic Preservation Santa Barbara, California.

Dwyer, Kevin
1982 *Moroccan Dialogues*. Johns Hopkins University Press, Baltimore.

Erlandson, Jon M.

1994 *Early Hunter-Gatherers of the California Coast*. Plenum Press, New York.

1997 The Middle Holocene along the Western Santa Barbara Coast. In *Archaeology of the California Coast during the Middle Holocene*, edited by Jon. M. Erlandson and Michael A. Glassow, pp. 91-109. Perspectives in California Archaeology 4. Institute of Archaeology, University of California, Los Angeles.

2002 Cultural Continuity, Change, and Complexity on the California Coast. In *Catalysts to Complexity: The Late Holocene along the California Coast*, edited by J.M. Erlandson and T.L Jones, pp. 320-329. UCLA Institute of Archaeology.

Erlandson, Jon M. and K. Bartoy

1995 Cabrillo, the Chumash, and Old World Diseases. *Journal of California and Great Basin Anthropology* 17(2):153-173.

Erlandson, Jon M., Roy Dugger, Richard Carrico, and Theodore Cooley

1992 Archaeological Investigations at CA-SBA-97: A Multicomponent Coastal Midden at Gaviota, California. In Archaeological Investigations at Some Significant Sites on the Central Coast of California, edited by H. Dallas, Jr. and G.S. Breschini, pp. 49-80. *Coyote Press Archives of California Prehistory 37.*

Erlandson, Jon M., Torben C. Rick, Todd J. Braje, A. Steinberg, and Rene Vellanoweth.

2008 Human Impacts on Ancient Shellfish: A 10,000 Year Record from San Miguel Island, California. *Journal of Archaeological Science* 35:2144-2152.

Erlandson, Jon. M., Torben C. Rick, Douglas J. Kennett, and Phillip L. Walker

2001 Dates, Demography, and Disease: Cultural Contacts and Possible Evidence for Old World Epidemics Among the Protohistoric Island Chumash. *Pacific Coast Archaeological Society Quarterly* 37(3):11-26.

Fedorova, Svetlana G.

1973 *The Russian Population in Alaska and California, Late Eighteenth Century—1867*. Translated by R. A. Pierce and A. S. Donnelly. Limestone Press, Kingston, Ontario, Canada.

Fitzhugh, Ben and Junko Habu (editors)
2002 *Beyond Foraging and Collecting: Evolutionary Change in Hunter-Gatherer Settlement Systems*. Klewer Academic/Plenum Press, New York.

Flannery, Kent V.
1972 The Cultural Evolution of Civilizations. *Annual Review of Ecology and Systematics* 3:399-426.

Gamble, Lynn H.
1983 The Organization of Artifacts, Features, and Activities at Pitas Point, a Coastal Chumash Village. *Journal of California and Great Basin Anthropology* 5:103-129.

1991 Organization of Activities at the Historic Settlement of *Helo'*: A Chumash Political, Economic, and Religious Center. Unpublished Ph.D. Dissertation, Department of Anthropology, University of California, Santa Barbara.

1995 Chumash Architecture: Sweatlodges and Houses. *Journal of California and Great Basin Anthropology* 17:54-92.

2002 Archaeological Evidence for the Origin of the Plank Canoe in North America. *American Antiquity* 67(2):301-315.

2005 Culture and Climate: Reconsidering the Effect of Paleoclimatic Variability among Southern California Hunter-Gatherer Societies. *World Archaeology* 37(1):92-108.

2008 *The Chumash World at European Contact: Power, Trade, and Feasting among Complex Hunter-Gatherers*. University of California Press, Los Angeles.

2012 New Perspectives on Social Structure of the Middle Holocene in the Santa Barbara Channel Region: A View from El Montón on Western Santa Cruz Island. Paper presented at the 77th Annual Meeting of the Society for American Archaeology Annual Meeting, Memphis.

Gamble, Lynn H., Phillip L. Walker, and Glenn S. Russell
2001 An Integrative Approach to Mortuary Analysis: Social and Symbolic Dimensions of Chumash Burial Practices. *American Antiquity* 66:185-212.

2002 Further Considerations on the Emergence of Chumash Chiefdoms. *American Antiquity* 67:772-777.

Geiger, Maynard
1963 Fray Junípero Serra: Organizer and Administrator of the Upper California Missions, 1769-1784. *California Historical Society Quarterly* 42(3):195-220.

Geiger, Maynard, and Clement Meighan
1976 As the Padres Saw Them. Santa Barbara Mission Archive Library, Santa Barbara, California.

Giddens, Anthony
1979 *Central Problems in Social Theory: Action, Structure and Contradiction in Social Analysis*. Macmillan, London.

Gifford, Edward W.
1947 Californian Shell Artifacts. *University of California Anthropological Records* 9(1):1-132.

Gill, Kristina M.
2013 Geophytes as an Important Food Source on the Channel Islands. Paper presented at the 47th Annual Society for California Archaeology Meeting, Berkeley.

Glassow, Michael A.
1979 An Evaluation of Models of Inezeño Chumash Subsistence Economics. In *Journal of California and Great Basin Anthropology* 1(1): 155-161.

1996 *Purisimeño Chumash Prehistory: Maritime Adaptations along the Southern California Coast*. Harcourt Brace.

1997 Middle Holocene Cultural Development in the Central Santa Barbara Channel Region. In *Archaeology of the California Coast during the Middle Holocene,* edited by Jon M. Erlandson and Michael A. Glassow, pp. 73-90. Perspectives in California Archaeology 4. Institute of Archaeology, University of California, Los Angeles.

Glassow, Michael A. (compiler and editor)
2010 Channel Islands National Park Archaeological Overview and Assessment. Department of the Interior, National Park Service.

Glassow, Michael A. and Larry R. Wilcoxon
1988 Coastal Adaptations Near Point Conception, California with Particular Regard to Shellfish Exploitation. *American Antiquity* 53(1):36-51.

Glassow, Michael A., Larry R. Wilcoxon, and Jon M. Erlandson
1988 Cultural and Environmental Change during the Early Period of Santa Barbara Channel Prehistory. In *The Archaeology of Prehistoric Coastlines* edited by G. Bailey and J. Parkington, pp. 65-77. Cambridge University Press, Cambridge.

Goddard, Ives (editor)
1996 Languages. *Handbook of North American Indians*, general editor W.C. Sturtevant, Volume 17. Smithsonian Institution, Washington, D.C.

Golla, Victor
1991 Introduction: John P. Harrington and His Legacy. *Anthropological Linguistics* 33(4):337-349.

2011 *California Indian Languages*. University of California Press, Berkeley.

Gordon, Larry
2006 Huntington Library Database Tells the Stories of 100,000 Mission Indians. The Computerized Repository is Available to the Public. The Los Angeles Times, August 8, 2006.

Gosden, Chris
2004 *Archaeology and Colonialism: Culture Contact from 5000 BC to the Present*. Cambridge University Press.

Grant, Campbell
1978 Chumash: Introduction. *Handbook of North American Indians* 8:505-508. Government Printing Office.

Graesch, Anthony P.
2000 Chumash Houses, Households, and Economy: Post-Contact Production and Exchange on Santa Cruz Island. Unpublished M.A. Thesis, Department of Anthropology, University of California, Los Angeles.

2001 Culture Contact on the Channel Islands: Historic-Era Production and Exchange Systems. In *The Origins of a Pacific Coast Chiefdom: The Chumash of the Channel Islands*, edited by J.E. Arnold, pp. 261-285. The University of Utah Press, Salt Lake City.

2004 Specialized Bead Making Among Island Chumash Households: Community Labor Organization During the Historic Period. In *Foundations of Chumash Complexity*, edited by J.E. Arnold, pp. 133-171. Perspectives in California Archaeology, Volume 7. Cotsen Institute of Archaeology, University of California, Los Angeles.

Gregor, Thomas A. and Daniel R. Gross
2004 Guilt by Association: The Culture of Accusation and the American Anthropological Association's Investigation of Darkness in El Dorado. *American Anthropologist* 106(4):687-698.

Guest, Francis F.
1989 An Inquiry into the Role of the Discipline in California Mission Life. *Southern California Quarterly* 71(1): 1-68,

Hackel, Steven W.
2006 Early California Population Project Report. *Journal of California and Great Basin Anthropology* 26(1):73-76.

Harrington, John P.
1913 Unpublished Island Chumash placename notes from Fernando Librado and other Ventureño consultants.

1928 Exploration of the Burton Mound at Santa Barbara, California. *Forty-fourth Annual Report of the Bureau of American Ethnology* 1926-1927, pp. 23-168. United States Government Printing Office, Washington, D.C.

1942 Culture Element Distributions: XIX, Central California Coast. *Anthropological Records* 7(1). University of California Press, Berkeley.

Harrington, Mark R.
1933 Gypsum Cave, Nevada. *Southwest Museum Papers* 8. Los Angeles.

Harrison, William M.
1965 Mikiw: A Coastal Chumash Village. *Annual Reports of the University of California Archaeological Survey* 7:91-178. Los Angeles.

Hayden, Brian
1990 Nimrods, Piscators, Pluckers, and Planters: The Emergence of Food Production. *Journal of Anthropological Archaeology* 9:31-69.

1992 A New Overview of Domestication. In *Last Hunters-First Farmers: New Perspectives on the Prehistoric Transition to Agriculture*, edited by T.D. Price and A. Gebauer, pp. 273-299. School of American Research Press, Santa Fe.

Heizer, Robert F.
1972 *California's Oldest Historical Relic?* Robert H. Lowie Museum of Anthropology, University of California, Berkeley.

Heizer, Robert F. (editor)
1951 The French Scientific Expedition to California, 1877-1879. In *University of California Archaeological Survey Report 12*, pp. 1-13. Berkeley, California.

1955 California Indian Linguistic Records: The Mission Indian Vocabularies of H.W. Henshaw. *Anthropological Records* 15(2). The University of California Press, Berkeley.

Heizer, Robert F. and Henry Reichlen
1964 The Scientific Expeditions of Léon de Cessac to California, 1877-1879; A Bibliography of the Chumash and Their Predecessors. *Report of the University of California Archaeological Survey 61*, pp. 5-23. Berkeley, California.

von Hemert-Engert, Adolph and Frederick Teggard (editors)
1910 The Narrative of the Portolá Expedition of 1769-1770 by Miguel Costansó. *Publications of the Academy of Pacific Coast History* 1(4):9-159. University of California Press, Berkeley.

Henry, Donald O.
1991 Foraging, Sedentism, and Adaptive Vigor in the Natufian: Rethinking the Linkages. In *Perspectives on the Past: Theoretical Biases in Mediterranean Hunter-Gatherer Research*, edited by G. A. Clark, pp. 353-370. University of Pennsylvania, Philadelphia.

Holmes, W.H.
1883 Art in Shell of the Ancient Americans. In *Second Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution*, edited by J.W. Powell, pp. 185-305. Government Printing Office, Washington, D.C.

Hoover, Robert L.
1971 Some Aspects of Santa Barbara Channel Prehistory. Unpublished P.D. Dissertation, Department of Anthropology, University of California, Berkeley.

1989 Spanish-Native Interaction and Acculturation in the Alta California Missions. In *Columbian Consequences: Volume 1, Archaeological and Historical Perspectives on the Spanish Borderlands West*, edited by David H. Thomas, pp. 395-406. Smithsonian Institution Press, Washington, D. C.

Hornbeck, David
1983 *California Patterns: A Geographical and Historical Atlas*. Mayfield Publishing, Palo Alto, California.

Horne, Stephen
1981 The Inland Chumash: Ethnography, Ethnohistory, and Archeology. Unpublished Ph.D. Dissertation, Department of Anthropology, University of California, Santa Barbara.

Hudson, Travis
1979 *Breath of the Sun, Life in Early California as Told by a Chumash Indian, Fernando Librado to John P. Harrington*. Malki Museum Press, Banning.

Hudson, Travis and Thomas C. Blackburn
1979 *The Material Culture of the Chumash Interaction Sphere, Volume I: Food Procurement and Transportation*. Ballena Press, Los Altos.

1983 *The Material Culture of the Chumash Interaction Sphere, Volume II: Food Preparation and Shelter*. Ballena Press/Santa Barbara Museum of Natural History.

1986 *The Material Culture of the Chumash Interaction Sphere, Volume IV: Ceremonial Paraphernalia, Games, and Amusements*. Ballena Press/Santa Barbara Museum of Natural History.

Hudson, Travis, Thomas Blackburn, Rosario Curletti, and Janice Timbrook
1977 *The Eye of the Flute: Chumash Traditional History and Ritual as told by Fernando Librado Kitsepawit to John P. Harrington*. Santa Barbara Museum of Natural History, Santa Barbara.

Hudson, Travis, Janice Timbrook, and Melissa Rampe (editors)
1978 *Tomol: Chumash Watercrafts as Described in the Ethnographic Notes of John P. Harrington*. Ballena Press, Santa Barbara.

Hudson, Travis and Janice Timbrook
1980 *Chumash Indian Games*. Santa Barbara Museum of Natural History, Santa Barbara.

Hudson, Travis and Ernest Underhay
1978 *Crystals in the Sky: An Intellectual Odyssey Involving Chumash Astronomy, Cosmology and Rock Art*. Ballena Press, Socorro, New Mexico.

Hull, Kathleen L.
2009 *Pestilence and Persistence: Yosemite Indian Demography and Culture in Colonial California*. University of California Press, Berkeley.

Jazwa, Christopher S., Lynn H. Gamble, and Douglas J. Kennett
2013 A High-Precision Chronology For Two House Features at an Early Village Site on Western Santa Crus Island, California, USA. *Radiocarbon* 55(1):185-199.

Johnson, John R.
1982a The Trail to Fernando. *Journal of California and Great Basin Anthropology* 4:132-138.

1982b An Ethnohistoric Study of the Island Chumash. Unpublished Master's Thesis, Department of Anthropology, University of California, Santa Barbara

1988 Chumash Social Organization: An Ethnohistoric Perspective. Unpublished Ph.D. Dissertation, Department of Anthropology, University of California, Santa Barbara.

1993 Cruzeño Chumash Social Geography. In *Archaeology on the Northern Channel Islands of California: Studies of Subsistence, Economics, and Social Organization*, edited by Michael Glassow, pp. 19-46. Coyote Press, Salinas, California.

1994 Site Visit, San Pedro Point. Unpublished field notes on file, Santa Barbara Museum of Natural History.

1999a Chumash Population History. In *Cultural Affiliation and Lineal Descent of Chumash Peoples in the Channel Islands and Santa Monica Mountains*, edited by S. McLendon and J.R. Johnson, pp. 93-130. Report prepared for the Archaeology and Ethnography Program, National Park Service, Washington, D.C.

1999b The Chumash Social –Political Groups on the Channel Islands. In *Cultural Affiliation and Lineal Descent of Chumash Peoples in the Channel Islands and Santa Monica Mountains*, edited by S. McLendon and J.R. Johnson, pp. 51-66. Report prepared for the Archaeology and Ethnography Program, National Park Service, Washington, D.C.

1999c Lineal Descendants from the Northern Channel Islands. In *Cultural Affiliation and Lineal Descent of the Chumash Peoples in the Channel Islands and Santa Monica Mountains*, edited by S. McLendon and J.R. Johnson, pp. 185-261. Report prepared for the Archaeology and Ethnography Program, National Park Service, Washington, D.C.

2000 Social Responses to Climate Change among the Chumash Indians of South-Central California. In *The Way the Wind Blows: Climate, History, and Human Action*, edited by R.J. McIntosh, J.A. Tainter, and S.K. McIntosh, pp. 301-327. Columbia University Press, New York.

2001 Ethnohistoric Reflections of Cruzeño Chumash Society. In *The Origins of a Pacific Coast Chiefdom: The Chumash of the Channel Islands*, edited by Jeanne Arnold, pp. 53-70. University of Utah Press, Salt Lake City, Utah.

2011 The Earliest European Contacts with the Chumash Islanders. *Mains'l Haul: A Journal of Pacific Maritime History* 47(1&2):38-45.

Johnson, John R., Thomas W. Stafford, Jr., Henry O. Ajie, and Don P. Morris
2002 Arlington Springs Revisited. In *The Fifth California Islands Symposium*, edited by D.R. Brown, K.C. Mitchell, and H.W. Chaney, pp. 541-544. U.S. Department of the Interior Minerals Management Service, Pacific OCS Region.

Johnson, John R., Thomas W. Stafford, Jr., and Thomas W. Rockwell
2005 Arlington Springs: Earliest Evidence for Paleoindians in Coastal California. Paper presented at "By Traces of Ancient Fires…" International Scientific Conference, Magadan, Russian.

Johnson, John R., Thomas W. Stafford, Jr., G. James West, and Thomas K. Rockwell
2007 Before and After the Younger Dryas: Chronostratigraphic and Paleoenvironmental Research at Arlington Springs, Santa Rosa Island, California. Paper presented at the American Geophysical Union Joint Assembly, Acapulco.

Johnson, John R. and G. James West
2008 Analysis of an Unusually Well Preserved Midden at Cueva Escondida, A Chumash Fishing Camp on Santa Cruz Island. Paper presented at the 7th California Islands Symposium, Oxnard.

Johnson, John R., G. James West, and Nan Deal
2010 La Cueva Escondida: An Unusually Well-Preserved Island Chumash Shell Midden on Santa Cruz Island. Paper presented at the 75th Annual Meeting of the Society for American Archaeology, St. Louis.

Jones, Terry L.
1993 Big Sur: A Keystone of Central California Culture History. *Pacific Coast Archaeological Society Quarterly* 29(1):1-78.

Jones, Terry L., Nathan E. Stevens, Deborah A. Jones, Richard T. Fitzgerald, and Mark G. Hylkema
2007 The Central Coast: A Midlatitude Milieu. In *California Prehistory: Colonization, Culture, and Complexity*, edited by T.L. Jones and K.A. Klar, pp. 125-146. Alta Mira Press, Plymouth, U.K.

Justice, Noel D.
2002 *Stone Age Spear and Arrow Points of California and the Great Basin*. Indiana University Press, Bloomington.

Karklins, Karlis
1982 Guide to the Description and Classification of Glass Beads. *History and Archaeology* 59:83-227. Parks Canada, Ottawa.

1994 A Classification System for Drawn Glass Beds. Paper presented at the Society for Historical Archaeology Conference on Historical and Underwater Archaeology, Vancouver, British Columbia.

Keeley, Lawrence H.
1988 Hunter-Gatherer Economic Complexity and "Population Pressure:" A Cross-Cultural Analysis. *Journal of Anthropological Archaeology* 7(4):373-411.

1995 Proto-agricultural Practices by Hunter-Gatherers. In *Last Hunters, First Farmers: New Perspectives on the Prehistoric Transition to Agriculture*, edited by T.D. Price and A. Gerbrauer, pp. 95-126. School of American Research Press, Santa Fe.

Kelly, Robert L.
1983 Hunter-Gatherer Mobility Strategies. *Journal of Anthropological Research* 39:277-306.

Kelsey, Harry
1986 *Juan Rodriguez Cabrillo*. Huntington Library, San Marino, CA.

Kennett, Douglas J.
2005 *The Island Chumash, Behavioral Ecology of a Maritime Society*. University of California Press, Berkeley.

Kennett, Douglas J. and Christina A. Conlee
2002 Emergence of Late Holocene Sociopolitical Complexity on Santa Rosa and San Miguel Islands. In *Catalysts to Complexity: Late Holocene Societies of the California Coast,* edited by J.M. Erlandson and T.L. Jones, pp. 147-165. Perspectives in California Archaeology 6. Cotsen Institute of Archaeology, University of California, Los Angeles.

Kennett, Douglas J., John R. Johnson, Torben C. Rick, Don P. Morris, and Juliet Christy
2000 Historic Chumash Settlement on Eastern Santa Cruz Island, Southern California. *Journal of California and Great Basin Anthropology* 22:212-222.

Kidd, Kenneth E.
1979 Glass Bead-Making from the Middle Ages to the Early Nineteenth Century. *History and Archaeology* 30. Parks Canada, Ottawa.

Kidd, Kenneth E. and Martha A. Kidd
1970 A Classification System for Glass Beads for the Use of Field Archaeologists. *Canadian Historic Sites, Occasional Papers in Archaeology and History* 1:45-89.

King, Cecil
1997 Here Come the Anthros. In *Indians and Anthropologists: Vine Deloria and the Critique of Anthropology*, edited by T. Biolsi and L. Zimmerman, pp. 115-119. University of Arizona Press, Tucson.

King, Chester D.
1967 The Sweetwater Mesa Site (LAN-267) and its Place in Southern California Prehistory. *Archaeological Survey Annual Report 9:25-76*. University of California, Los Angeles.

1969 Map 1: Approximate 1760 Chumash Village Locations and Populations. *University of California Archaeological Survey Annual Report* 11:3-4. Los Angeles.

1975 The Names and Locations of Historic Chumash Villages. *Journal of California Anthropology* 2(2):171-179.

1976 Chumash Inter-Village Exchange. In *Native Californians: A Theoretical Retrospective*, edited by L.J. Bean and T. Blackburn, pp. 289-318. Ballena Press, Socorro, N.M.

1990 *Evolution of Chumash Society: A Comparative Study of Artifacts Used for Social System Maintenance in the Santa Barbara Channel Region before 1804*. Garland Publishing, New York.

2000 *Native American Indian Cultural Sites in the Santa Monica Mountains*. Santa Monica Mountains and Seashore Foundation and the National Park Service.

Kostromitivnov, P.

1974 Notes on the Indians in Upper California. In *Ethnographic Observations on the Coast Miwok and Pomo by Contre-Admiral F. P. Von Wrangell and P. Kostromitinov of the Russian Colony Ross, 1839*, edited F. Stross and R. Heizer, pp. 7-18. Archaeological Research Facility University of California, Berkeley.

Kroeber, Alfred L.

1925 *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin 78. Smithsonian Institution, Washington, D.C.

Laird, Carobeth

1975 *Encounter with an Angry God: Recollections of My Life with John Peabody Harrington*. Malki Museum Press, Banning, CA.

Lambert, Patricia M.

1993 Health in Prehistoric Populations of the Santa Barbara Channel Islands. *American Antiquity* 58:509-521.

Lambert, Patricia M. and Phillip L. Walker

1991 Physical Anthropological Evidence for the Evolution of Social Complexity in Coastal Southern California. *Antiquity* 65:963-973.

Landberg, Leif C. W.
1965 The Chumash Indians of Southern California. *Southwest Museum Papers*, No. 19. Southwest Museum, Los Angeles.

Larson, Daniel O., John R. Johnson, and Joel C. Michaelson
1994 Missionization among the Coastal Chumash of Central California: A Study of Risk Minimization Strategies. *American Anthropologist* 96:263-299.

Lathrop, Donald W. and Robert L. Hoover
1975 Excavations at Shilimaqshtush: SBA-205. *San Luis Obispo County Archaeological Society Occasional Paper* 10.

Lepofsky, Dana, Ken Lertzman, Douglas Hallett, and Rolf Mathewes
2005 Climate Change and Culture Change on the Southern Coast of British Columbia 2400-1200 Cal. B.P.: An Hypothesis. *American Antiquity* 70(2):267-293.

Lewis, Herbert S.
1998 The Misrepresentation of Anthropology and Its Consequences. *American Anthropologist* 100:716-731.

2007 The Influence of Edward Said and *Orientalism* on Anthropology, or: Can the Anthropologist Speak? *Israel Affairs* 13(4):774-785.

Lieberman, Daniel E.
1993 The Rise and Fall of Seasonal Mobility among Hunter-Gatherers. *Current Anthropology* 34(5):599-631.

Lightfoot, Kent G.
1995 Culture Contact Studies: Redefining the Relationship between Prehistoric and Historical Archaeology. *American Antiquity* 60(2):199-217.

2005 *Indians, Missionaries, and Merchants: The Legacy of Colonial Encounters on the California Frontiers*. University of California Press, Berkeley.

Lightfoot, Kent G. and Antoinette Martinez
1995 Frontiers and Boundaries in Archaeological Perspective. *Annual Review of Anthropology* 24:471-492.

1997 Interethnic Relationships in the Native Alaskan Neighborhood: Consumption Practices, Cultural Innovations, and the Construction of Household Identities. In *The Native Alaskan Neighborhood: A Multiethnic Community at Colony Ross*, edited by K.G. Lightfoot, A.M. Schiff, and T.A. Wake, pp. 1-22. The Archaeology and Ethnohistory of Fort Ross, California, Vol. 2. Archaeological Research Facility, University of California, Berkeley.

Lightfoot, Kent G. and William S. Simmons
1998 Culture Contact in Protohistoric California: Social Contexts of Native and European Encounters. *Journal of California and Great Basin Anthropology* 20(2):138-170.

Loeb, Edwin M.
1926 Pomo Folkways. In University of California Publications in American Archaeology and Ethnology 19(2):149-405. University of California, Berkeley.

Marcus, Joyce and Kent V. Flannery
1994 Ancient Zapotec Ritual and Religion: An Application of the Direct Historical Approach. In *The Ancient Mind: Elements of Cognitive Archaeology*, edited by C. Renfrew and E.B.W. Zubrow, pp. 55-74. Cambridge University Press, Cambridge, U.K.

Matsui, Akira
1996 Archaeological Investigations of Anadromous Salmonid Fishing in Japan. *World Archaeology* 27(3):1996.

Melin, Sharon R. and Robert L. DeLong
2000 At-Sea Distribution and Diving Behavior of California Sea Lion Females from San Miguel Island, California. In *The Fifth California Islands Symposium*, edited by D. R. Brown, K. C. Mitchell, and H. W. Chaney, pp. 407-412. U.S. Department of the Interior Minerals Management Service, Pacific OCS Region.

Milliken, Randall T.
1995 A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769-1810. Ballena Press, Menlo Park, California.

2006 *The Central California Ethnographic Community Distribution Model, Version 2.0, with Special Attention to the San Francisco Bay Area*. Submitted by, Far Western Anthropological Research Group, Davis. Report on file, Office of Cultural Resources, CalTrans District 4, Oakland.

Milliken, Randall T. and Al W. Schwitalla
2012 *California and Great Basin Olivella Bead Guide*. Left Coast Press, Walnut Creek, CA.

Mills, Elaine L.
1981-5 A Guide to the Field Notes. *The Papers of John Peabody Harrington in the Smithsonian Institution, 1907-1957, Volumes 1-2*. Kraus International Publications, White Plains, New York.

Mills, Elaine L. and Ann J. Brickfield
1986-9 A Guide to the Field Notes. *The Papers of John Peabody Harrington in the Smithsonian Institution, 1907-1957, Volumes 3-8*. Kraus International Publications, White Plains, New York.

Mills, Elaine L. and Louise G. Mills
1991 A Guide to the Correspondence. *The Papers of John Peabody Harrington in the Smithsonian Institution, 1907-1957, Volume 9*. Kraus International Publications, Millwood, New York.

Mithun, Maryanne
1999 *The Languages of Native North America*. Cambridge University Press, Cambridge.

Moore, Jerry D.
1987 A Late Prehistoric Homestead on the Santa Barbara Coast. *Journal of California and Great Basin Anthropology* 9(1):100-109.

Moratto, Michael J.
1984 *California Archaeology*. Academic Press, New York.

Moss, Madonna L., Jon M. Erlandson, and Robert Stuckenrath
1989 The Antiquity of Tlingit Settlement on Admiralty Island, Southeast Alaska. *American Antiquity* 54(3):534-543.

Netting, Robert, Richard Wilk and Eric J. Arnould (editors)
1984 *Households: Comparative and Historical Studies of the Domestic Group*. University of California Press, Berkeley.

Noah, Anna C.
2005 Household Economies: The Role of Animals in a Historic Period Chiefdom on the California Coast. Unpublished Ph.D. Dissertation, Department of Anthropology, University of California, Los Angeles.

Olson, Ronald L.
1928 Unpublished field notes on file at Phoebe Hearst Museum, University of California, Berkeley.

1930 Chumash Prehistory. *University of California Publications in American Archaeology and Ethnology* 28:1-21.

Orr, Phil C.
1968 *Prehistory of Santa Rosa Island*. Santa Barbara Museum of Natural History, Santa Barbara.

Ortner, Sherry B.
1984 Theory in Anthropology Since the Sixties. *Comparative Studies in Society and History* 26(1):126-166.

Pauketat, Timothy R.
2001 Practice and History in Archaeology: An Emerging Paradigm. *Anthropological Theory* 1(1):73-98.

Perissinotto, Giorgio (editor)
1998 *Documenting Everyday Life in Early Spanish California: The Santa Barbara Presidio Memorias y Facturas, 1779-1810*. Santa Barbara Trust for Historic Preservation, Santa Barbara, California.

Perry, Jennifer E. and Colleen Delaney-Rivera
2011 Interactions and Interiors of the Coastal Chumash. *California Archaeology* 3(1):103-126.

Peterson, Robert R., Jr.
1994 Archaeological Settlement Dynamics on the South Side of Santa Cruz Island. In *The Fourth California Islands Symposium: Update on the Status of Resources*, edited by W.L. Halvorson and G.J. Meander, pp. 215-222. Santa Barbara Museum of Natural History, Santa Barbara.

Plog, Stephen
1990 Agriculture, Sedentism, and the Development of Regional Systems. In *The Architecture of Social Integration in Prehistoric Pueblos*, edited by W.D. Lipe and M. Hegmon, pp. 143-154. Occasional Papers No. 1, Crow Canyon Archaeological Center, Cortez, Colorado.

Preston, William
1996 Serpent in Eden: Dispersal of Foreign Diseases into Pre-Mission California. *Journal of California and Great Basin Anthropology* 18(1):2-37.

Price, T. Douglas and James A. Brown (editors)
1985 *Prehistoric Hunter-Gatherers: The Emergence of Cultural Complexity*. Academic Press, New York.

Priestly, Herbert Ingram (translator)
1972 *A Historical, Political, and Natural Description of California by Pedro Fages, Written for the Viceroy in 1775*. Ballena Press, Ramona, California.

Raab, L. Mark
1996 Debating Prehistory in Coastal Southern California: Resource Intensification Versus Political Economy. *Journal of California and Great Basin Anthropology* 18(1):64-80.

Raab, L. Mark and Katherine Bradford
1997 Making Nature Answer to Interpretivism: Response to J.E. Arnold, R.H. Colten, and S. Pletka. *American Antiquity* 62:340-341.

Raab, L. Mark and Daniel O. Larson
1997 Medieval Climatic Anomaly and Punctuated Cultural Evolution in Coastal Southern California. *American Antiquity* 62:319-336.

Raab, L. Mark, Judith F. Porcasi, Katherine Bradford, and Andrew Yatsko
1995 Debating Cultural Evolution: Regional Implications of Fishing Intensification at Eel Point, San Clemente Island. *Pacific Coast Archaeological Society Quarterly* 31:3-27.

Rafferty, Janet E.
1985 The Archaeological Record on Sendentariness: Recognition, Development, and Implications. *Advances in Archaeological Method and Theory, Volume 8*. Academic Press, New York.

Reff, Daniel T.
1992 Contact Shock in Northwestern New Spain, 1518-1764. In *Disease and Demography in the Americas*, edited by J. W. Verano and D. H. Ubelaker, pp. 265-276. Smithsonian Institution Press, Washington, D.C.

Rick, Torben C.
2004 Daily Activities, Community Dynamics, and Historical Ecology on California's Northern Channel Islands. Unpublished Ph.D. Dissertation Department of Anthropology, University of Oregon, Eugene.

2007a *The Archaeology and Historical Ecology of Late Holocene San Miguel Island*. Perspectives in California Archaeology 8, edited by J.E. Arnold. Cotsen Institute of Archaeology, University of California, Los Angeles.

2007b Household and community Archaeology at the Chumash Village of *Niaqla*, Santa Rosa Island, California. *Journal of Field Archaeology* 32:243-263.

Rick, Torben C., Rene L. Vellanoweth, Jon M. Erlandson, and Douglas J. Kennett
2002 On the Antiquity of the Single-Piece Fishhook: AMS Radiocarbon Evidence from the Southern California Coast. *Journal of Archaeological Science* 29:933-942.

Ritchie, William A.
1932 The Algonkin Sequence in New York. *American Anthropologist* 34(3):406-414.

1938 A Perspective of Northeastern Archaeology. *American Antiquity* 4(2):94-112.

Rogers, David B.
1929 *Prehistoric Man on the Santa Barbara Coast*. Santa Barbara Museum of Natural History, Santa Barbara.

Rosenberg, Michael
1998 Cheating at Musical Chairs: Territoriality and Sedentism in an Evolutionary Context. *Current Anthropology* 39(5):653-681.

Ross, Lester A.
1997 Glass and Ceramic Trade Beads from the Native Alaskan Neighborhood. In *The Archaeology and Ethnohistory of Fort Ross California, Volume 2, The Native Alaskan Neighborhood, A Multiethnic Community at Colony Ross*, edited by K.G. Lightfoot, A.M. Schiff, and T.A. Wake, pp. 179-210. Contributions of the University of California Archaeological Research Facility No. 55. University of California, Berkeley.

Said, Edward
1978 *Orientalism*. Vintage, New York.

Salls, Roy A.
1988 Prehistoric Fisheries of the California Bight. Unpublished Ph.D. Dissertation. Department of Anthropology, University of California, Los Angeles.

Sassaman Kenneth E.
2004 Complex Hunter-Gatherers in Evolution and History: A North American Perspective. *Journal of Archaeological Research* 12(3):227-280.

Schumacher, Paul
1875 Ancient Graves and Shellheaps of California. *Smithsonian Institution Annual Report, 1874*:353-355. Washington, D.C.

1877 Researches in the Kjökkenmöddings and Graves of a Former Population of the Santa Barbara Islands and the Adjacent Mainland. *United States Geographic and Geological Survey of the Territories*, Bulletin 3:37-56. Washington, D.C.

1879 The Method and Manufacture of Soapstone Potts. *Report Upon United States Geographical Surveys West of the 100th Meridian*, VII: 117-121. Washington, D.C.

Service, Elman R.
1962 *Primitive Social Organization: An Evolutionary Perspective*. Random House.

Sharp, Joanne P. (editor)
2009 *Geographies of Postcolonialism*. Sage Publications, London.

Silliman, Stephen W.
2009 Change and Continuity, Practice and Memory: Native American Persistence in Colonial New England. *American Antiquity* 74(2):211-230.

2011 Households, Time, and Practice: A Reply to Vitelli. *American Antiquity* 76(1):190-192.

Skibo, James and Michael B. Schiffer
2008 *People and Things: A Behavioral Approach to Material Culture*. Springer, New York.

Spivak, Gayatri C.
1988 Can the Subaltern Speak? In *Marxism and the Interpretation of Culture*, edited by C. Nelson and L. Grossberg, pp. 271-316. Macmillan, London.

Stein, Gil J.
2005 The Comparative Archaeology of Colonial Encounters. In *The Archaeology of Colonial Encounters*, edited by G. Stein, pp. 3-31. School of American Research Press, Santa Fe.

Steward, Julian
1942 The Direct Historical Approach to Archaeology. *American Antiquity* 7(4):337-343.

Stirling, M. W.
1963 John Peabody Harrington 1884-1961. *American Anthropologist* 65(2):370-381.

Strong, William D.
1935 *An Introduction to Nebraska Archaeology*. Smithsonian Miscellaneous Collections 93(10). Smithsonian Institution, Washington D.C.

Sutton, Elizabeth A.
2008 Living in the Margins? An Investigation of Interior Late and Contact Period Chumash Residential Sites on *Limuw* (Santa Cruz Island) California. Paper presented at the 2008 Mathias Symposium, University of California Natural Reserve System, Bodega Bay.

2014 Digging Stick Weights and Doughnut Stones: An Analysis of Perforated Stones from the Santa Barbara Channel Region. *Journal of California and Great Basin Anthropology* 34(1):17-42.

Swisher, Karen G.
1998 Why Indian People Should Be the Ones to Write about Indian Education. In *Natives and Academics: Researching and Writing about American Indians,* edited by D. Mihesuah, pp. 190-200. University of Nebraska Press, Lincoln.

Tartaglia, Louis J.
1976 Prehistoric Maritime Adaptations in Southern California. Unpublished Ph.D. Dissertation, Department of Anthropology, University of California, Los Angeles.

Tikhmenev, Petr. A.
1978 *A History of the Russian-American Company*. Translated by R.A. Pierce and A.S. Donnelly. University of Washington Press, Seattle.

Timbrook, Jan
2007 Chumash Ethnobotany: Plant Knowledge Among the Chumash People of Southern California. Santa Barbara Museum of Natural History and Heydey Books, Berkeley, California.

Vellanoweth, Rene L., Torben C. Rick, and Jon M. Erlandson
2000 Middle and Late Holocene Maritime Adaptations on the Northeastern San Miguel Island, California. In *The Fifth California Islands Symposium*, edited by D. R. Brown, K. C. Mitchell, and H. W. Chaney, pp. 607-614. U.S. Department of the Interior Minerals Management Service, Pacific OCS Region.

Voss, Barbara L.
2000 Colonial Sex: Archaeology, Structured Space, and Sexuality in Alta California's Spanish-Colonial Missions. In *Archaeologies of Sexuality*, edited by R. A. Schmidt and B. L. Voss, pp. 35-61. Routledge, London.

Wagner, Henry R. (editor)
1929 *Spanish Voyages to the Northwest Coast of America in the Sixteenth Century*. California Historical Society, San Francisco.

Walker, Phillip L. and Sandra E. Hollimon
1989 Changes in Osteoarthritis Associated with the Development of a Maritime Economy Among Southern California Indians. *International Journal of Anthropology* 4(3):171-183.

Walker, Phillip L. and John R. Johnson
992 Effects of Contact on the Chumash Indians. In *Disease and Demography in the Americas*, edited by J.W. Verano and D. H. Ubelaker pp. 127-140. Smithsonian Institution Press, Washington, D.C.

1994 The Decline of the Chumash Indian Population. In *In the Wake of Contact: Biological Responses to Conquest*, edited by C. S. Larsen and G. R. Milner, pp. 109-120. John Wiley and Sons, New York.

Walker, Phillip L., Patricia Lambert, and Michael J. DeNiro
1989 The Effects of European Contact on the Health of California Indians. In *Columbian Consequences, Vol. 1: Archaeological and Historical Perspective on the Spanish Borderlands West*, edited by David .H. Thomas, pp. 349-364. Smithsonian Institution Press, Washington, D.C.

Wallace, William J.
1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11:214-230.

Wallerstein, Immanuel

1974 *The Modern World-System I: Capitalist Agriculture and the of the European World-Economy in the Sixteen Century*. Academic Press, New York.

Walsh, Jane M.

1976 *John Peabody Harrington: The Man and His California Indian Fieldnotes*. Ballena Press/ Malki Museum Press, Ramona, California.

Weaver, D.W., David P. Doerner, and Bruce Nolf

1969 *Geology of the Northern Channel Islands: AAPG and SEPM Pacific Sections.* American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists Special Publication, Los Angeles.

Wedel, Waldo R.

1938 *The Direct-Historical Approach in Pawnee Archaeology*. Smithsonian Institution, Washington, D.C.

1941 Archaeological Investigations at Buena Vista Lake, Kern County, California. *Bureau of American Ethnology Bulletin 130*. United States Government Printing Office, Washington, D.C.

Wilcoxon, Larry R.

1981 Subsistence and Site Structure: An Approach for Deriving Cultural Information from Coastal Shell Middens. Paper presented at the 46th Annual Meeting of the Society for American Archaeology, San Diego.

Woodward, Arthur

1938 The First Ethnologists in California. *Masterkey* 12:141-151.

Woodward, Lisa L. and Martha J. Macri

2005 J.P. Harrington Database Project: An Archival Resource for Anthropologists, Archaeologists, and Native Communities. *Journal of California and Great Basin Anthropology* 25(2):235-240.

Ziegler, Alan C.

1975 Recovery and Significance of Unmodified Faunal Remains. In *Field Methods in Archaeology*, edited by T.R. Hester, R.F. Heizer, and J.A. Graham, pp. 183-206, 6th ed. Mayfield, Palo Alto, California.

APPENDIX: Shell Bead Measurements

SCRI-384, House 1

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
T1	0-10 cm	Olivella	1.2	3.8	2	G1
T1	0-10 cm	Olivella	1	4.2	1.3	G1
T1	0-10 cm	Olivella	0.6	5.2	1	H1AI
T1	0-10 cm	Olivella	1	4.5	1.1	J1
T1	10-20 cm	Olivella	1.1	5.4	1.2	J1
T1	10-20 cm	Olivella	1.4	3.5	1.9	K2
T1	10-20 cm	Olivella	1.2	5.2	1.1	H
T1	10-20 cm	Olivella	1	4.8	1.1	H
T1	10-20 cm	Olivella	1	4	0.9	H
T1	20-30 cm	Red Abalone	1.75	5.8	1.27	
T1	20-30 cm	Mussel	2.18	5.9	1.7	
T1	20-30 cm	Olivella	1.25	3.9	0.9	H1A
T1	20-30 cm	Olivella	0.8	4.3	0.8	H1A
T1	20-30 cm	Olivella	1.38	5.45	0.7	H1A
T1	20-30 cm	Olivella	0.97	5.24	0.65	H1B
T1	20-30 cm	Olivella	0.9	5.3	0.9	H1A
T1	20-30 cm	Olivella	0.7	5.3	1	H1B
T1	20-30 cm	Olivella	1	5.43	1.45	G2A
T1	20-30 cm	Olivella			1.25	G6
T1	20-30 cm	Olivella	0.84	4.57	1.84	G1
T1	20-30 cm	Olivella	0.97	4.1	1.55	G1
T1	20-30 cm	Olivella	1.07	4.13	1.55	G1
T1	20-30 cm	Olivella	.87	3.8	1.4	G1
T1	20-30 cm	Olivella	1.2	2.6	1.23	K3
T1	30-40 cm	Olivella	1.5	3.37	1.72	K1
T1	30-40 cm	Olivella	1	4.96	1.2	G6
T1W	30-40 cm	Olivella	10.58	6.34	1.9	A1A
H1E	0-10 cm	Olivella	2.5	2.2	1	Unid.
H1E	0-10 cm	Olivella	0.9	4.6	1.01	H1B
H1E	0-10 cm	Olivella	1.15	6.06	1.05	H1A
H1E	10-20 cm	Red Abalone	1.73	6.61	1.4	
H1E	10-20 cm	Red Abalone	1.66	5.95	1.4	
H1E	10-20 cm	Red Abalone	2.1	5.39	1.23	
H1E	10-20 cm	Mussel	1.19	5.57		
H1E	10-20 cm	Mussel	1.86	6.11	1.44	
H1E	10-20 cm	Mussel	2.29	5.77	1.81	
H1E	10-20 cm	Olivella	1.32	5.86	1.01	H1B
H1E	10-20 cm	Olivella	0.86	5.38	0.98	H1A
H1E	10-20 cm	Olivella	0.85	4.77	1	H1B

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
H1E	10-20 cm	Olivella	0.6	5.11	1	H1A
H1E	10-20 cm	Olivella	0.77	4.1	0.7	H2
H1E	10-20 cm	Olivella	0.87	4.6	0.9	H2
H1E	10-20 cm	Olivella	1.11	4.21	1	H1A
H1E	10-20 cm	Olivella	0.86	5.1	1.27	J1
H1E	10-20 cm	Olivella	1.1	5.51	1.31	G6
H1E	10-20 cm	Olivella	1.32	5	0.9	H1A
H1E	10-20 cm	Olivella	0.8	4.42	1.77	G6
H1E	10-20 cm	Olivella	1.27	4.84	1.89	G4
H1E	10-20 cm	Olivella	0.96	4.33	1.7	G1
H1E	10-20 cm	Olivella	1.16	4.41	1.47	G1
H1E	10-20 cm	Olivella	0.94	4.22	1.42	G1
H1E	10-20 cm	Olivella	0.99	3.97	1.25	G1
H1E	10-20 cm	Olivella	1.02	4.2	1.25	G1
H1E	10-20 cm	Olivella	1	4.32	1.22	G1
H1E	10-20 cm	Olivella	1.17	4.32	1.1	Unid.
H1E	10-20 cm	Olivella	1.66	3.61	1.56	K2
H1E	10-20 cm	Olivella	1.28	3.61	1.65	G1
H1E	10-20 cm	Olivella	1.43	3.79	1.45	K1
H1E	10-20 cm	Olivella	1.33	3.26	1.91	G1
H1E	10-20 cm	Olivella	0.93	3.69	1.1	G1
H1E	10-20 cm	Olivella	1.32	3.6	1.6	G1
H1E	10-20 cm	Olivella	0.93	3.26	1.59	G1
H1E	10-20 cm	Olivella	1.25	3.77	1.45	G1
H1E	10-20 cm	Olivella	1.18	2.52	1.15	K2
H1E	20-30 cm	Red Abalone	1.71	5.75	1.16	
H1E	20-30 cm	Red Abalone	1.95	5.56	1.3	
H1E	20-30 cm	Red Abalone	2.1	6.29	1.3	
H1E	20-30 cm	Red Abalone	1.9	5.28	1.3	
H1E	20-30 cm	Red Abalone	1.43	5.13	1.2	
H1E	20-30 cm	Red Abalone	1.37	5.62	1.2	
H1E	20-30 cm	Red Abalone	1.32	3.64	1.2	
H1E	20-30 cm	Mussel	1.27	5.77	1.15	
H1E	20-30 cm	Olivella	1.04	5.4	1	H1A
H1E	20-30 cm	Olivella	0.96	4.16	0.95	H1A
H1E	20-30 cm	Olivella	1.1	5.04	0.9	H1A
H1E	20-30 cm	Olivella	1.57	4.7	0.9	H1B
H1E	20-30 cm	Olivella	1.02	5.16	0.9	H1A
H1E	20-30 cm	Olivella	1.1	3.96	1.3	G1
H1E	20-30 cm	Olivella	1.01	5.3	1.45	Unid.
H1E	20-30 cm	Olivella	1.21	6.49	1.35	J1
H1E	20-30 cm	Olivella	0.8	6.08	1.47	J1

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
H1E	20-30 cm	Olivella	0.98		1.1	H1A
H1E	20-30 cm	Olivella	0.4	6.23	1	H1A
H1E	20-30 cm	Olivella	0.95	4.87	0.92	H1A
H1E	20-30 cm	Olivella	1.09	4.05	1.15	H1A
H1E	20-30 cm	Olivella	0.8	5	1	H1A
H1E	20-30 cm	Olivella	1.29	4.72	0.9	H1B
H1E	20-30 cm	Olivella	0.97	4.5	1.2	G1
H1E	20-30 cm	Olivella	1	4.4	1.75	G1
H1E	20-30 cm	Olivella	0.75	4.22	1.27	G1
H1E	20-30 cm	Olivella	0.86	4.37	1.7	G1
H1E	20-30 cm	Olivella	0.86	3.78	1.4	G1
H1E	20-30 cm	Olivella	0.82	4.59	1.43	G1
H1E	20-30 cm	Olivella	1.34	4.71	1.5	G1
H1E	20-30 cm	Olivella	1.2	4.83	1.4	G1
H1E	20-30 cm	Olivella	1.05	4.52	1.2	G1
H1E	20-30 cm	Olivella	0.98	4.28	0.9	H1A
H1E	20-30 cm	Olivella	1.35	4.57	1.62	G1
H1E	20-30 cm	Olivella	1.3	4.56	1.3	G1
H1E	20-30 cm	Olivella	1.06	3.76	1.3	G1
H1E	20-30 cm	Olivella	1.56	4	2.05	K2
H1E	20-30 cm	Olivella	1.5	3.85	1.8	K2
H1E	20-30 cm	Olivella	1.17	3.53	1.6	G1
H1E	20-30 cm	Olivella				Unid.
H1E	20-30 cm	Olivella	1.82	4.11	1.85	G6
H1E	20-30 cm	Olivella	0.9	3.34	1.43	G1
H1E	20-30 cm	Olivella	1.34	3.69	1.7	G1
H1E	20-30 cm	Olivella	1.1	4.2	1.8	G1
H1E	20-30 cm	Olivella	1.3	4.3	1.9	G1
H1E	20-30 cm	Olivella	1.5	4.26	1.6	G1
H1E	20-30 cm	Olivella	1.1	4.18	1.77	G1
H1E	20-30 cm	Olivella	1.28	4.55	1.4	G1
H1E	20-30 cm	Olivella	1.3	4.83	1	H1B
H1E	30-40 cm	Olivella	1.95	6.1	1.7	G5
H1E	30-40 cm	Olivella	1.9	3.5	1.85	K2
H1E	30-40 cm	Olivella	1.22	4.63	1.7	G6
H1E	30-40 cm	Olivella				Unid.
H1E	30-40 cm	Olivella	3.08	8.8	2.5	E2A1
H1E	30-40 cm	Olivella	1.27	5.75	0.85	H1A
H1E	30-40 cm	Olivella	1.48	5.73	1	H2
H1E	30-40 cm	Olivella	1.1	4.3	0.9	H1A
H1E	30-40 cm	Olivella	1.2	4.36	1.6	G1
H1E	30-40 cm	Olivella	1.45	4.12	1.54	G1
H1E	30-40 cm	Olivella	1.31	3.7	1.65	K2
H1E	30-40 cm	Olivella	1	3.68	1.2	G1
H1E	30-40 cm	Olivella	2	3.97	1.62	K2
H1E	30-40 cm	Olivella	1.1	3.14	1.81	K2

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Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
H2	Sweep	Abalone	1.23	3.96	1.4	
H2	Sweep	Olivella	1.03	4.32	1.7	G1
H2	Sweep	Olivella	1.39	4.43	1.23	G1
H2	Sweep	Olivella	1.15	4.44	1.2	G1
H2	Sweep	Olivella	1	4.15	1	H1A
H2	Sweep	Olivella	1.06	5.75	1.1	H1A
H2	Sweep	Olivella	1.77	4.4	1.6	K1
H2	Sweep	Olivella	2.56	3.29	1.2	K1
H2T1A	Sidewall	Olivella	1.2	5.9	1.7	G2A
H2T1A	10-20 cm	Olivella	1.06	3.38	1	H
H2T1A	10-20 cm	Olivella	0.9	4.95	1	H1A
H2T1A	10-20 cm	Olivella	1.04	6.11	1.2	J1
H2T1A	10-20 cm	Olivella	2.4	2.8	1.7	K3
H2T1A	20-30 cm	Abalone	1.85	5.59	1	
H2T1A	20-30 cm	Unid.	3.5	3.1	0.8	Unid.
H2T1A	20-30 cm	Olivella	1.2	5.6	1	H
H2T1A	20-30 cm	Olivella	1.11	5.67	1	H1A
H2T1A	Ash	Red Abalone	0.96	5.56	1	
H2T1A	Ash	Olivella	0.82		1	H
H2T1A	Ash	Olivella				Unid.
H2T1B	20-30 cm	Unid.		4.6	1.1	Unid.
H2T1B	20-30 cm	Red Abalone	1.95	6.45	1.33	
H2T1B	20-30 cm	Olivella	1.15	4.94	1.3	G1
H2T1B	20-30 cm	Olivella	1.17	4.41	1.4	G1
H2T1B	20-30 cm	Olivella	1.06	5.67	1.4	G6
H2T1B	20-30 cm	Olivella	0.96	6.5	1	H1A
H2T1B	20-30 cm	Olivella	1.14	6.09	1	H1A
H2T1B	20-30 cm	Olivella	1.15	4.98	1	H1A
H2T1B	20-30 cm	Olivella	1.1	5.07	0.9	H1A
H2T1B	20-30 cm	Olivella	0.97	4.77	1	H1B
H2T1B	20-30 cm	Olivella	1.15	5.2	0.95	H1B
H2T1B	20-30 cm	Olivella	1.68	4.68	0.95	H1B
H2T1B	20-30 cm	Olivella	1.09	5.07	0.8	H1B
H2T1B	20-30 cm	Olivella	1.21	4.8	1	H1B
H2T1B	20-30 cm	Olivella	1.79	4.02	1.75	K2
H2T1B	30-40 cm	Olivella	0.9	4.35	1.8	G1
H2T1B	30-40 cm	Olivella	1.2	4.05	1.3	G1
H2T1B	30-40 cm	Olivella	1.56	4.85	1	H1A
H2T1B	30-40 cm	Olivella	1.15	4.7	1	H1A
H2T1B	30-40 cm	Olivella	1.03	5.28	1	H1B
H2T1B	30-40 cm	Olivella	1.32	4.73	1	H1B
H2T1B	40 cm - sterile	Olivella	1.1	4.8	1	H1B
H2T1C	10-20 cm	Olivella	1.6	3.9	1.3	G1

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
H2T1C	10-20 cm	Olivella	0.72	4.4	1.7	G1
H2T1C	10-20 cm	Olivella	0.8	4.77	1	H1A
H2T1C	10-20 cm	Olivella	1.45	4.88	0.8	H1A
H2T1C	10-20 cm	Olivella	1	4.75	1.1	H1B
H2T1C	10-20 cm	Olivella	1.1	5.04	1.1	H1B
H2T1C	10-20 cm	Olivella	1.98	5.32	1.05	H2
H2T1C	10-20 cm	Olivella	1.27	5.24	1.1	H2
H2T1C	20-30 cm	Olivella	1.04	5.55	1	H
H2T1C	20-30 cm	Olivella	0.9	4.65	1.15	H1A
H2T1C	20-30 cm	Olivella	1.28	5.3	1	H1B
H2T1C	20-30 cm	Olivella	1.33	4.75	1	H1B
H2T1C	20-30 cm	Olivella	1	5.03	1.2	H2
H2T1C	20-30 cm	Olivella	1.22	5.92	1.5	J1
H2T1C	20-30 cm	Olivella				Unid.
H2T1C	Ash	Olivella	0.85	4.16	1.5	G1
H2T1C	Ash	Olivella	1.38	4.68	1.8	G1
H2T1C	Ash	Olivella	1.83	4.83	1.73	G1
H2T1C	Ash	Olivella	1	6.36	1	H1A
H2T1C	Ash	Olivella	0.85	6.25	1	H1A
H2T1C	Ash	Olivella	0.92	4.51	1.15	H1A
H2T1C	Ash	Olivella	1.26	6.29	1	H1B
H2T1C	Ash	Olivella	0.9	4.82	0.8	H1B
H2T1C	Ash	Olivella	0.88	4.17	1	H1B
H2T1D	0-10 cm	Olivella	1.02	4.83	1	H1B
H2T1D	0-10 cm	Olivella	1.05	4.31	1	H1B
H2T1D	10-20 cm	Olivella	0.96	4.11	1.42	G1
H2T1D	10-20 cm	Olivella	1.03	4.88	0.8	H1A
H2T1D	10-20 cm	Olivella	1.04	4.72	0.8	H1A
H2T1D	10-20 cm	Olivella	0.8	5.01	1	H1A
H2T1D	10-20 cm	Olivella	0.81	4.4	1	H1B
H2U1	2	Abalone	0.91	4.81	0.1	
H2U1	2	Olivella	2.74	5.14	2	Unid.
H2U1	3	Unid.	3.11	4.8	2.6	Unid.
H2U1	3	Unid.	4.68	4.3	2.3	Unid.
H2U1	3	Olivella	1.58	4.14	1.21	G
H2U1	3	Olivella	1.65	4.47	1.5	G1
H2U1	3	Olivella	1.06	3.9	1.25	G1
H2U1	3	Olivella	1	4.81	1	H1A
H2U1	3	Olivella	0.83	4.51	1	H1A
H2U1	3	Olivella	1.18	5.35	1.2	H1A
H2U1	3	Olivella	1.13	3.81	0.8	H1A
H2U1	3	Olivella	0.82	4.96	1	H1B
H2U1	3	Olivella	1.49	5.39	1.15	H1B
H2U1	3	Olivella	1.61	5.09	1	H1B
H2U1	3	Olivella	0.9	5.73	1	H1B
H2U1	3	Olivella	0.98	5.81	1.5	J1
H2U1	3	Olivella	0.93	5.94	1.44	J1
H2U1	3	Olivella	1.38	5.05	1.3	J1

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
H2U1	4	Olivella	1.03	3.96	1.1	H1A
H2U1	4	Olivella	1.21	4.2	1.1	H1A
H2U1	4	Olivella	0.98	5.6	1	H1B
H2U1	4	Olivella	1.2	4.6	1.8	J1
H2U1	4	Olivella				Unid.
H2U1	4	Olivella	0.84	4.86	1.33	G1
H2U1	4	Olivella	0.83	4.62	1.7	G1
H2U1	4	Olivella	1.05	4.57	1	H1A
H2U1	4	Olivella	1.19	4.75	1	H1A
H2U1	4	Olivella	1.28	4.17	0.8	H1A
H2U1	4	Olivella	1.37	5.33	1	H1A
H2U1	4	Olivella	1.04	5.65	1.2	H1B
H2U1	4	Olivella	0.85	5.04	1.1	H1B
H2U1	4	Olivella	1.7	5.52	1	H1B
H2U1	4	Olivella	1.26	5.79	1.5	J1
H2U1-4	3	Unid.	2.01	3.12	1.5	Unid.
H2U1-4	3	Olivella	0.78	4.11	1.5	G1
H2U1-4	3	Olivella	1.12	5.87	1.4	J1
H2U2	3	Olivella	0.77	3.8	1.2	G1
H2U2	3	Olivella	1.06	3.98	1.3	G1
H2U2	3	Olivella	1.38	5.75	1	H1A
H2U2	3	Olivella	0.97	5.27	1	H1A
H2U2	3	Olivella	0.95	4.38	1	H1A
H2U2	3	Olivella	0.78	4.68	1	H1A
H2U2	3	Olivella	1.1	4.65	1	H1B
H2U2	3	Olivella	2.68	4.89	1.12	K1
H2U3	3	Abalone	1.39	4.49	2	
H2U3	3	Clam	2.41	3.91	1.2	
H2U3	3	Olivella	7.67	4.41	0.92	A1
H2U3	3	Olivella	1.87	4.4	2	G1
H2U3	3	Olivella	1	4.07	1	H
H2U3	3	Olivella	1.02	5.6	1	H
H2U3	3	Olivella	1.31	5.81	1.02	H1A
H2U3	3	Olivella	1.05	4.29	0.9	H1A
H2U3	3	Olivella	1.11	5.92	1.2	J1
H2U3	3	Olivella	1	5.78	1.25	J1
H2U3	3	Olivella	1.7	3.07	1	K2
H2U3	3	Olivella	1.02	3.75	1.23	Unid.
H2U3	4	Mussel	2.32	10.27	1.74	
H2U3	4	Olivella	7.44	4.77	2	A1
H2U3	4	Olivella	0.96	3.64	1.65	G1
H2U3	4	Olivella	1.05	3.81	0.9	H
H2U3	4	Olivella	1.52	6.16	1.1	H1A
H2U3	4	Olivella	1.2	3.41	1	H1A
H2U3	4	Olivella	1.71	5.16	0.9	H1B
H2U3	4	Olivella	1.28	6.04	1	H2
H2U4	3	Olivella				Unid.
H2U4	3	Olivella	1.01	4.72	1	H1A

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
H2U4	3	Olivella	1.22	3	1.4	K3
H2U5	2	Olivella	1.11	3.61	1.47	G1
H2U5	2	Olivella	1.18	4.05	1.74	G1
H2U5	2	Olivella	0.96	3.72	1.1	H
H2U5	2	Olivella	1.25	5.04	1	H1A
H2U5	2	Olivella	1.17	4.93	1.1	H1A
H2U5	2	Olivella	2.03	4.48	1	K1
H2U5	2	Olivella	1.4	4.19	1.6	K2
H2U5	3	Unid.	1.91	5.08	1.4	Unid.
H2U5	4	Olivella	0.9	3.75	1.74	G1
H2U5	4	Olivella	0.86	5.42	1	H1B
H2U5	4	Olivella	1.13	6.08	1.1	H2
H2U5	4	Olivella	1.79	3.67	1.74	K2
H2U6	1	Olivella	0.71	4.19	1.6	G1
H2U6	2	Olivella	1.33	4.36	1.3	G1
H2U6	2	Olivella	1	3.57	1.3	G1
H2U6	2	Olivella	0.86	3.58	1.7	G1
H2U6	2	Olivella	1.17	4.64	0.8	H1B
H2U6	2	Olivella	2.17	4.55		Unid.
H2U6	2	Olivella	1.01	4.18	0.54	Unid.
H2U6	2	Olivella	1.05	4.39	0.9	Unid.
H2U6	3	Olivella	7.25	5.23	2	A1
H2U6	3	Olivella	1.91	4.91	1.35	E1A1
H2U6	3	Olivella	1.75	4.36	1.8	E1A1
H2U6	3	Olivella	0.85	3.35	1.48	G1
H2U6	3	Olivella	0.98	4.38	1.3	G1
H2U6	3	Olivella	1.46	4.04	1.3	G1
H2U6	3	Olivella	0.92	4.2	1.8	G1
H2U6	3	Olivella	0.97	3.78	1	H
H2U6	3	Olivella	1.14	5.12	1.1	H
H2U6	3	Olivella	0.94	3.97	0.9	H
H2U6	3	Olivella	1.05	3.98	0.95	H
H2U6	3	Olivella	1	4.6	1	H
H2U6	3	Olivella	1.11	5.23	0.85	H1A
H2U6	3	Olivella	1.03	4.69	0.8	H1A
H2U6	3	Olivella	0.88	3.57	0.8	H1A
H2U6	3	Olivella	1.07	5.12	0.8	H1A
H2U6	3	Olivella	1.15	4.64	1	H1A
H2U6	3	Olivella	0.85	4.49	1	H1A
H2U6	3	Olivella	0.75	4.46	1	H1A
H2U6	3	Olivella	0.88	5.94	1	H1B
H2U6	3	Olivella	0.93	4.69	0.95	H1B
H2U6	3	Olivella	1.05	5.6	1.3	J1
H2U6	3	Olivella	1.27	5.68	1.5	J1
H2U6	3	Olivella	1.56	3.69	1.6	K2
H2U6	3	Olivella	1.58	3.53	2	K2
H2U6	3	Olivella	1.54	3.02	1.7	K2
H2U6	3	Olivella	1.61	4.03	1.45	Unid.

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
H2U6	3	Olivella	1.42	4.24	1	H
H2U6	4	Olivella	1.34	5.82	1.45	F4
H2U6	4	Olivella	1.52	5.78	1.1	H1A
H2U6	4	Olivella	1.17	6.47	1.2	H2A
H2U6	4	Olivella	1.19	5.9	1.4	J1
H2U6	Feature 2	Olivella	1.32	4.98	1	H
H2U7	2	Olivella	1.24	4.49	1.34	G1
H2U7	2	Olivella	1.27	4.47	1.1	H1A
H2U7	2	Olivella	1.41	4.03	1.54	K2
H2U7	3	Olivella	1.32	4.39	1.57	G1
H2U7	3	Olivella	0.73	4.47	1.5	G1
H2U7	3	Olivella	1.6	4.37	1.5	G1
H2U7	3	Olivella	1.36	5.59	1.3	G2A
H2U7	3	Olivella	0.85	4.71	1	H1A
H2U7	3	Olivella	1.61	4.84	1	H1A
H2U7	3	Olivella	1.02	3.77	1.1	H1A
H2U7	3	Olivella	2.08	3.75	1.5	K1
H2U7	3	Olivella	1.22	3.62	1	K2
H2U7	3	Olivella	1.57	3.78	1	K2
H2U7	3	Olivella	1.16	3.87	1.77	K2
H2U7	3	Olivella	1.4	3.82	1	H1A

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Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
NHUB	29-50 cm	Olivella	0.91	4.39	1	H1A
NHUB	29-50 cm	Olivella	0.99	3.67	1.1	H1A
NHUB	29-50 cm	Olivella	1.33	4.26	1.2	G1
NHUB	29-50 cm	Olivella	0.99	6.11	1	C2
NHUB	29-50 cm	Olivella	0.73	4.19	0.8	H1A
NHUB	29-50 cm	Olivella	1.4	4.8	0.9	H1A
NHUB	29-50 cm	Olivella	1.1	3.6	1	H1B
NHUB	29-50 cm	Olivella	1.67	2.95	1	K3
NHUB	29-50 cm	Olivella	1.18	5.54	1	H1B
NHUB	29-50 cm	Olivella	0.94	3.77	1	H1A
NHUB	50-60 cm	Olivella	0.97	4.63	1.6	G1
NHUB	50-60 cm	Olivella	0.82	4.13	1.5	G1
NHUB	50-60 cm	Olivella	0.71	5.89	1.1	H2
NHUB	50-60 cm	Olivella	1.4	5.1	0.8	H2
NHUB	50-60 cm	Olivella	1.33	3.86	1.5	K2
NHUB	50-60 cm	Olivella	0.9	3.94	1.5	G1
NHUB	50-60 cm	Olivella	1.01	4.2	1.5	G1
NHUB	50-60 cm	Olivella	1.95	3.85	1.5	K2
NHUB	50-60 cm	Olivella	1.2	3.4	1	K2
NHUB	50-60 cm	Olivella	1	3.7	1.34	Unid.
NHUB	50-60 cm	Olivella	1	4.8	1.3	G1
NHUB	50-60 cm	Olivella	1.3	6.16	0.9	H1A
NHUC	45-50 cm	Abalone	1.49	5.69	1.42	
NHUC	45-50 cm	Clam	2	4.7	2.5	
NHUC	45-50 cm	Olivella	0.8	3.13	1	H1A
NHUC	45-50 cm	Olivella	1.13	4.6	1	H1B
NHUC	45-50 cm	Olivella	1.04	6	1	H1A
NHUC	45-50 cm	Olivella	2.81	6.46	1.83	K1
NHUC	45-50 cm	Olivella	1.09			Unid.
NHUC	45-50 cm	Olivella	0.4	3.76	1.4	G1
NHUC	50-60 cm	Olivella	0.96	5.53	0.95	H1B
NHUC	50-60 cm	Olivella	5.83	4.19	1.3	A1
NHUC	50-60 cm	Olivella	3.36	6.66	2.4	K1
NHUC	50-60 cm	Olivella	0.97	4.21	1	H1B
NHUC	50-60 cm	Olivella	1.3	5.9	1.1	H1B
NHUC	50-60 cm	Olivella	1.5	4.8	2	G1
NHUC	50-60 cm	Olivella	1.2	5	1	H1B
NHUC	50-60 cm	Olivella	1	3.9	1	H1A
NHUC	50-60 cm	Olivella	1.2	4.2	1	H1A
NHUC	50-60 cm	Olivella	1.3	5.9	1.3	J
NHUC	50-60 cm	Olivella	1.2	4.5	1.5	G1
NHUC	Floor	Clam	2.5	4.7	2.3	
NHUC	Floor	Olivella	1.3	3.3	0.8	Unid.
NHUC	Floor	Olivella	1.4	4.5	1.8	G1
NHUC	Floor	Olivella	1.6	4.4	1.6	G1
NHUC	Floor	Olivella	1	4	1.3	G1

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
NHUC	Floor	Olivella	1.5	5.5	0.9	H1B
NHUC	Floor	Olivella	1.2	5	1.6	G1
NHUC	Floor	Olivella	1	4	1.3	G1
NHUC	Floor	Olivella	1.9	6.5	1.3	G2A
NHUC	Floor	Olivella	0.9	5	1	H1B
NHUC	Floor	Olivella	1.2	4	1	H1B
NHUC	Floor	Olivella	1.2	4	1.3	G1
NHUC	Floor	Olivella	1.1	4.6	1.6	G2A
NHUC	Floor	Olivella	1.2	6.22	0.8	H
NHUC	Floor	Olivella	0.86	4.8	1	H1B
NHUC	Floor	Olivella	0.9	5	1	H1B
NHUC	Floor	Olivella	1.3	4.7	1	H1B
NHUC	Floor	Olivella	1.3	4.5	1.6	G1
NHUC	Floor	Olivella	1.1	4.1	1.5	G1
NHUC	Floor	Olivella	2.2	4	1.4	K1
NHUC	Floor	Olivella	1.3	3.4	1.1	K2
NHUC	Floor	Olivella	0.9			Unid.
NHUC	Floor	Olivella	1.2	6.2	1.2	H1A
NHUC	Floor	Olivella	1.1	4.2	0.8	H1B
NHUC	Floor	Olivella	1.2	4.1	2.1	G1
NHUC	Mortar Pedestal	Olivella	0.9	4.1	1	H1B
NHUC	Mortar Pedestal	Olivella	2.3	5.4	0.8	K1
NHUC	Mortar Pedestal	Olivella	1.4	5.1	1.1	H1B
NHUD	40-50 cm	Olivella	1.2	5.9	1	H1B
NHUD	40-50 cm	Olivella	1.1	5.8	1.3	J
NHUD	40-50 cm	Olivella	1.5	5.8	1.2	G2A
NHUD	40-50 cm	Olivella	1.5	6.1	1.1	H1B
NHUD	40-50 cm	Olivella	1	3.8	1.5	G1
NHUD	40-50 cm	Olivella	1.8	6.4	1	H1A
NHUD	40-50 cm	Olivella	1.8	3.4	0.9	K2
NHUD	40-50 cm	Olivella	1.5	4.6	1.3	G1
NHUD	50-60 cm	Olivella	2.2	6.1	0.5	K1
NHUD	50-60 cm	Olivella	2.2	5.9	1	K1
NHUD	50-60 cm	Olivella	1.6	6.2	1.4	J
NHUD	50-60 cm	Olivella	2.1	3.5	1.9	K2
NHUD	50-60 cm	Olivella	1.6	3.3	1.4	K2
NHUD	50-60 cm	Olivella	1.4	2.8	1.1	K3
NHUD	50-60 cm	Olivella	1.4	5.6	1	J
NHUD	50-60 cm	Olivella	0.8	3.4	1	H
NHUD	50-60 cm	Olivella	0.8	4	0.7	H1A
NHUD	50-60 cm	Olivella	1.6	4.7	1.7	G1
NHUD	50-60 cm	Olivella	2	3	1.7	K3
NHUD	50-60 cm	Olivella	1.4	3.7	1.1	H1A
NHUD	Floor	Olivella	0.8	5.8	1	H1A
NHUD	Floor	Olivella	0.7	3.9	1.1	Unid.

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
NHUD	Floor	Olivella	0.3	3.44	0.92	H1A
NHUD	Floor	Olivella	2.4	3.1	1.5	K3
NHUD	Floor	Olivella	1.6	3.9	1.9	K2
NHUD	Floor	Olivella	1.7	3	1.2	K2
NHUD	Floor	Olivella	0.8	6.2	1	H1A
NHUF	29-50 cm	Abalone	2.4	7.1	1.5	
NHUF	29-50 cm	Olivella	1	4.4	1.5	G1
NHUF	29-50 cm	Olivella	3.8	9.4	2.9	E3A
NHUF	29-50 cm	Olivella	4.9	11.3	2.4	E3A
NHUF	29-50 cm	Olivella	1.1	4	1.2	G1
NHUF	29-50 cm	Olivella	1	4.2	1.4	G1
NHUF	29-50 cm	Olivella	1.9	5.6	1	H1A
NHUF	29-50 cm	Olivella	0.84	4.6	1	H
NHUF	29-50 cm	Olivella				Unid.
NHUF	29-50 cm	Olivella	1.2	4.4	1.5	G1
NHUF	Floor	Olivella	1.1	4.2	1.4	G1
NHUF	Floor	Olivella	1.1	4.3	1.5	G1
NHUF	Floor	Olivella	1	4.3	1	H1A
NHUF	Floor	Olivella	1.4	3.9	1.8	G1
NHUF	Floor	Olivella	1.1	4	1.7	G1
NHUG	41-50 cm	Olivella	1	4.5	1.6	G1
NHUG	41-50 cm	Olivella	1.3	4.1	1.4	G1
NHUG	41-50 cm	Olivella	1.4	3.9	1.5	G1
NHUG	41-50 cm	Olivella	1.1	4	1.3	G1
NHUG	41-50 cm	Olivella	1.3	6	1	H1A
NHUG	41-50 cm	Olivella	1.1	5.6	1.1	H1A
NHUG	41-50 cm	Olivella	1.6	3	1.2	K2
NHUG	50 cm-Floor	Olivella	1.1	5.9	0.9	H
NHUG	50 cm-Floor	Olivella	1.3	3.9	1.6	G1
NHUG	Floor	Olivella	1	4	1.3	G1
NHUG	Floor	Olivella	1.3	4	1.4	G1
NHUG	Floor	Olivella	1	4.1	1	H1A
NHUG	Floor	Olivella	1	4.3	1.5	G1
NHUG	Floor	Olivella	1.2	4	1	H1A
NHUG	Floor	Olivella	2	7.4	2.6	E1B2
NHUG	Floor	Olivella	0.8	3.9	1.2	Unid.
NHU2H	Surface	Olivella	1.2	3.9	1.7	K2
NHUH	33-50 cm	Red Abalone	1.4	3.7	1.2	
NHUH	33-50 cm	Olivella	2.3	4.7	2.2	K1
NHUH	33-50 cm	Olivella	1.6	3.8	1.2	K2
NHUH	33-50 cm	Olivella	1.5	4.1	0.9	K2
NHUH	33-50 cm	Olivella	1.3	4.5	0.8	H1A
NHUH	33-50 cm	Olivella	1.1	5.5	0.9	H1A
NHUH	33-50 cm	Olivella	1	3.9	1.9	G1

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
NHUH	50 cm-Floor	Unid.	2.8	3.2		Unid.
NHUH	50 cm-Floor	Olivella	1.3	4.8	0.9	H1A
NHUH	50 cm-Floor	Olivella	1.7	4	1.7	Unid.
NHUH	50 cm-Floor	Olivella	1.3	4.2	1.7	K2
NHUH	50 cm-Floor	Olivella	1.1	6.3	1.2	H
NHUH	50 cm-Floor	Olivella	2.3	5.9	1	H1A
NHUH	50 cm-Floor	Olivella	1.1	5	1	H1A
NHUH	50 cm-Floor	Olivella	2	6.8	1.7	E1B1
NHUH	50 cm-Floor	Olivella	1.9	3.1	1.4	K2
NHUH	50 cm-Floor	Olivella	1.5	2.9	1.7	K3
NHUH	50 cm-Floor	Olivella	1.6	2.8	1	K3
NHUH	Floor	Unid.	3.2	2.3	0.7	Unid.
NHUH	Floor	Olivella	3	7	2.4	E1B1
NHUH	Floor	Olivella	1.4	3.9	1.5	K2
NHUH	Floor Sweep	Olivella	1.5	6.7	1	H
NHUH	Floor Sweep	Olivella	1.2	5.6	1	H1A
NHUH	Floor Sweep	Olivella	1.2	4.1	1.7	G1

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Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
GSU1B	0-10 cm	Abalone	1.6	5.2	1	
GSU1B	0-10 cm	Olivella	1	4	1	H
GSU1B	0-10 cm	Olivella	0.9	3.3	1	H1A
GSU1B	0-10 cm	Olivella	0.8	4.1	1.2	G1
GSU1B	0-10 cm	Olivella	1.2	4.3	1.2	G1
GSU1B	10-20 cm	Olivella	1.8	4.1	1.4	Unid.
GSU1B	10-20 cm	Olivella	1.9	3.4	1.6	K2
GSU1B	10-20 cm	Olivella	1	4.8	0.9	H1A
GSU1B	10-20 cm	Olivella	2	4.8	1.7	G1
GSU1B	10-20 cm	Olivella	2.6	4.4	1.4	K1
GSU1B	10-20 cm	Olivella	1.3	4.5	1.5	G1
GSU1B	10-20 cm	Olivella	1.3	3.8	1.6	K2
GSU1B	10-20 cm	Olivella	1.3	4.1	1.5	K2
GSU1B	10-20 cm	Olivella	1.2	4.2	1.7	G1
GSU1B	10-20 cm	Olivella	1	4.1	1.5	G1
GSU1B	20-30 cm	Olivella	1.4	4	1.5	G1
GSU1B	20-30 cm	Olivella	2.2	3.4	1.9	K2
GSU1B	20-30 cm	Olivella	1.7	3.7	1.3	K1
GSU1B	20-30 cm	Olivella	1	4.5	1.6	G1
GSU1B	20-30 cm	Olivella	4.1	10.5	2.4	E3A
GSU1B	20-30 cm	Olivella	1.3	4.9	1	H1A
GSU1B	20-30 cm	Olivella	1.1	4.3	1.3	G1
GSU1B	20-30 cm	Olivella	1.4	3.8	1	H1A
GSU1B	20-30 cm	Olivella	1	4.2	0.7	H1A
GSU1B	20-30 cm	Olivella	1.8	3.9	1.5	K2
GSU1B	20-30 cm	Olivella	1	3.8	1.8	K2
GSU1B	30-40 cm	Abalone				
GSU1B	30-40 cm	Olivella	1	4.3	1	H1A
GSU1B	30-40 cm	Olivella	0.9	4.9	0.8	H1B
GSU1B	30-40 cm	Olivella	0.9	4.3	1.5	Unid.
GSU1B	30-40 cm	Olivella	1.3	4.6	1	H1B
GSU1B	30-40 cm	Olivella	1.1	4.5	0.9	H1B
GSU1B	30-40 cm	Olivella	1.4	4.4	1.7	G1
GSU1B	30-40 cm	Olivella	1.5	3.9	1.4	K2
GSU1B	30-40 cm	Olivella	1.2	4.3	1	H1B
GSU1B	30-40 cm	Olivella	0.9	4.3	1.2	G1
GSU1B	30-40 cm	Olivella	0.9	4	1	H1A
GSU1B	30-40 cm	Olivella	1.4	3.5	1.2	Unid.
GSU1B	40-50 cm	Olivella	1.4	4.8	1	H1B
GSU1B	40-50 cm	Olivella	1	3.5	1	H1B
GSU1B	40-50 cm	Olivella	1.1	4.1	1.5	G1
GSU1B	40-50 cm	Olivella	1	4.74	1.3	G1
GSU1B	40-50 cm	Olivella	1.3	4.2	1.3	G1
GSU1B	40-50 cm	Olivella	1.5	4.2	1	H
GSU1B	40-50 cm	Olivella	0.8	3.9	0.8	H1B
GSU1B	40-50 cm	Olivella	1.3	4.4	1.2	G1

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
GSU1B	50 cm-Sterile	Olivella	1.5	3.5	1.6	K2
NGSU1B	40-50 cm	Olivella	1.6	4.7	1	H1A
NGSU1B	40-50 cm	Olivella	2.4	6	1.4	Unid.
NGSU1B	40-50 cm	Olivella	1.4	4.7	1	H1A
NGSU1B	40-50 cm	Olivella	1.6	3.9	1.7	K2
NGSU1B	40-50 cm	Olivella	0.9	6	1.12	Unid.
NGSU1B	40-50 cm	Olivella				Unid.
NGSU1B	40-50 cm	Olivella	1.3	4.4	1	H1A
NGSU1B	40-50 cm	Olivella	1	4.8	1.2	G1
NGSU1B	40-50 cm	Olivella	1.3	4.5	1	H1A
NGSU1B	40-50 cm	Olivella	1.1	4.3	1	H1A
NGSU1B	40-50 cm	Olivella	1.2	4.1	1	H1A
NGSU1B	40-50 cm	Olivella	1.3	4.2	1	H1A
NGSU1B	40-50 cm	Olivella	1.2	4.9	1.3	G1
NGSU1B	40-50 cm	Olivella	1.7	4.5	0.9	H1B
NGSU1B	40-50 cm	Olivella	1.3	4.4	1	H1A
NGSU1B	40-50 cm	Olivella	1	3.9	1.1	H
NGSU1B	40-50 cm	Olivella	1.1	4.7	1	H1B
NGSU1B	40-50 cm	Olivella	1.2	4.7	1.6	G1
NGSU1B	40-50 cm	Olivella	0.9	4.6	1	H1B
NGSU1B	40-50 cm	Olivella	1.4	4.3	1.4	G1
NGSU1B	40-50 cm	Olivella	1.3	3.8	1	H
NGSU1B	40-50 cm	Olivella	1	3.5	1	H1B
NGSU1B	40-50 cm	Olivella	1.7	2.9	1.4	K3
NGSU1B	40-50 cm	Olivella	1.1	4.4	0.8	H1B
NGSU1B	40-50 cm	Olivella	1.1	3.6	1	H1B
NGSU1B	40-50 cm	Olivella	0.9	4	1	H
NGSU1B	40-50 cm	Olivella	1.3	4	1	H1A
NGSU1B	40-50 cm	Olivella	1	3.5	1.4	G1
NGSU1B	50cm-Sterile	Abalone	1.3	4.7	1.4	
GSU1C	0-10 cm	Olivella	1.5	4.5	1.3	G1
GSU1C	0-10 cm	Olivella	1.1	4.2	1.9	G1
GSU1C	0-10 cm	Olivella	1.1	5.7	1	H1A
GSU1C	10-20 cm	Abalone	1.6	4.3	1.4	
GSU1C	10-20 cm	Olivella	1.2	3.8	1.8	K2
GSU1C	10-20 cm	Olivella	1.1	4.2	1.6	G1
GSU1C	10-20 cm	Olivella	1.4	3	1	K3
GSU1C	10-20 cm	Olivella	1.5	2.9	1.6	K2
GSU1C	10-20 cm	Olivella	1	3.8	1	H
GSU1C	20-30 cm	Olivella	1.1	4.5	1.2	G1
GSU1C	20-30 cm	Olivella	1.1	4.1	1	H1A
GSU1C	20-30 cm	Olivella				Unid.
GSU1C	20-30 cm	Olivella	1.2	3.6	1.3	K2
GSU1C	30-40 cm	Olivella	1.5	3.8	1.6	K2
GSU1C	30-40 cm	Olivella				Unid.
GSU1C	30-40 cm	Olivella	1.2	3.6	1	H

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
GSU1C	30-40 cm	Olivella	1.7	2.7	1.6	K3
GSU1C	30-40 cm	Olivella	0.9	3.8	1	H
GSU1C	50-60 cm	Olivella	0.7	3.5	1.2	G1
GSU1E	10-20 cm	Olivella	1.3	4.2	1.3	G1
GSU1E	10-20 cm	Olivella	1.7	4.6	1.5	G1
GSU1E	10-20 cm	Olivella	1.1	4.4	1.6	G1
GSU1E	10-20 cm	Olivella	1.4	4.1	1.2	G1
GSU1E	10-20 cm	Olivella	0.9	4	1	H1A
GSU1E	10-20 cm	Olivella	1.1	4.1	1.6	G1
GSU1E	10-20 cm	Olivella	1.6	3.9	1.2	K2
GSU1E	10-20 cm	Olivella	0.8	4.2	1.2	G1
GSU1E	20-30 cm	Olivella	1	3.9	1.1	H1A
GSU1E	30-40 cm	Olivella	1.3	4.2	0.9	H1A
GSU1F	10-20 cm	Abalone	1.6	5.6	1.2	
GSU1F	10-20 cm	Olivella	1.3	3.8	1.4	K2
GSU1F	10-20 cm	Olivella	1.2	4.5	1	H1A
GSU1F	10-20 cm	Olivella	1.3	4	1.6	G1
GSU1F	10-20 cm	Olivella	1.1	3.8	1.3	G1
GSU1F	20-30 cm	Clam	9.4	5	2.1	
GSU1F	20-30 cm	Olivella	0.7	4.5	1.3	G1
GSU1F	20-30 cm	Olivella	1.3	4.6	1.3	G1
GSU1F	20-30 cm	Olivella	1.9	9	2.3	E1A1
GSU1F	20-30 cm	Olivella	0.9	3.9	1.2	G1
GSU1F	20-30 cm	Olivella	1.8	4.6	1.5	G1
GSU1F	40-50 cm	Olivella	0.8	4.5	1	H1A
GSU1F	40-50 cm	Olivella	1.3	4.7	1	H1B
GSU1F	40-50 cm	Olivella	1.5	4.3	1	H1A
GSU1F	40-50 cm	Olivella	1.4	4.2	0.8	H1B
GSU1F	50-55 cm	Olivella	1.1	4.4	1	H1A
GSU1F	50-55 cm	Olivella	1.1	4	0.9	H1B
GSU1F	50-55 cm	Olivella	1.2	4.7	1	H1B
GSU1F	50-55 cm	Olivella	1.5	4.2	1	H1B
GSU1F	50-55 cm	Olivella	1	3.9	1	H1A
GSU1F	sweep	Olivella	1.5	3.9	1	H1A

SCRI-324, Test Units

Unit	Level	Shell Type	Thickness (mm)	Diameter (mm)	Hole Diam. (mm)	Type
BH1	0-10 cm	Olivella	1.1	4.3	0.85	H1A
BH1	0-10 cm	Olivella	1.1	4.1	1	H1B
BH1	10-20 cm	Olivella	1.3	4.4	1	H1A
BH1	20-30 cm	Olivella	1.04	3.98	1.5	G1
BH1	20-30 cm	Olivella	1.25	4.18	1.5	G1
BH2	0-10 cm	Olivella	1	3.7	2	G1
BH5	40 cm	Olivella	1	4.16	1.47	G1
TU2	0-10 cm	Olivella	1.17	4.06	1.35	G1
TU2	0-10 cm	Olivella	1	3.64	1.55	Unid.
unknown		Olivella	1.25	4.68	1.4	G1
surface		Olivella	0.6	4.12	0.9	H