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Encounters at *tamál-húye*: An Archaeology of Intercultural Engagement
in Sixteenth-Century Northern California

By

Matthew Alan Russell

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Anthropology

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Kent G. Lightfoot, Chair

Professor Patrick V. Kirch

Professor Kerwin Lee Klein

Spring 2011

Encounters at *tamál-húye*: An Archaeology of Intercultural Engagement
in Sixteenth-Century Northern California

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by Matthew Alan Russell

Abstract

Encounters at *tamál-húye*: An Archaeology of Intercultural Engagement
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Matthew Alan Russell

Doctor of Philosophy in Anthropology

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Professor Kent G. Lightfoot, Chair

This dissertation explores an intercultural engagement and its material aftermath, as well as larger processes of culture change and continuity in sixteenth-century northern California. The starting points for the research are cross-cultural encounters between Tamal hunter-gatherers and English voyagers under Sir Francis Drake in 1579 and the Spanish crew from the shipwrecked Manila galleon *San Agustín* in 1595, which occurred in *tamál-húye*, the Coast Miwok-language name for present-day Drakes Bay, California. Archaeological evidence from extensive excavations around *tamál-húye* during the 1940s-1970s indicates that Tamal villagers took advantage of the body of introduced material culture from the *San Agustín* shipwreck by salvaging objects and incorporating them into their cultural practices. I utilize this body of existing archaeological data, and a historical anthropological approach incorporating multiple lines of evidence, to address two primary questions about the cross-cultural encounters at *tamál-húye* that have not been addressed in detail by previous researchers.

First, I evaluate how the Tamal people incorporated material culture from the shipwreck into their cultural practices by analyzing museum collections, archival excavation records and original field notes, and published reports from the earlier investigations, and by incorporating additional data from ethnography, historical documents, and native oral traditions. I recreate the excavations in a Geographic Information System (GIS) to analyze intra-site artifact and feature patterning, and I examine the correlation between distributions of sixteenth-century introduced objects and indigenously-manufactured items. Second, using a framework based on an “event-oriented” archaeology, I assess whether this short-term, pre-colonial event, and the material culture introduced as a result, was a source of long-term Tamal culture change. I investigate whether Tamal salvage and reuse of the ship’s cargo, and incorporation of the introduced material culture into their daily lives, resulted in transformations to Tamal cultural practices.

My results suggest the Tamal people incorporated material culture from the *San Agustín* shipwreck in complex ways. Some porcelain fragments were modified into traditional artifacts such as bead blanks, pendants, bifaces, and other objects, while the large quantity of unmodified porcelain fragments may represent discarded by-products from the production of these and other objects. Overall, the ways in which the Tamal recontextualized sixteenth-century introduced objects were a complex combination of utilitarian and symbolic reuse.

For Kathy and Monty

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CHAPTER ONE

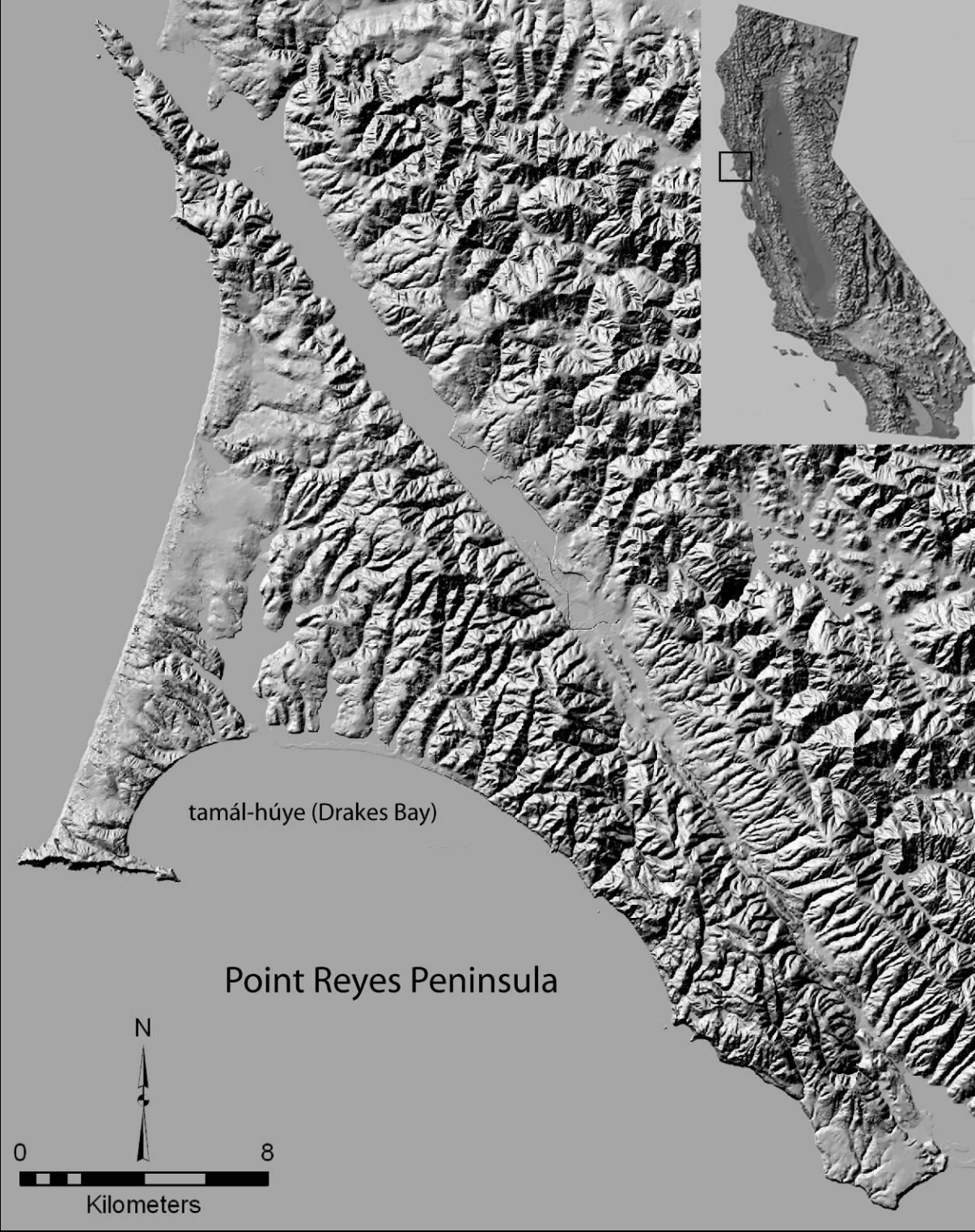
INTRODUCTION

During a brief span in the late sixteenth century, indigenous hunter-gatherers on the northern California coast met European voyagers, both Spanish and English, for the first time. The Coast Miwok-speaking Tamal people, inhabitants of what is now coastal Marin County, including Point Reyes National Seashore, were not culturally isolated. They had long been in contact with nearby village communities who spoke their language, as well as neighboring California Indians from other language groups, as part of complex trade networks that moved clam and abalone shell inland in exchange for obsidian, steatite (soapstone), and other raw materials not available on the coast. Their encounter with the sixteenth-century visitors was unprecedented, however, and foreshadowed Spanish and Russian colonization of northern California more than 175 years later. Using a shipwreck that occurred in 1595 as a unique intercultural engagement where contact was mediated almost entirely through introduced material culture, without the presence of a long-term colonizing population, my research examines how the Tamal people negotiated this cross-cultural encounter, explores how they recontextualized introduced material culture from *San Agustín* and integrated it into their daily lives, and considers the long-term implications of an event that took place more than a century-and-a-half before Spanish colonists reached the area.

This dissertation explores an intercultural engagement and its material aftermath, as well as larger processes of culture change and continuity in sixteenth-century northern California. The starting point for my research is a brief event that took place in northern California in the late fall of 1595, a cross-cultural encounter between Spanish voyagers from the shipwrecked Manila galleon *San Agustín* and Tamal hunter-gatherers in *tamál-húye*,¹ the Coast Miwok-language name for present-day Drakes Bay, California (Figures 1.1)(Barrett 1908:307; Collier and Thalman 1996:14). This encounter represents one of the earliest intersections of Europeans and California Indians on the U.S. Pacific coast. After the shipwreck, however, the Spaniards were only present in *tamál-húye* for a short time before they continued their voyage to New Spain (Mexico) in a small boat. When the Spanish departed, they left behind the wreck of the *San Agustín* and its cargo. Archaeological evidence from extensive excavations around *tamál-húye* during the 1940s-1970s indicates that Tamal villagers took advantage of this body of introduced material culture by salvaging objects from the shipwreck and incorporating them into their cultural practices. I utilize this body of existing archaeological data, along with a historical anthropological approach incorporating multiple lines of evidence within a holistic framework (Lightfoot 2005a), to address two primary questions about the cross-cultural encounters at *tamál-húye* that have not been addressed in detail by previous researchers. First, I attempt to evaluate how the Tamal people incorporated material culture from the shipwreck into their cultural practices. Examining how the Tamal incorporated European and Asian material culture into their daily lives is especially significant in this case given that it occurred outside the normal context in which indigenous people obtained European goods—that is, trade with explorers and through long-term colonial entanglements (Rogers 1990; Wilson and Rogers 1993). Beyond the initial exchanges that took place with the Tamal villagers, the Spanish were not present to structure use of European materials. In this regard, while the project fits comfortably within a

1. Tamal is the proper name of the village community, and the people, that inhabited the Point Reyes Peninsula, and is capitalized, while *tamál-húye* is a place-name from the Coast Miwok language, and is traditionally not capitalized.

Figure 1.1. Point Reyes Peninsula and *tamál-húye*, or Drakes Bay. Map by author.



larger body of literature on archaeologies of culture contact and colonialism (e.g. Cusick 1998; Lightfoot 2005a; Lyons and Papadopoulos 2002; Murray 2004; Rogers and Wilson 1993; Silliman 2004; Stein 2005a; Torrence and Clarke 2000), it presents an opportunity to approach issues of culture contact from a different perspective than previous studies. In this case, the focus is how the Tamal actively selected materials for salvage from a diverse range of goods, rather than selecting objects whose availability was mediated by early traders and colonists. Salvage of the ship's cargo provides an exceptional opportunity to examine the choices made by Coast Miwok people in selecting specific objects for reuse in indigenous contexts. I examine this question by reconstructing previous archaeological excavations through analysis of museum collections, archival excavation records, original field notes, and published reports from the earlier investigations, and by incorporating additional data from ethnography, historical documents, and native oral traditions. I recreate the excavations in a geographic information system (GIS) and use exploratory spatial data analysis (ESDA) to analyze intra-site artifact and feature patterning.

Second, I attempt to evaluate whether this short-term, pre-colonial event, and the material culture introduced as a result, was a possible source of long-term Tamal culture change, or whether extended entanglement from later, eighteenth- and nineteenth-century colonialism was necessary for significant social transformation to occur. While many archaeological studies have investigated native responses to European colonial enterprises, and therefore emphasize the implications of long-term cross-cultural entanglements for culture change and continuity (e.g. Deagan 1983, 1995; Kirch and Sahlins 1992; Lightfoot 2005a; Lightfoot, et al. 1997; Lightfoot, et al. 1991), my research instead examines the long-term implications of a short-term event, using a shipwreck as a unique case where, after a brief cross-cultural encounter, extended contact was mediated through introduced material culture without the presence of a colonizing population. My study investigates whether indigenous salvage and reuse of the ship's cargo, and incorporation of that introduced material culture into their daily lives, resulted in significant transformations to local Tamal cultural practices, as well as regional interaction between Coast Miwok-speaking California Indian groups.

This chapter presents an introduction to my project. First, I situate my research questions within a theoretical framework focused on an "event-oriented" archaeology, which provides the context for my interpretations and conclusions. Next, I give a brief historical background of the sixteenth-century events that form the focus of my research, and I highlight previous archaeological research and interpretations of those events. I then outline the methodology I use to address my research questions, including a discussion of how Tamal people may have incorporated introduced material culture into their daily lives, and how I attempt to evaluate these possibilities using multiple lines of evidence based on an archaeological foundation. I also introduce my GIS-based excavation reconstruction and spatial analysis, which is the primary data set I use to address my research questions, and outline a detailed examination of introduced sixteenth-century objects from the *San Agustín*. Finally, I outline the organization of the rest of this dissertation.

THEORETICAL PERSPECTIVE

Silliman (2005) recently highlighted the importance of making clear distinctions between archaeologies of culture contact (short-term events) and colonialism (long-term entanglements) (see also Hill 1998). Many studies have focused on investigating native responses to European

colonial enterprises, and therefore emphasize the importance of long-term cross-cultural entanglements for culture change and continuity (e.g. Deagan 1983; Deagan 1995; Kirch and Sahlins 1992; Lightfoot 2005a; Lightfoot, et al. 1997; Lightfoot, et al. 1991). In contrast, this project examines the potential long-term implications of a short-term event, in this case a shipwreck event that represents one of the earliest cross-cultural encounters between Europeans and native peoples in northern California.

The theoretical perspective for this project has a foundation based on Marshall Sahlins' "event-oriented anthropology" (Sahlins 1981a, 1985, 1991, 2004, 2005), as termed by Biersack (1991a:7), which along with the work of other practice-oriented scholars (e.g. Sewell 2005) emphasizes the importance of the "event" in history. Sahlins's theory of practice is particularly suited to culture contact studies (Lightfoot, et al. 1998; Ortner 1984). Sahlins foregrounds the importance of short-term "events" and places them on equal theoretical footing with the broader concept of "structure" in ways similar to Bourdieu (1977) and Giddens (1979). He highlights the recursive relationship between structure and events, in which events produce and reproduce structure, while structure (including historical antecedents and cultural context) both constrains and enables events (Sahlins 1981a, 1985). As Sahlins notes, "[t]he great challenge to an historical anthropology is not merely to know how events are ordered by culture, but how, in that process, the culture is reordered" (Sahlins 1981a:8). Cultural transformation occurs in the interaction between structure and event, that is, when a group's underlying cultural logic is confronted by an entirely unique circumstance that it must incorporate. This can be especially true when cultural groups encounter one another for the first time—each approaches the other with its own cultural logic and through such encounters both are transformed in a "structure of the conjuncture" (Sahlins 1981a:68).

At the same time, certain events are of a different order and fundamentally change a cultural system in a significant way. Sahlins's theoretical work seeks to understand what makes an event historically significant, and when and under what circumstances it fundamentally transforms cultural practice (Sahlins 1991, 2004, 2005). An event's significance is entirely situated within particular cultural contexts; each situation is unique and must be evaluated with reference to its historically-contingent condition (Sahlins 1991:44-45). Sahlins's suggests that "[a]n event becomes such as it is interpreted. Only as it is appropriated in and through the cultural scheme does it acquire an historical *significance*" (Sahlins 1985:xiv, emphasis original). In Sahlins's view, events are different from daily happenings: "[n]ot every action is a historical event....In the general category of human actions, historical events are a subclass only, consisting of these actions that change the order of things" (Sahlins 1991:46). What constitutes a historically-significant event can only be understood through detailed analysis of cultural context. Biersack (1991a:7) terms this approach to understanding the implication of specific events an "event-oriented anthropology." In drawing on what Sahlins (1991:43) has called the "anthropological concept of the historical event," this project asks whether the wreck of the *San Agustín* was a "historical event" for the Tamal people of the Point Reyes Peninsula—if it resulted in fundamental changes to their cultural practice, or simply provided new goods that they incorporated into their material culture with no associated cultural transformation. In this regard, the project may be considered an "event-oriented archaeology."

HISTORICAL BACKGROUND

Sixteenth and early seventeenth-century European voyages along the California coast and encounters between seafarers and Indians are documented in a rich historical record. Sixteenth-century voyagers' chronicles about Alta California record the mariner's view of their interactions with indigenous people. Native oral traditions, passed down through the generations, document some Indian perceptions of the events, while archaeological remains offer another unique view of these engagements. Archaeological excavations around *tamál-húye* that took place from the 1940s-1970s unearthed important evidence of these entanglements, including European and Asian artifacts from the shipwrecked Spanish galleon *San Agustín* found in a number of Tamal village sites. These sites and artifacts illuminate a fascinating chapter in the history of California Indian and European interaction.

There are five documented European voyages to Alta California before the eighteenth century, including only two that made landfall in northern California. The first of these was the global circumnavigation of Sir Francis Drake, who in the summer of 1579 spent five weeks on the California coast preparing his ship for a long Pacific crossing and eventual return to England (Vaux 1854). Scholars debate the precise location of Drake's landfall, but most agree it was within the territory of Coast Miwok-speaking inhabitants of the northern Bay Area, encompassing Marin and southern Sonoma Counties today—likely in what the Coast Miwok-speakers called *tamál-húye*. Based on anthropological assessment of historical accounts (Heizer 1947; Kroeber 1925; Lightfoot and Simmons 1998), this encounter may have had important ritual connotations, but no material culture can be conclusively tied to Drake's visit. From an archaeological perspective, therefore, another interaction that took place just 16 years later is more intriguing.

The Spanish Manila galleon *San Agustín*, carrying a diverse cargo of Chinese trade goods including porcelain, silk, and other luxury items, wrecked in *tamál-húye* in November 1595 while en route from the Philippines to New Spain (Mexico). Spain's Manila trade was a major artery of east-west commerce between Asia and Europe for nearly 250 years, beginning in 1573 (Schurz 1939). Manila galleons, Spanish vessels constructed in Mexico or the Philippines specifically for the trade, carried the Chinese trade goods from Manila across the Pacific via a northern route that intersected North America on the California coast, and then proceeded south to Acapulco. Sebastian Rodriguez Cermeño and an 80-member crew left the Philippines on July 5, 1595 aboard the *San Agustín*. After a four-month Pacific crossing, Cermeño reached California and anchored his vessel in a large, sheltered bay (later named Drakes Bay) to re-provision and assemble a small launch for coastal exploration, but the ship was driven ashore during a storm after its arrival and became a total loss. The Spaniards were forced to modify the launch to accommodate the entire crew for their eventual return to Mexico, but they had to abandon *San Agustín* and its cargo. For more than a month, however, both before and after *San Agustín*'s wreck and while completing modifications to the launch, Cermeño's crew interacted with the Tamal population (Sanchez 2001; Wagner 1924).

From the Tamal perspective, the Spanish departure was likely just the beginning of their interaction with the shipwreck itself, as small-scale collecting, opportunistic salvage, or possibly systematic exploitation likely continued for some time. In fact, Tamal salvage of the wreck began before the Spanish had even departed—Cermeño, *San Agustín*'s captain, noted in his log a confrontation between Tamal individuals who had collected ship's timbers, and the Spaniards, who needed the timbers to modify their launch for the return to Mexico (Wagner 1924:23). This

interaction between the Spanish sailors and Tamal hunter-gatherers, and especially the indigenous population's salvage of the shipwreck, left a rich archaeological record of early cross-cultural encounters in California, including a considerable quantity of introduced European and Asian material culture from the wreck reused by Tamal villagers. This month-long interaction between the *San Agustín*'s crew and the Tamal not only represents one of the earliest documented contacts between Europeans and indigenous peoples on the northern California coast, but the last recorded contact for more than 175 years until Spanish colonialism reached the region in the late-eighteenth century. The material remnants of this fascinating interlude of California history lie buried both beneath the landscape of modern-day Point Reyes National Seashore in the remains of coastal village sites and middens, as well as submerged beneath the waters offshore in the remnants of the shipwreck itself. While this study focuses on the terrestrial aspects, I recognize that both sources of data are equally significant components of the overall story, each of which is necessary to paint a complete picture of the events that transpired on the beaches of *tamál-húye* in 1595.

PREVIOUS RESEARCH

The *San Agustín* shipwreck has never been located. Current archaeological evidence for the shipwreck is indirect, consisting of more than 1,000 blue and white underglaze Chinese export porcelain sherds, earthenware and stoneware fragments, iron spikes, and a handful of other objects such as bitumen, wax, and several small metal objects that may include a compass needle and nails (Von der Porten 1972). These objects were all found among traditional California Indian artifacts in wholly-native contexts in Tamal village and midden sites during excavations from the 1940s-1970s. From 1940-1951, University of California archaeologists excavated seven sites in *tamál-húye* that yielded sixteenth-century material culture from the *San Agustín* (Beardsley 1954a, 1954b; Heizer 1941; Meighan 1950a, 2002; Meighan and Heizer 1952). Their primary interest was to use artifacts from the *San Agustín* as chronometric markers for refining the area's culture history, even though they found that in some cases nearly 20% of artifacts recovered from shell midden sites were European and Asian in origin (Meighan 1950a:29). These researchers either viewed Coast Miwok reuse of the porcelain ceramics in a strictly utilitarian way, assuming typical western uses such as food preparation, serving, and storage, or that they were collected as simple curiosities or "trifles" (Heizer 1941; Treganza and King 1968; Von der Porten 1968). Heizer noted that,

[t]he presence in the Indian village sites of the Chinese export porcelain ware is relatively easy to explain. The wider occurrence of porcelain fragments than of iron spikes may be accounted for on the basis of greater usefulness, attractiveness, and portability of the porcelain vessels. Although no complete porcelain bowls or plates were found, there did occur in more than one instance, in single sites, several fragments of the same vessel. Presumably the whole pottery vessel was brought to the site and, when broken, was discarded and became scattered in the refuse layers. None of the fragments, all of which are irregular and have sharp edges, bears evidence that they were looked upon by the Indians as particularly valuable objects. Had they been so regarded we might expect that an especially colorful piece would have been drilled or notched for attachment to a cord and worn as a decorative pendant, but no evidence of this was found. Nor were any

porcelain vessels found as burial offerings in the graves which were excavated. These blue decorated porcelain bowls and plates seem to have been regarded by the Drake's Bay Indians as utilitarian containers and were discarded with other damaged tools, emptied clamshells, picked birdbones, etc., when they became broken (Heizer 1941:322-323).

From 1951-1973, researchers from San Francisco State College (now University), Santa Rosa Junior College, and the Drake Navigators Guild excavated at least nine additional sites that contained introduced sixteenth-century objects likely from the *San Agustín* (King and Upson 1970; Treganza 1959; Treganza and King 1968; Von der Porten 1968, 1972). These researchers also assumed utilitarian reuse of the objects, although they did note a few porcelain fragments that had been modified into bead blanks and pendants, or flaked as bifacial tools (Treganza 1959; Treganza and King 1968; Von der Porten 1968). Von der Porten noted that Tamal individuals,

...found the sherds of broken bowls neither beautiful, nor suggestive of magic, nor very useful despite the attempts to flake a few for use as crude scrapers. Some Indians must have been struck with the facts that the porcelain was flat and white like clam shells, so several sherds were flaked to a typical disc shape. When the glaze could not be drilled, they were abandoned (Von der Porten 1963:13).

In total, at least 15 sites have been investigated in *tamál-húye* that may include material culture from the *San Agustín* shipwreck. Despite this rich record, however, the original researchers published very little on previous excavations that focused on Tamal cultural practices or that engages with the data from a contemporary, culture contact perspective.

In a more recent evaluation of the sixteenth-century introduced objects found at *tamál-húye*, Lightfoot and Simmons (1998) question the previously-held notion that Tamal people saw the objects as either utilitarian or as simple curiosities. Their alternative interpretation is based on the premise that, as Europeans began expanding into new territories across the globe beginning in the late-fifteenth century, indigenous peoples often interpreted early encounters with Europeans from their own native standpoint or worldview (i.e. Sahlins 1981a, 1985; Salmond 1991, 1997). As a result, under certain circumstances, some indigenous groups may have viewed strangers, and subsequently their material culture, in ritual or ceremonial contexts. For example, some may have looked at the encounters in the context of creating new relationships with powerful outsiders; others, under historically-contingent circumstances, may have associated symbolic or ideological meaning to the foreign encounters, as well as to subsequent incorporation of introduced material culture into their daily practice. Important variables structuring the significance of cross-cultural encounters were the circumstances under which the outsiders were met and how they were perceived. In this light, Lightfoot and Simmons (1998) offer an interpretation for how the Coast Miwok-speaking inhabitants of *tamál-húye* viewed the foreign materials, suggesting a possible ceremonial or ritual use. Based on the context of the Indian's encounter with Sir Francis Drake in 1579, which may have occurred during an important ritual time called the *Kuksu* ceremony, Tamal individuals may have collected porcelain sherds and iron spikes from *San Agustín* after 1595 because they were valued as symbols of the previous encounter, as objects that signified unknown worlds, or as charms imbued with significance because of the context of the Drake encounter 16 years before

(Lightfoot and Simmons 1998:158-161). The Tamal people may also have incorporated the objects into other aspects of their ritual practice, used goods from the ship to create and maintain a unique local identity, or possibly employed them to negotiate new social relations with neighboring groups. Lightfoot and Simmons summarized their view by noting,

It is clear that the study of culture contact in protohistoric California needs to be reconceptualized for those places where early encounters took place....The spatial distribution of European and Asian goods dating to the sixteenth and seventeenth centuries and their association with other archaeological remains should become significant areas of research. It is only through detailed studies of archaeological deposits dating to protohistoric times, compared systematically with earlier prehistoric and later historical sites, that we can begin to critically evaluate the meaning of foreign goods, as well as the broader implications of early encounter and trade...(Lightfoot and Simmons 1998:165).

My project uses multiple lines of evidence, built on an archaeological foundation, to evaluate competing hypotheses that view Tamal perception of introduced objects as either utilitarian vessels or “merely trifles,” or, alternatively as powerful objects imbued with symbolic meaning.

METHODOLOGICAL APPROACH

My research draws a methodological approach from contemporary archaeologies of culture contact and colonialism (e.g. Stein 2002; 2005b). The unique circumstances of the Tamal people’s encounter with Drake in 1579, which may have included a ritual or ceremonial element, and of their salvage of material from the *San Agustín* after a brief set of interactions with the Spanish and Filipino crew following the shipwreck, require a research approach that highlights an indigenous understanding of the events in order to examine both the immediate effects and potential long-term implications. A framework for research that incorporates a unilinear approach such as acculturation or world systems theory would not be appropriate for this project—traditional approaches to culture contact study have often taken a colonialist perspective, which has “perpetuated macroscale analyses of world systems, a focus on core-periphery linkages, and the employment of insular models of culture change” (Lightfoot and Martinez 1995:487). An approach highlighting the colonial perspective results in the false notion of essentialist cultural groups opposing one another across a distinctly defined boundary, and that interaction can be accurately interpreted by archaeologists through a sharp division in material culture. Instead, research approaches for a project such as mine should be built upon a framework that highlights an indigenous worldview. A more nuanced approach such as this can combine both macroscale and microscale perspectives, and may consider episodes of culture contact as dynamic zones of cross-cutting social interaction and active identity construction. Negotiating identities will be archaeologically visible in innovative transformations of material culture adoption and use on both sides of the encounter, and by interpretations that allow for the active use of material culture to create new social identities and foster cultural interactions (Lightfoot and Martinez 1995).

A primary theme linking material culture research and the study of cross-cultural encounters highlights the incorporation or recontextualization of introduced goods into indigenous societies. Denning (1995:23) refers to introduced goods as “cargo,” a term used in Pacific studies to refer to objects from another culture used in wholly new contexts. A cultural biography of objects approach like this explores the manner in which an object’s meaning continually changes as it circulates through different nodes in exchange networks (Appadurai 1986a, 1986b; Kopytoff 1986; Turgeon 1997, 2004). This perspective approaches how cargo is recontextualized by different societies without assuming indigenous peoples incorporated those objects into their daily lives because of an inherent technological superiority in European goods, an assumption often made by early researchers.

Recontextualization of introduced objects is often approached in terms of how “cargo” is incorporated into indigenous societies, and many researchers have demonstrated that foreign material culture can be incorporated by indigenous population seamlessly into traditional contexts. While this recontextualization may significantly change the object’s meaning, it may do so without attendant culture change (e.g. Burley 1989; Kirch 1992; Marshall and Maas 1997; Thomas 1991, 1997a; Upton 1996; Wagner 1998). In these cases, items may be seamlessly incorporated into existing cultural structures, replacing or supplementing traditional objects, but without altering associated practices. In other circumstances, however, native groups can sometimes incorporate foreign material objects in new ways that lead to altered cultural practices (e.g. Hamell 1987; Trigger 1991). Finally, there is a nuanced intermediate position that suggests that indigenous groups repurposed introduced goods in ways consistent with their own cosmology or worldview, but that such recontextualization led to structured change within the boundaries of cultural continuity (e.g. Burley, et al. 1992; Cabak and Loring 2000; Thomas 2002a). These interpretations are often influenced by a practice-based view that suggests cultures are never static, that they are constantly being re-constituted and re-ordered by daily practice. Thomas, for example, cautions that pre-contact indigenous societies were dynamic and constantly in flux, and argues against “postulat[ing] a pristine and stable pre-contact situation that never existed” (Thomas 2002b:35).

Some researchers (e.g. Burley 1989; Marshall and Maas 1997) have found that when native people incorporated material culture introduced during cross-cultural encounters, ceremonial contexts may have been more open to culture change than everyday practice. One of my primary research avenues to address long-term culture change, therefore, is to focus on possible ceremonial or ritual use of introduced material culture salvaged from the *San Agustín*. As discussed above, early interpretations of why Coast Miwok-speaking individuals collected goods from the shipwreck assumed simple utilitarian reuse (Heizer 1941; Meighan and Heizer 1952; Von der Porten 1968). In contrast, Lightfoot and Simmons (1998) offer a more nuanced interpretation of Tamal reuse of material from the *San Agustín*. They suggest that because of the possible ceremonial context that structured the Tamal people’s first encounter with Europeans, they “...probably collected porcelain sherds and iron spikes because they were valued as symbolic referents of previous encounters and as materials that signified unknown worlds. The primary purpose was not to modify them into tools or ornaments per se; rather, they were probably regarded as similar to charms...” (Lightfoot and Simmons 1998:160). To test these ideas, I compare different ways that Tamal villagers may have incorporated introduced material culture into their cultural practices, and I consider the archaeological implications of each. Ultimately, the question is whether archaeological data, combined with historical, oral, and

ethnographic information, is fine-grained enough to allow reasonable interpretations for cultural recontextualization of objects salvaged from *San Agustín*.

Salvaged Materials as Utilitarian Items

One way that Tamal individuals may have used introduced artifacts is for pragmatic or utilitarian purposes. New objects such as ceramic vessels may have been incorporated into existing cultural practices in pragmatic ways that resulted in no significant change to their daily lives. For example, as suggested by Heizer (1941), the Tamal may have used porcelain plates and bowls, and other ceramic vessels, from the shipwreck as food preparation, serving, and storage containers, which they discarded as they broke. According to this idea, Tamal people would have used ceramic vessels as an equivalent to baskets and food platters that were simply made from a new, previously unknown material. There are several archaeological findings that would support this premise. If ceramic vessels were prized for their storage or food preparation value, for example, then Tamal people would likely only have salvaged whole ceramic vessels for reuse. As these vessels broke and were discarded this would result in multiple fragments of each ceramic vessel present at each archaeological site. In addition, particular vessel forms may have been selected more frequently than others, and it may be possible to use ceramic counts to compare percentages of vessel forms at each site to determine if there was a preference for particular forms. A preference for selecting hollowware versus flatware vessels, for example, may indicate utilitarian incorporation of porcelain ceramics into existing foodways that favored stews, porridges, and gruels (Cabak and Loring 2000; Farnsworth 1996; Voss 2008). As a control, percentages of vessel forms from each site can be compared to the percentages of available vessel forms on the shipwreck. Available percentages can be reconstructed from a collection of more than 420 beach-collected porcelain sherds that continue to wash ashore seasonally, presumably from the offshore shipwreck site itself. This beach-collected assemblage of porcelain represents a random sample of vessels available on the shipwreck, which can be compared to culturally-selected vessel forms carried to Tamal village sites and recovered during archaeological excavations.

In addition to use of ceramic vessels as food preparation, serving, or storage containers, Tamal peoples may have used porcelain and other ceramic fragments as raw material for utilitarian objects such as bifacial tools and projectile points. If this is true, villagers may have collected broken ceramics from the ship or beach, and a significant percentage of individual (or non-mendable) sherds may be present at each archaeological site, but spatial patterning should indicate association with stone tool workshops or other raw materials, such as obsidian, and they should be found in various states production. In addition, if porcelain fragments were used as an equivalent to lithic material for flaked stone tools, then a careful examination of the ceramic assemblage should reveal evidence of modification and functional reuse. While Heizer (1941:322-323) notes that early excavations did not reveal any culturally-modified sixteenth-century ceramics, later excavations by Meighan, Treganza, and Von der Porten did uncover limited evidence of modification (King and Upson 1970; Meighan 1950b; Treganza and King 1968; Von der Porten 1968). A more detailed analysis of the material is warranted. If transformed into culturally-appropriate trade items, porcelain artifacts may have been traded within established exchange networks to surrounding areas, and may also be found in regional and pan-regional contexts.

In addition to porcelain fragments, iron spikes from the *San Agustín* shipwreck are the second most abundant introduced objects recovered from archaeological sites at *tamál-húye*. The Tamal may have used iron spikes as tools, for example as an equivalent to antler or bone wedges or pressure flakers. If this was the case, then the archaeological record might show iron spikes clustering spatially with indigenously-manufactured worked bone or antler tools. In addition, there might be evidence of use-wear on the spikes that would indicate utilitarian use. Alternatively, Tamal villagers may not have used iron spikes found in archaeological sites directly—rather, the spikes may have been secondarily-deposited in midden-areas as the villagers used timbers from the shipwreck for fuel or for building shelters. If that were the case, then un-used iron spikes might be discarded in midden areas, along with broken ceramic vessels and other secondary refuse of daily life in the village, or they might be found associated with household architectural features (Meighan 1950b).

If foreign material culture is found beyond the local Drakes Bay area in modified forms or found within sites in *tamál-húye* in utilitarian contexts as described above, then we may be able to infer that the material was used in a pragmatic way by the Tamal groups who salvaged the material. In any of these cases, objects can be considered to have been incorporated into existing indigenous structures without significant cultural transformations taking place. This is what Turner (1974) describes as “change within tradition.”

Introduced Objects in Ceremonial Contexts

A different premise advocated by Lightfoot and Simmons (1998) suggests that Tamal villagers in *tamál-húye* primarily viewed objects from the *San Agustín*, in particular Chinese porcelain, as ceremonial or ritual items. This idea suggests that foreign objects may have been incorporated into Tamal cultural practices in ways consistent with their cosmology and worldviews. In this role, the ceramics may have served as indexes, or “aniconic representations,” of other worlds or deceased ancestors (Gell 1998:26); or as “historical mnemonics,” objects that served as repositories of social memory or specific events, especially for elite or restricted social groups (Joyce 2003:117). Likewise, Weiner’s (1992) concept of “inalienable possessions,” objects imbued with ceremonial or ritual meaning that are considered to be repositories of knowledge and do not circulate in exchange networks, is also germane here (see Mills 2004). Inalienable objects can take many forms—they may be rare objects or singularities, or they may be mundane or natural objects—and they are most often used in ceremonies of authentication and commemoration, and are used to confer ritual authority on individuals or collectives (Mills 2004). These notions suggest that sixteenth-century European and Asian objects may have served as material memories of when outsiders arrived to participate in the Kuksu or other Tamal ceremonial activities (Silliman 2009). Introduced objects may have had inherent meaning by themselves, which might have led Tamal individuals to collect and distribute even broken ceramic fragments from the shipwreck or the beach. Although not as easily tested archaeologically, this model may be reflected in the presence of ceramic sherds from many different vessels at each site, indicating there was no preference for intact versus broken vessels. In addition, sherds from the same vessels found may be found at different sites, indicating some level of exchange of the sherds themselves. There may also be more extensive evidence for sharing or exchange of individual, unmodified ceramic fragments, both locally and regionally. Jones notes, for example, “...the fragmentation of objects, the accumulation of sets of objects and the recomposition of fragmented objects are critical to the creation of social

relations, since the act of breaking and sharing material culture establishes affiliation between people” (Jones 2001:101). Although previous researchers noted the lack of introduced artifacts in burials (Heizer 1941:322-323), these objects may be found in other spatially-segregated places within sites that were associated with sacred activities or spaces, or they may be spatially associated with other “symbolic” objects associated with ceremonial or cosmological practice, such as charmstones, or distinctive manuports, such as crystals, shark teeth, and fossilized whalebone fragments. In addition, if porcelain fragments were valued for their symbolic association, then decorative elements may have played an important role in selecting individual fragments. Design motifs on the ceramics can be carefully recorded, critically examined, and frequency patterns identified and compared to ethnographic literature and oral traditions to determine if selection of particular objects was dictated by cultural values (Wilkie 2000; Wilkie and Farnsworth 1999, 2005).

Another associated premise is that introduced material culture may have been used as raw materials for objects such beads and pendants that had symbolic value. In this case, the Tamal may have collected broken ceramics from the ship or beach, and many individual, non-mendable sherds may be present, but they may be found in various states of production and use in specific contexts—spatially, these worked objects may be primarily incorporated into workshop areas used for producing clam disc beads or abalone shell ornaments. If transformed into trade items such as beads or pendants, porcelain artifacts may also have been traded within established exchange networks to surrounding areas, and may be found in regional contexts outside *tamál-húye*. Isolated sixteenth-century porcelain finds have been reported in at least two sites outside Point Reyes, and these are examined for context and evidence of modification.

Polysemic Nature of Material Culture

As these ideas suggest, it may be difficult to differentiate between “utilitarian” and “symbolic” objects, and these categories are not mutually exclusive. From an indigenous perspective, objects rarely possess a single meaning, but often had complex, nuanced meanings that could be at once pragmatic and ritual, or pragmatic in certain circumstances and ritual in others (Thomas 1991). In an indigenous worldview, introduced objects such as ceramics and iron may have been regarded as status items representing social connections to European outsiders, in addition to their practical value. Some items that could be incorporated into previously-held categories of high-value or symbolic indigenous objects may have been recontextualized into those roles. Items without previous context, but with perceived pragmatic value, such as porcelain sherds or iron spikes, may have been desired for their utilitarian value, but may also have held myriad culturally-constructed meanings beyond simple pragmatism. Ethnographic and ethnohistoric evidence suggests that Coast Miwok-speaking California Indians shared a common cultural belief in the polysemic nature of material culture (Collier and Thalman 1996; Kelly 1978a). Everyday objects held a variety of meanings, pragmatic and ceremonial, secular and sacred. Objects signified social relations between individuals, as well as between people and the spiritual world. This aspect of Tamal cultural tradition must be understood and considered in any interpretation of how introduced material culture from European voyagers was incorporated into indigenous daily practice. Incorporating foreign material culture, therefore, likely occurred in complex ways. It may also have varied considerably across class, gender, and age lines. Undoubtedly, not all Tamal individuals perceived European outsiders or their material culture in the same ways, and this project attempts to account for these differences.

Long-Term Implications: Culture Change and/or Continuity?

While my project's primary research question is how the Tamal may have recycled goods from *San Agustín* and integrated them into their cultural practices, a secondary question is whether long-term culture change resulted. Research examines the role of introduced material objects during culture change in the context of intercultural engagements. One notion suggests that introduced material culture, when used in traditional contexts, is not responsible for culture change by itself, but only when associated with European colonial structures. Introduced material culture may be reconceptualized and used in traditional contexts, but this does not constitute long-term structural transformation—this is instead what Turner (1974) refers to as “change within tradition” (see also Clarke 2000:161-163). On the other hand, introduced material culture may be incorporated into traditional contexts in the absence of European colonial structures and transformation may result as a consequence of objects being used in new and different ways (see Turner 1974). This might happen if there is incorporation of introduced material culture into ritual or ceremonial contexts (e.g., Burley 1989; Marshall and Maas 1997), if there is differential access to foreign material culture or use in feasting or prestige displays that leads to socioeconomic inequality (e.g., Armit and Finlayson 1995; Hayden 1995), or other alternative scenarios. For example, the encounters or the introduced material culture may have contributed to changes in settlement patterns, social relations and exchange networks, organization and use of space, ceremonial and mortuary practice, or material culture. Was there a transformation in local settlement patterns or regional exchange networks? Did local inhabitants use the objects to create a unique local identity, or employ them to negotiate new social relations with neighboring groups? Were introduced objects integrated into new forms of ritual practice? The overall question is, then, did Tamal cultural practices change as a result of the contacts with Drake and Cermeño in the late-sixteenth century, and with the use of introduced objects from *San Agustín* that followed? A GIS analysis examining intra-site patterning will allow an evaluation of whether major changes in layout of space or organization of sites took place following the sixteenth-century encounters.

Beardsley (1947; 1954a; 1954b) previously addressed questions about the intensity of culture change to overall Coast Miwok cultural practices as a result of the earliest European encounters. He examined historical records that described aspects of daily life in the Drakes Bay/Tomales Bay region from the sixteenth century until the period of extended contact began in the early-nineteenth century, and he summarized details about a number of generalized Coast Miwok cultural characteristics. His research, while innovative at the time, nonetheless suffers from an early-twentieth century bias typical of Kroeberian anthropology that assumed a static, unchanging past (Lightfoot and Parrish 2009 73-77). Beardsley wrote,

Correspondences between ethnographic data from the Coast Miwok and the earliest historical accounts are so close in those items for which comparison is possible as to justify the conclusion that cultural groups did not shift in the intervening two hundred years. As is shown in the following pages, this conclusion is borne out by archeological evidence (Beardsley 1954a:19).

While this may be true from a broadly-based reading of the historical record, it is unclear how much archaeological data was able to address the question—this was not one of Beardsley's primary avenues of research. Furthermore, change at some level did occur to the Tamal

inhabitants of *tamál-húye*, because they collected foreign material culture and brought it back to their village sites for some purpose. The question is, does incorporation of introduced material culture into traditional indigenous cultural practices constitute culture change? Or is this continuity? Or is it even possible to tell the difference given the limitations of available data? In this regard, this study is partially an exploration of available data to determine if archaeological remains, oral traditions, and historical records can provide insight into issues of culture change and/or continuity. Are the data fine-grained enough to address diachronic questions about culture change and continuity during the 175 year interval between the sixteenth-century encounters and the advent of Spanish colonialism? Or are the data, particularly those relating to chronology, too coarse to address such questions?

Silliman (2009) offers a cautionary note regarding this line of inquiry. He suggests that researchers should not automatically assume that cross-cultural encounters resulted in either change *or* continuity as two mutually exclusive outcomes. Silliman writes,

[F]or social agents, communities, or households to move forward, they must change *and* remain the same. But to have moved forward means to have carried on. Therefore, the incorporation of so-called ‘European/Euro-American’ objects into Indigenous cultural practices in ways that insure their survival as individuals, families, and communities should not lead us to interpret them in terms of loss or passive acquiescence (Silliman 2009:226).

This is an important point. Even though my study attempts to examine the long-term implications of the intercultural interaction and recontextualization of introduced material culture by looking for change in cultural practices triggered by or associated with the introduced objects, I am not asking these questions within a research framework that portrays indigenous populations as passive recipients of new technologies and imposed cultural transformation (Harrison and Williamson 2004). Rather, since the event under study is a short-term encounter rather than a long-term colonial entanglement, I would suggest that any change to Tamal cultural practices occurred within the structure and logic of their own worldview and cosmology, and was due to active negotiation by native populations using the sixteenth-century cross-cultural encounters and the material culture introduced as a result, as a starting point. My analysis specifically focuses on the introduced material culture from each site, especially the porcelain fragments, within the broader context of Coast Miwok material culture. Using excavation records to plot artifact distributions and evaluate context and spatial associations of both introduced and indigenous materials, I generate interpretations about the relationships between artifacts and particular activities, and about how objects were used in daily cultural practices. The artifact’s spatial patterning, reconstructed from original excavation data, may reveal if introduced artifacts were associated with specific activities or classes of indigenous artifacts that reflect particular practices. Depending on the context, patterns of activity may represent new forms of cultural practice.

RESEARCH STRATEGIES

To address my research questions and evaluate the ways in which the Tamal people incorporated introduced material culture from the *San Agustín* shipwreck in the context of the different ideas discussed above, as well as to examine the long-term implications of the short-

term encounter at *tamál-húye*, my project uses an historical anthropology approach. Historical anthropology uses multiple lines of evidence and a holistic framework to understand past interactions from multiple perspectives (Lightfoot 2003, 2005a, 2005b; Lightfoot, et al. 1998; Lightfoot, et al. 1993). Making use of multiple data sources to address problems in the past, historical anthropology is a potent tool for investigating a range of issues central to contemporary anthropology. As Lightfoot notes, “[a]rchaeology, archival documents, ethnographic observations, and native narratives together comprise the holistic study of historical anthropology, the most powerful approach for investigating the past, outside of a time machine” (Lightfoot 2005a:15). By incorporating data from archaeological, historical, oral, and ethnographic sources into a cohesive whole that allows an unbiased view of the past, this approach allows sixteenth-century interactions between Europeans and the Tamal to be interpreted in the widest possible context. Using a historical anthropological approach, synthesizing archaeological data from studies conducted at Point Reyes from 1940s–1970s, as well as using historical and ethnographic accounts along with native oral traditions, my research examines how the Tamal population incorporated introduced material from the *San Agustín* shipwreck into their cultural practices.

An important aspect of my study was to conduct a detailed analysis of the sixteenth-century encounters at *tamál-húye* based on both the available historical accounts written by European voyagers, and native oral traditions from an indigenous perspective. Each of these data sources has inherent biases, but it is important to examine as completely as possible the background and worldview of English and Spanish voyagers, as well as the Coast Miwok-speaking inhabitants of the Point Reyes Peninsula, in an attempt to understand the possible perceptions of each as they approached the encounter. Lightfoot and Simmons (1998) contend that this background may have structured Tamal salvage and reuse of material culture from the *San Agustín* shipwreck.

While I utilize multiple lines of evidence to address my primary research questions, archaeological analysis provides the foundation for my study. I conduct a detailed archaeological study using archived data and museum collections from previous excavations on the Point Reyes Peninsula. In this way, my project demonstrates the continuing research value of “old” archaeological collections and their ability to answer contemporary anthropological questions (see also, for example, Luby, et al. 2006; Rick 2007). Even though extensive archaeological research was conducted in *tamál-húye* beginning in the early twentieth century, and much of it was focused on locating evidence for sixteenth-century European visits, there has been little synthesis of these data to address current issues in the archaeology of intercultural engagements (c.f. Lightfoot and Simmons 1998).

My project utilizes existing museum collections and archival field data from previous archaeological excavations, some nearly 70 years old, as its primary data source. My research focuses on archaeological data from 15 contact-era indigenous archaeological sites around *tamál-húye* that may have produced introduced material culture from the sixteenth century, which researchers investigated from the early-1940s to the early-1970s. The archaeological data include published reports, existing museum collections, and original field notes and excavation records. Original field data and artifact assemblages are curated at the Phoebe A. Hearst Museum of Anthropology at the University of California, Berkeley and at Point Reyes National Seashore. I use these collections and the accompanying data to reconstruct the previous excavations and re-analyze the data to address my research questions. No additional excavations were conducted; however, I did conduct new chronometric studies of museum material to refine

site chronologies, and surface mapping of the previously-excavated sites to place them in a contemporary context.

This dissertation can be broadly considered a work of historical archaeology, while at the same time it is an archaeological history. I trace the history of research at each of the sites, carefully piece together the available materials, evaluate recovery methods and provenience systems, and finally use the data to recreate the excavations in a GIS framework. Although researchers recovered material likely from the *San Agustín* from as many as 15 contact-era Tamal sites at *tamál-húye*, the extent of excavation and the amount of introduced sixteenth-century material culture varied considerably from site to site. Of the 15 sites, six were extensively excavated, four were partially excavated, and five had only limited testing. The number of introduced objects recovered from these sites varied from a minimum of a single porcelain fragment to a maximum of more than 300 ceramic sherds and other objects. After examining original excavation records, field notes, logs, drawings and reports from each site, and evaluating recovery techniques to recognize possible biases in the artifact assemblages, I found that only six of the 15 sites had sufficient data available to both accurately reconstruct the excavations in a GIS framework and to address my research questions. The sites I include in my detailed analysis include four sites investigated by University of California, Berkeley archaeologists from 1940 to 1951 (CA-MRN-232, CA-MRN-242, CA-MRN-271, and CA-MRN-307), and two sites excavated by researchers from San Francisco State University, Santa Rosa Junior College, and the Drake Navigators Guild from 1958 to 1973 (CA-MRN-216 and CA-MRN-298). Nonetheless, I include a detailed analysis of introduced sixteenth-century objects from all 15 sites in my investigation.

My archaeological analysis follows two primary lines of inquiry. First, I reconstruct the excavation from six primary sites at *tamál-húye* within a GIS framework, and I conduct exploratory spatial data analysis (ESDA) to look for intra-site patterning. In particular, I evaluate whether introduced objects are clustered in statistically-significant ways with other artifact-types representing specific cultural practices. I also evaluate whether the layout and use of space within sites changed after introduction of the sixteenth-century material culture. Second, I conduct a detailed analysis of introduced objects from all 15 sites that have yielded material from the *San Agustín* to look for clues as to how Tamal individuals incorporated them into their cultural practices. I discuss each of these in more detail below.

While GIS has been a powerful tool for evaluating regional-level archaeological inquiry for many years, using GIS for intra-site analysis has not developed at the same pace. Increasingly, however, archaeologists recognize the explanatory value that such studies can bring to archaeological interpretation (D'Andrea, et al. 2002; Katsianis, et al. 2008; McCoy and Ladefoged 2009; Nigro, et al. 2003; Spikins, et al. 2002). True three-dimensional analyses, however, remain a challenge (Abdul-Rahman and Pilouk 2008; Batty 2005; Maguire, et al. 2005). Using detailed excavation records and field notes, I reconstructed as completely as possible previous excavations within a GIS framework. Plotting artifacts from each site in GIS allows me to analyze statistically spatial patterns and relationships between various artifact classes using ESDA, a method that combines graphic and statistics functions within a GIS framework to search for general trends (McCoy and Ladefoged 2009:265). Statistical packages included within the GIS software (ArcGIS 9.3) allow me to examine and compare variables such as artifact density and arithmetic mean center, and to conduct nearest neighbor analysis. My analysis focuses on evaluating the context and spatial associations of the full artifact assemblage from each site, including both introduced and indigenous materials, to generate interpretations

about how artifacts may have been associated with particular activities and how they were used in daily cultural practices. The artifact's spatial patterning, reconstructed from original excavation records, may reveal if introduced artifacts were associated with specific activities or classes of indigenous artifacts that reflect particular practices. Because several sites had limited excavation, each intra-site assemblage is statistically evaluated for significance.

An important consideration during my GIS analysis was to compare *practices* represented by artifacts, as much as possible, rather than simply comparing *artifact types*. Silliman (2009) has recently pointed out that categorizing artifacts as simply "European" or "indigenous" can be problematic when evaluating cross-cultural encounters, and that highlighting cultural practices, rather than artifact-types, can result in more nuanced interpretations (see also Loren 2000, 2001). He notes that a focus on practice, not objects, is particularly important for understanding not only the meaning or value put on objects, but for whom the objects were meaningful or valued. Similarly, as a complement to more sophisticated artifact-based studies of culture contact, continuity, and change (e.g., Deagan 1983, 1995; Farnsworth 1992; Hoover 1992:41-42), Lightfoot et al. (1998:200-203) proposed a "contextual" approach that situates artifacts physically within the built environment and conceptually within the notion of daily practice (Bourdieu 1977). Rather than using universal acculturation models, the researchers situated material culture within specific cultural contexts, the larger spatial organization of the site, while the site was nested within larger regional and pan-regional contexts. Lightfoot et al. (1998:205) focus on aspects of cultural practice that result in a material assemblage, including organization of residential space, trash disposal, choice and preparation of food, domestic material culture, and settlement layout. By examining each of these along a comparative baseline, they make the case that social identity in pluralistic communities is comprised of a combination of worldviews from the individual ethnicities represented, each referenced in different ways and at different scales. Comparable culture contact studies have been undertaken by Crowell (1997), Martinez (1997), and Silliman (2004).

In addition to a GIS study focused on six sites from *tamál-húye*, I also conduct detailed examination of introduced sixteenth-century objects from all 15 sites on the Point Reyes Peninsula to look for signs of indigenous recontextualization. The majority of introduced objects from *San Agustín* recovered from Tamal sites are fragments of Chinese blue-and-white export porcelain. There are also a large number of iron spikes, a smaller quantity of stoneware and earthenware ceramic fragments, and a few other artifacts that may also be attributed to the sixteenth-century encounters. I analyze the ceramic assemblages by recording basic metric data for each sherd; verifying origin, date, and ceramic type represented by each sherd by visually examining paste, glaze, and decoration to separate sixteenth-century ceramics from later, historic-period ceramics; and entered all information into a Filemaker Pro relational database.

Based on the ceramic assemblage's descriptive data, I identify ceramic vessel forms from individual and mended sherd characteristics by comparing to published sixteenth-century assemblages of Asian ceramics from Spanish contexts. In addition, through a detailed examination of the ceramic fragments, I identify minimum number of vessels (MNV) represented at each site, which gives an estimate of the total number of ceramic vessels from *San Agustín*'s cargo that are present. This in turn can be used to estimate the percentage of cargo represented by the archaeological assemblage. I also use MNVs to compare percentages of vessel forms from within each site and among all 15 sites to determine if Tamal villagers selected particular vessel forms more frequently than others. I compare these results to the percentages of vessel forms available for salvage from the shipwreck. Available ceramic types may be reconstructed by

examining the more than 420 beach-collected porcelain fragments in the Point Reyes National Seashore Museum, which are presumed to be from *San Agustín* and have washed ashore due to natural processes—this may be considered a random sample of porcelain vessels found on *San Agustín*. In addition to vessel form, I also critically examine design motifs and compare their frequency within each site and between the 15 sites to identify potential patterns. Percentages of different designs present in the collections can once again be compared to the beach-collected porcelain assemblage, which acts as a control, to determine if Tamal individuals selected certain designs more frequently than others. I also compare designs to ethnographic literature and oral traditions to determine if salvage and selection of particular objects was dictated by cultural values (Wilkie 2000).

After collecting basic information and descriptive statistics about the introduced artifact assemblage, I address the question of Tamal reuse and reconceptualization of the artifacts through detailed examination of each artifact. I carefully examine all objects for evidence of Californian Indian reuse, including modification into traditional artifact classes such as bifaces, beads, and pendants. Understanding the variability in artifact modification is a critical component of addressing my primary research questions pertaining to utilitarian versus non-utilitarian artifact use.

Finally, to address the issue of culture change or continuity, I critically evaluate the archaeological data, particularly the chronological controls, to determine if it is possible to isolate post-contact sixteenth-century deposits from pre-colonial eighteenth century deposits. I assess the possibility of examining diachronic change in specific cultural practices, as well as the layout and use of space. While it is clear that major social transformation likely took place among the Tamal after Spanish colonists arrived in northern California in 1769, and certainly by 1800 when much of the population of Marin County began to move into Spanish missions (Milliken 1995:176), it is unclear to what degree significant culture change occurred in the nearly 200 year interval after the sixteenth-century encounters and the advent of Spanish colonialism. In order to evaluate potential change during that period requires tight chronological control to isolate material signatures from each time period. My research examines whether this fine-grained data exists in the archaeological record at *tamál-húye*.

ORGANIZATION OF THE DISSERTATION

After this introductory chapter, Chapter Two situates the overall research project within a theoretical framework of an event-based approach. I review Sahlins's event-oriented anthropology and an approach based on the archaeology of the event, which highlights the work of *Annales* scholars. I then propose an event-oriented archaeology based on the work of Sahlins, Sewell, and others.

In Chapter Three, I conduct a detailed analysis of the sixteenth-century encounters at *tamál-húye* based on available historical documents, native oral traditions, and ethnographic observations. I examine the background and worldview of English and Spanish voyagers, as well as the Coast Miwok-speaking inhabitants of the Point Reyes Peninsula, in an attempt to understand the possible perceptions of each as they approached the encounter. I then examine how those perceptions may have structured salvage and reuse of material culture from the *San Agustín* shipwreck.

The next five chapters are a detailed investigation of previous archaeological excavations on the Point Reyes Peninsula that yielded material from the *San Agustín*. In Chapter Four, I summarize previous archaeological work on the six contact-era sites on which I focus my analysis. My summary highlights the long history of archaeological field work in what is now Point Reyes National Seashore, most of which was conducted to find evidence of the sixteenth-century European voyagers. Chapter Five is a detailed analysis of the archaeological assemblages from each site. I examine the full range of archaeological materials recovered from each site, which sets the stage for my GIS excavation reconstruction and intra-site pattern analysis. Chapter Six is an evaluation of excavation methodology and recovery techniques for each of the excavations that contributed to the museum collections I analyze. This information is critical for accurately reconstructing the excavations in a GIS framework, as well as for understanding the limitations imposed by methods employed by previous researchers. Reconstructing the old excavations within a GIS framework and a detailed exploratory spatial data analysis is the subject of Chapter Seven, while a focused analysis of introduced sixteenth-century artifacts from the sites is undertaken in Chapter Eight. Finally, in Chapter Nine, the conclusion, I evaluate my original research questions with regard to the archaeological analysis in the previous chapters.

CONCLUSION

My project includes the contemporary Coast Miwok community in research design development, and ensuring results are returned to the tribe in the form of publications and presentations, as well as education and outreach opportunities. There is growing awareness within the field of archaeology that working with descendent communities in all stages of research is not only important for cultivating good relationships, but also for adding to the complexity and scope of both the research questions we ask and the interpretations we make from our data. I have consulted with Coast Miwok tribal members from the Federated Indians of Graton Rancheria from the earliest stages of research to ensure that the project incorporates perspectives relevant to indigenous concerns and contributes to tribal education and outreach programs.

By addressing my primary research questions about how Tamal people incorporated introduced material culture into their cultural practices, and whether it resulted in significant social change, this dissertation contributes to understanding how native populations adopted introduced material culture in cross-cultural encounters, and further, examines broader issues of culture change and continuity during intercultural interactions. The research contributes to contemporary culture contact studies by investigating a distinctive intercultural engagement from a unique perspective, examining how Coast Miwok-speaking hunter-gatherers incorporated introduced material culture from a shipwreck into their cultural practices more than 175 years before the advent of long-term colonial contact, to address potential long-term implications of a short-term event. Importantly, because of the unique nature of the case study—direct interaction with the shipwrecked crew limited to a short-term encounter followed by complete absence of contact with Europeans for several generations, it is possible to say that the motivation for Tamal villagers to recontextualize foreign material culture and incorporate it into their daily lives was entirely indigenous. There was no acculturation pressure from a colonizing presence. In this way, the project is situated under the broader rubric of culture contact studies (e.g. Crowell 1997;

Lightfoot, et al. 1998), and it contributes a unique perspective to our understanding of early intercultural encounters between indigenous populations and Europeans in northern California.

Finally, because of the central role that a shipwreck played in the case under study here, maritime archaeology can bring a unique perspective to the study cross-cultural encounters (Dellino-Musgrave 2006). Shipwrecks can be touchstones to specific moments of cross-cultural engagement and can help us understand how these interactions unfolded. They can contribute a unique perspective to understanding early intercultural engagements, particularly in the context of early maritime encounters like those in the late-sixteenth century at *tamál-húye*. Shipwrecks can provide distinctive examples of indigenous engagement with the expanding world capitalist system (see Wolf 1982), and can be used to address the synergistic effects of early culture contact by materializing the consequences of coastal hunter-gatherer contact with European voyagers. While I interpret the particular historical contingencies of the encounter at *tamál-húye* as an early example of the intersection of native California with nascent European merchant capitalism, the encounter itself was entirely unintentional. It was the result of a maritime disaster that was not unique and was repeated throughout the history of seafaring. This is one of the processes that maritime archaeology is in a unique position to address: the effects of interaction between indigenous populations and Europeans and their material culture in specific locations before the advent of formal colonial enterprises (see also Gibbs 2003, 2006). This is an example of an encounter in which prior asymmetrical relations between cultural groups did not exist, and it highlights the importance that historical contingency can have in such circumstances (Stein 1998, 2002b, 2005a). In the case of Tamal people's encounter with *San Agustín*, due to the unintentional nature and historical contingencies of the encounter, it was not the Spaniards who drew the California Indians into the nascent world capitalist system, rather it was the Tamal who drew the Spaniards into their world system through retention and reuse of introduced material culture from the shipwreck—it is “more apt to speak of an incorporation of the world system into the local polity than the reverse” (Thomas 1990:64). This case provides an example of how shipwrecks represent unintentional interaction that can significantly alter the dynamics of cross-cultural encounters between native societies and representatives of the expanding world capitalist system.

CHAPTER TWO

AN EVENT-ORIENTED ARCHAEOLOGY

INTRODUCTION

Silliman (2005) recently highlighted the importance of making clear distinctions between archaeologies of culture contact (short-term events) and colonialism (long-term entanglements) (see also Hill 1998). According to Silliman, the term “culture contact” focuses on events, while “colonialism” highlights a process—each is characterized by very different types of interactions, negotiations, and outcomes (Silliman 2005:59-60, 62). While many studies have focused on investigating native responses to European colonial enterprises, and therefore emphasize the importance of long-term cross-cultural entanglements for assessing both culture change and continuity (e.g. Deagan 1983; Deagan 1995; Kirch and Sahlins 1992; Lightfoot 2005a; Lightfoot, et al. 1997; Lightfoot, et al. 1991), my research instead examines the potential long-term implications of short-term events, in this case both a “culture contact” and a shipwreck event, which represent the earliest cross-cultural encounters between northern California Indians and Europeans.

One of the primary theoretical perspectives for my project is based on Marshall Sahlins’ theoretical treatment of the “event” (Sahlins 1981a, 1985, 1991, 2004, 2005), which Biersack (1991a:6) has called an “event-oriented anthropology.” An event-oriented perspective draws on a body of theory developed by Sahlins and other practice-based scholars (e.g. Sewell 2005) that emphasizes the importance of the concept of the “event” in history. In a way similar to Bourdieu’s (1977) theory of practice and Giddens’ (1979) structuration theory, Sahlins’ approach highlights the importance of short-term “events” and places them on equal theoretical footing with the broader concept of “structure” by emphasizing their recursive relationship (Sahlins 1981a, 1985). Certain events are of a different order and can precipitate fundamental culture change, and Sahlins’ theoretical work seeks to understand what makes an event historically significant, and when and under what circumstances it fundamentally transforms cultural practice (Sahlins 1991, 2004, 2005). According to Sahlins, an event’s significance is entirely situated within particular cultural contexts; each situation is unique and must be evaluated independently (Sahlins 1985:xiv, 1991:44-45). What constitutes a historically-significant event can only be understood through detailed analysis of cultural context.

In a more recent work, historian William H. Sewell synthesized and amplified Sahlins’ work on the event (Sewell 2005). Like Sahlins, in Sewell’s view what defines an event and sets it apart from a daily happening or a routine occurrence is its outcome. He notes,

I argue that events should be conceived of as sequences of occurrences that result in transformation of structures. Such sequences begin with a rupture of some kind—that is, a surprising break with routine practice....But most ruptures are neutralized and reabsorbed into the preexisting structures in one way or another....[A]n occurrence only becomes a historical event, in the sense in which I use the term, when it touches off a chain of occurrences that durably transforms previous structures and practices (Sewell 2005:227).

According to Sewell, it is unlikely that structural transformation resulting from events could have been predicted from gradual changes that normally occur through production and reproduction of the cultural order. Instead, substantial social change can be the result of the novel rearticulation of structural elements in the face of unforeseen circumstances (Sewell 2005:228).

Drawing on Sahlins' (1991:43) "anthropological concept of the historical event," as well as Sewell's (2005) theory of the event, my project asks whether the "sequence of occurrences" beginning with the unprecedented encounters with European visitors (Drake and Cermeño), the wreck of the *San Agustín*, and recontextualization of introduced goods from the shipwreck within indigenous cultural practices was an "historical event" for the Coast Miwok-speaking Tamal people of Point Reyes. Did salvage and re-use of foreign material cultural result in measurable changes to their cultural practices, or did it simply provide new goods that did not initiate substantial cultural transformation? In this regard, the project may be considered an "event-oriented archaeology." By examining how the Tamal incorporated introduced objects into their daily practices, I am not examining whether the California Indians succumbed to outside acculturative pressure or adopted new European cultural elements based on their use of objects from *San Agustín* (sensu Silliman 2009). Nor do I suggest that cultural transformation, either gradual or sudden, can only be precipitated by outside events, thus robbing the Tamal of their inherent ability to initiate change. Rather, since the event I am studying is a short-term encounter that included limited direct contact between the Europeans and the Tamal, any culture change or other long-term implications for indigenous society must have taken place within the structure and logic of Tamal worldview and cosmology, and would have been due to active negotiation of the unexpected occurrence by native populations.

In this chapter, I outline a research perspective based on an "event-oriented archaeology." I begin with a brief background about the separation of anthropology and archaeology from history, and how a historical perspective was reintegrated with anthropology. This background is fundamental to my discussion of an event-oriented archaeology. I then discuss previous approaches focused on the "archaeology of the event," which are based on the work of *Annales* historians and that have been outlined by scholars working in maritime archaeology (e.g. Gibbs 2002; Gibbs 2003; Staniforth 1997, 2003a, 2003b). I focus on Staniforth's approach, which highlights when unique events such as shipwrecks represent cultural continuity. Finally, I outline a theoretical perspective using a practice-based "event-oriented archaeology," which instead emphasizes when unique events (whether shipwrecks or short-term cross cultural encounters, e.g. Sahlins 1981a) can represent "turning points" that initiate culture change, and I discuss the implications of this perspective for archaeologies of cross-cultural encounters.

BACKGROUND

During the peak of processualism and the New Archaeology, much archaeological research focused on explaining human behavior and long-term processes of social change and continuity (Trigger 1989). Because many prehistoric archaeological sites accumulated slowly over time, some researchers viewed them as suitable only for answering very broad questions about human environmental adaptation, social complexity, and technological innovation. Newly developed absolute dating techniques allowed New Archaeologists to move beyond a primary focus on regional chronologies and instead viewed material culture in terms of adaptations to help people cope with environmental variability, which could in turn be used to explain the

processes of culture change (e.g. Binford 1962; Binford 1965; Watson, et al. 1971). Archaeological data, in particular, were thought to be well suited to investigating culture change over time. A diachronic approach was one of the main motivations for using archaeology to investigate issues of culture change, rather than relying on sociocultural anthropology to address these questions (Plog 1973). Archaeological research that highlighted individual, short-term events did not contribute to processualist goals to identify broad patterns of human behavior.

There was also an overall separation of archaeology and history under the processualist paradigm, a separation that had roots in mid-twentieth century anthropology. As Denning notes, history and anthropology “have had a love-hate relationship for a hundred years” (Denning 1980:35). Within the discipline of anthropology, predominant theoretical orientations focused on static approaches to evolution and diffusion, and later on functionalist approaches to culture. These approaches denied that the past was relevant to anthropological studies. Prominent early- and mid-twentieth-century anthropologists such as Radcliffe-Brown and Lévi-Strauss created an artificial separation between the disciplines by rejecting historical causality and assuming indigenous peoples existed in an unchanging “ethnographic present” (Denning 1980:42; Thomas 1996:19). Radcliffe-Brown’s functionalist project, which focused on making comparative and lawful statements about social relations, required that one ignore historically-different ways these laws were put into practice, and to focus on the larger comparisons, not the individual expressions. Similarly, Saussure and the French structural anthropologists, such as Lévi-Strauss, thought cultural structures, like language, could only be systemic objects if intruding history was glossed over (Sahlins 1985:143). Lévi-Strauss “drove a wedge between anthropology and history by imagining that primitive cultures...are timeless, outside of history...” (Denning 1980:42). He also denied any significant impact of history or events on structure, his underlying cultural code or grammar.

Within archaeology, some practitioners of the New Archaeology sought to make archaeology a nomothetic science for explaining general processes of culture change (Fritz and Plog 1970; Watson, et al. 1971, 1984), in opposition to what they perceived as particularist history concerned with chronicling unique events (Moreland 1992). They thought investigating specific events fell to historians, and as a result the archaeology of short-term events was under-theorized (c.f. Clarke 1978). Many processual archaeologists also saw a historical approach as a leftover from the culture history method, from which they actively tried to distance themselves (Cobb 1991:169).

By the latter part of the twentieth century, however, efforts were underway to reunite history and anthropology. Anthropologists and archaeologists increasingly realized the need to consider the historical contingencies of cultures under study. Both Bourdieu (1977) and Giddens (1979), whose theories of practice explore how culture is produced and reproduced in the daily activities of individuals, with an emphasis on balancing structure and agency, stress the need to situate cultural practice in a historical context. The ethnographic present, a timeless entity, was finally exposed as a myth, and there was a realization that societies can only be understood by knowing their particular histories; structure and history are both necessary for complete understanding of the past (Hodder 1985; Hodder and Hutson 2003; Thomas 1996).

Several researchers working in the Pacific arena were instrumental in bringing anthropology and history back together, beginning in the 1960s. Sahlins’ structural history, which focused on developing anthropological theory using a variety of historical examples in the Pacific, highlights the intertwining of history and anthropology. As he notes, “[m]y object...is...simply to show some ways that history is organized by structures of significance”

(Sahlins 1981a:8). Thus, history is culturally ordered, and culture is ordered by its history. What anthropologists refer to as structure—the symbolic relations of cultural order—is an historical object. According to Sahlins (1985), this negates the opposition between structure and history.

Similarly, Pacific scholar Greg Denning tries to “open historical analysis in a gentle way to anthropology, and perhaps more radically, treat history as anthropology, as an exploration of otherness and a pursuit that requires ethnography of itself”(Thomas 1997b:34). Denning’s intent was to create an intersection of history and anthropology, and he notes, “I thought the small contribution it made to Pacific anthropology and history was to show that the historian’s concern in recovering the particular out of a myriad of sources was rewarding to the anthropologist, and that the anthropologist’s concern for wider issues changed the historian’s interpretation of the sources”(Denning 1980:5).

Another prominent Pacific scholar who blurs the lines between history and anthropology is Anne Salmond, who characterizes her work as partly an historical study about the impartiality of historical explanation (Salmond 2003). She asserts that tales of European discovery are often shaped by imperial attitudes, which have led to fundamental disciplinary divisions: history studies European explorers, while anthropology focuses on native populations at contact. This artificial divide obscures the fact that the voyages were complex, cross-cultural encounters and impoverishes what we can learn from them. There were intricate perceptions and misunderstandings on both sides of first encounters between Europeans and indigenous groups, shaped by specific worldviews and cosmologies. Salmond suggests that “[t]o attempt to grasp their meaning requires an anthropological imagination as much as the historian’s disciplined control of written words”(Salmond 1991:431).

Recombining anthropological and historical research perspectives have had a major impact on contemporary archaeological research. Beginning in the 1980s, some scholars disenchanted with certain aspects of processualist thought began to inject history back into archaeological research (e.g. Hodder 1985, 1987; Little and Shackel 1989), although it must be noted that many British archaeologists did not follow American processualist disregard for history in the first place (Trigger 1989:316-319). Some archaeologists incorporated ideas from the *Annales* school of historiography (Bintliff 1991a; Knapp 1992b)(see below). In particular, postprocessual archaeologists turned to history as a legitimate model for explaining long-term change, and “Braudel’s...hierarchical and cyclical model of historical process serves as a key heuristic device for understanding the relationship between long-term change and the individual events that lead to the formation of the archaeological record” (Cobb 1991:170). More recently, Pauketat’s practice-based historical processualism attempts to put history back into a processual practice of archaeology (Pauketat 2001b). He notes that in archaeological practice, earlier perspectives viewed history as either background noise to behavior (processualism) or biased narrative (postprocessualism)—Pauketat rejects both. He notes, “[m]y definition of history as the process of tradition building or cultural construction through practice is considerably broader than history as either noise or narrative. History is the practicing and embodying of traditions on a daily basis...One is disposed to do and to be in certain ways because of one’s experiences in social settings. The doing and being is practice, not behavior, because doing and being are contingent on historical context” (Pauketat 2001a:4-5). Further, Cobb (1991:171) suggests “perhaps it is best to retain a sense of pluralism in our borrowing of models to evaluate past behavior,” and he explores how a processual approach might “incorporate notions of the particular or specific events into a discipline that still hopes to make some generalizations about human behavior.”

A series of approaches collectively developed by practitioners of the *Annales* school over several decades during the twentieth century was perhaps the most influential historical perspective applied to archaeological research. Most important for my current project, the *Annales* approach is the basis for an important theoretical perspective focused on the “archaeology of the event” (Staniforth 1997, 2003a, 2003b). In the next section, I outline how the *Annales* approach has been applied in archaeology, and specifically to Staniforth’s “archaeology of the event.”

ANNALES SCHOOL AND THE ARCHAEOLOGY OF THE EVENT

***Annales* and Archaeology**

In a move away from the anti-historicism of processual archaeology, archaeologists began incorporating ideas from the French *Annales* school of historiography in the 1980s. The *Annales* school has its foundation in the 1930s, and was itself a reaction against traditional, event-centered history and a response to positivism prevalent in history and the social sciences at the time. The first generation of *Annalistes* includes Marc Bloch and Lucien Febvre, founders of the movement’s eponymous journal *Annales d'Histoire Economique et Sociale* (“Annals of Economic and Social History”). The hallmark of the *Annales* approach is interdisciplinary, merging archaeology, history, social anthropology, sociology, geography, and psychology in a multi-faceted methodology for studying pre-modern societies. Although *Annales* lacks a single, unifying framework, important themes include a focus on the daily lives of ordinary people, population demography, analysis of class structure, patterns of diet and health, and ideologies and worldview (*mentalités*) (Bintliff 1991b). Their aims included total historical reconstruction (*l’histoire totale*) using a wide variety of source material (Knapp 1992a).

Fernand Braudel represents the second generation of *Annales* scholars, and it is Braudel’s ideas that have been the most influential for archaeologists. Braudel’s most important contribution is his “wavelength” historical framework, characterized by a tripartite scale of history (Braudel 1972:20-21). In Braudel’s model, historical time operates at three levels simultaneously, each linked to the others through a recursive relationship. The longest wavelength of time is the *longue durée*, which is the “history of the long, even of the very long time span...” (Braudel 1980:27). The *longue durée* is the underlying structure that influences and provides context for daily life. It can include slowly changing technologies, persistent cultural features like ideology and worldview (*mentalités*), and the impact of human geography and the physical environment (Bintliff 1991b:7). Braudel also refers to the *longue durée* as geographical time (Braudel 1972:21). Next there is a medium-term wavelength (*moyenne durée*), which operates in “...slow but perceptible rhythms” (Braudel 1972:20). This is Braudel’s (1972:20) social history, or the history of groups, which may encompass generations or centuries and focus on demographic change, economic cycles, and socio-political changes (*conjoncture*, or *l’histoire conjoncturelle*) (Bintliff 1991b:7). Finally, there is a short-term wavelength, individual time, highlighting the history of events (*événements*, or *l’histoire événementielle*). Braudel (1972:21) notes this is closest to traditional history, recording the actions of individual participants and lives.

Braudel’s “wavelength” model of history is the most significant contribution of the *Annales* school to archaeology. Each of the three wavelengths, or durations (*durée*), has a continuous dialectic relationship with the others, and together they shape the human societies

archaeologists study through material remains (Bintliff 1991b). While recognizing multiple levels of time in historical study, Braudel's attention is clearly focused on the *longue durée*, for which he is most well-known in archaeological circles. According to Braudel, the long-term and medium-term durations are mostly imperceptible to individual people, but they act as structures that both constrain and enable human action—because of his focus on structures, this model has been termed “structural history” (*l'histoire structurelle*) (Bintliff 1991b:7).

Braudel's structural history model is particularly amenable to archaeological application, and a number of studies have specifically employed it (Bintliff 1991a; Cobb 1991; Duke 1992; Hodder 1987; Knapp 1992b; Little and Shackel 1989). The notion that time operates on different scales, from the very long to the very short, fits well with an archaeological perspective that investigates long-term processes visible in the archaeological record, as well as short-term events that signal change (Knapp 1992a:2). As Bintliff (1991b:8) notes, “[a]s a theory of how the world works, and how we can reconcile in a single methodology the general and particular, the event and the millennial trend, the individual and the community or society, Braudel's Structural History is a landmark with inexhaustible potential.” Another strength of the *Annales* approach for archaeology is a recognition of the role that material culture plays in human behavior (Fletcher 1992).

Despite methodological advances represented by application of Braudel's ideas, critiques of the approach suggest that after outlining different scales of history, Braudel failed to demonstrate how these scales can be integrated into a coherent whole—he introduces his framework, but did not show how to apply it to real-world research. As Fletcher (1992:39) suggests about the *longue durée*, “[w]e know what is being referred to, but the meaning slips away under careful scrutiny.” In addition, Braudel highlights the geographic and economic aspects of long- and medium-term, at the expense of worldview or *mentalités* (Bintliff 1991b 8-9). Most importantly, archaeologists have argued against the over-determination of Braudel's long-term structures. According to Knapp (1992a:6), “Braudel's major contribution to this dynamic attempt at human science, and a hallmark of *Annales* methodology, is the principle that macrophenomena are determinate and microphenomena indeterminate.” This presents significant problems for contemporary archaeologists who argue that human agency is paramount in any attempt to understand the past. There is a complex interplay of structure and agency as both enabling and constraining that is not sufficiently considered in Braudel's analysis (Knapp 1992a; Moreland 1992). This interchange is taken up in somewhat more detail by third generation *Annalistes*, including Jacques Le Goff and Emmanuel Le Roy Ladurie.

A final concern about Braudel's model is his lack of emphasis on the event. According to Braudel, the *longue durée* is the underlying structure that influences and provides context for individual events—historians cannot begin to understand specific events without contextualizing them within the *longue durée*. Individual events contribute to the long-term historical stream, but analysis of the events is subject to the historian's judgment of what constitutes an important event. Braudel suggests particular events can be considered important if they can help explain “significant details” of larger historical issues; if they have far-reaching consequences; if they were considered important to the event's contemporaries; and, finally, if the event is part of a longer chain of events, when each link is a necessary contributor to the object of study (Braudel 1973:901-902). Nonetheless, Braudel notes that “[r]esounding events are often only momentary outbursts, surface manifestations of these larger movements and explicable only in terms of them” (Braudel 1972:21). Chains of specific events “imply the existence of some global order going beyond them and the need to continue the search for structure and category behind the

event” (Braudel 1973:902). His focus, therefore, remains on long-term structures. Ultimately, Braudel equates the event with traditional, narrative political history (*l’histoire événementielle*) (Knapp 1992a:6), and suggests that event’s “delusive smoke fills the minds of its contemporaries, but it does not last, and its flame can scarcely ever be discerned” (Braudel 1980:27). In this way, Braudel set up a fundamental opposition between structure and event—the event was seen as anti-structural, and structure as nullifying the event (Sahlins 1991:39).

Dismissing the importance of events in historical scholarship led to discontent within *Annales* historiography, as third-generation *Annalistes* recognized the need to consider human action and agency more seriously (Knapp 1992a). The new generation of *Annales* scholars emphasized the importance of events by focusing attention on the daily lives of ordinary people, including such topics as diet and health, ideology, symbolism, and cultural patterns (*mentalité*) (Bintliff 1991b). Le Roy Ladurie emphasized events as points of historical intersection that break patterns and therefore are critical to understanding cultural and historical change (Knapp 1992a:6). He focuses on individual events as transitions between one set of structural conditions and another. Le Roy Ladurie notes, “the event can be a means of innovation, an accidental transition as it were...from one *structure* to another...” (Le Roy Ladurie 1979:130, emphasis original). In his work, he suggests that to highlight these transition-points, the best methodology is to start with a specific structure and work backwards through historical analysis to find the event or circumstance that precipitated it—this is known as a “structure-event-structure” approach (Le Roy Ladurie 1979:115-116).

Archaeology of the Event

Partly as a result of Braudel’s focus on long-term and medium-term history, when archaeologists began to apply *Annales* ideas to their research, they also focused on larger scales of history while minimizing emphasis on specific events. Archaeologists have been slower to focus on specific events, and some have even questioned whether archaeological data can be used to study the faster historical rhythms of the conjuncture or the event (Jones 1991; Smith 1992). A theoretical perspective that highlights the archaeology of the event is rooted in Braudel’s theoretical division of time into wavelengths, but stems more directly from third generation *Annalistes* such as Le Roy Ladurie and Le Goff (Staniforth 2003a:103-104).

Staniforth’s “archaeology of the event” is an archaeological approach that specifically draws on third-generation *Annales* emphasis on the event (Staniforth 1997, 2003a, 2003b). The focus of Staniforth’s analysis is on colonial-period shipwrecks in Australia, which underscores the fact that historical archaeology, with its combination of the archaeological and historical records, is in many cases better suited to an event-based approach than prehistoric archaeology. Staniforth makes the case that while certain types of archaeological evidence may not be suited to investigating an individual event, shipwrecks, resulting from a specific action—the shipwreck event—may be uniquely suited to that role (Staniforth 1997:18). Maritime archaeology, and in particular nautical archaeology (concerned with the details of past ship construction), often focuses on the singularity of shipwrecks as “time capsules,” unique windows into the past. This narrow perspective has led to a critique of maritime archaeology as a particularist project with little relevance to anthropological archaeology (Staniforth 2003a:105). Using an *Annales*-based framework, Staniforth demonstrates that wreck events themselves, however, are tied into larger structural processes. He examines how particular shipwrecks under study are related to broader forces such as capitalism, consumerism, and colonialism (Staniforth 1997:20).

Using a broadly comparative theoretical framework, Staniforth argues that successful British colonization of Australia required expanding trade networks to supply colonists with appropriate consumer goods that allowed them to maintain their familiar British social system and identity. By analyzing material culture found on four shipwrecks transporting such goods to colonial ports, he demonstrates how artifacts carried both embedded and attached meanings for the consumers that allowed them to maintain their place in the world. Using specific artifact classes, including building construction materials, alcohol, tobacco, beverages, and personal hygiene, Staniforth shows how colonists far from their homeland used objects to differentiate themselves from indigenous peoples, reassure themselves of their place in the world, and help establish important networks of social relations (Staniforth 2003b:2-3). Staniforth demonstrates how an *Annales* approach can be applied to maritime archaeology by considering object meaning, and by linking multiple individual shipwreck events to larger structural considerations through the material culture carried on board. He maintains the dialectic between *événements* and *conjuncture* that is the hallmark of *Annales* scholarship, while maintaining British *mentalités* as the primary object of study (Staniforth 2003a, 2003b).

Using individual shipwreck events and the material culture carried on board as representations of broader British attitudes and worldviews, Staniforth essentially demonstrates an effort by colonists to maintain cultural continuity. Goods shipped from around the world on vessels bound for Australia, some of which did not reach their final destination and are therefore available for study today, illustrate the importance of maintaining a sense of familiarity in new environs by surrounding oneself with familiar material objects. Staniforth (2003b:2) notes that “[i]n the colonial context, cultural continuity was one of the critical ways in which people established order in their world.” Recognizable architecture, alcohol, food and beverage helped maintain that order. Staniforth’s “archaeology of the event,” therefore, uses events to show how culture is reproduced and maintained. At heart, it demonstrates cultural continuity. By using events (shipwrecks) to reflect larger structures (British worldview), Staniforth’s approach may have more in common with a Braudelian perspective than the perspective of third generation *Annales* scholars. While Staniforth’s *proximate* object of study is material culture from shipwreck events, his *ultimate* object of study is the structure that produced them.

Delgado (2009) provides another recent example of the archaeology of the event that also links individual events to larger structures, in a way similar to Staniforth. In his study of San Francisco’s waterfront, which developed in a very short period between 1849-1855, Delgado writes that “[t]he *General Harrison* site may be an especially good example of the archaeology of *événements*, but its true value lies in its association with the wider infrastructure of the waterfront, the conjunctures or social processes of the world system in the industrial nineteenth century, and the relationship of these elements to the Pacific’s *longue durée*” (Delgado 2009:28).

A perspective based on an archaeology of the event that links individual shipwreck events to broader processes that produces them has been a productive mode of research, especially in maritime archaeology. An alternative way to view the relationship between structure and events, however, is to suggest that instead of events simply reflecting larger structures, there is a recursive relationship between the two, where events actively create structures and vice versa. On this point, Giddens writes, “structure is both medium and outcome of the reproduction of practices [events]...” (Giddens 1979:5). Structure both enables and constrains events, and events both reproduce and transform structure. A view of events in which they play an active role in cultural transformation is essential to what I term an “event-oriented archaeology.”

EVENT-ORIENTED ARCHAEOLOGY

My use of the term “event-oriented archaeology” is based on Sahlins’ theoretical analysis of the event, which has been referred to as an “event-oriented anthropology” (Biersack 1991b:5-6). I argue that a similar analysis of significant events and their potential impact on culture change can, in certain circumstances, be investigated through an historical anthropology based on archaeology. The late-sixteenth century intercultural engagement between the Tamal people of northern California and European voyagers shipwrecked in the Manila Galleon *San Agustín* may be one of these unique events that give us a window into larger processes of culture change and/or continuity. The key concern here, as I outline in Chapter One, is whether a short-term shipwreck event and resulting introduction of foreign material culture precipitated culture change, or if long-term colonial entanglement was necessary for such change to occur. In this section, I review literature that outlines the dialectic between structure and event, and that highlights a practice-based perspective that views the two in a recursive relationship. I then lay the foundation for what an “event-oriented archaeology” would look like, both theoretically and methodologically.

Structure and Event

Structure

Considering the dialectic between structure and event remains a key theme in historical anthropology, especially with regard to cross-cultural encounters in the Pacific (Barber 1999; Biersack 1990). The concept of structure, however, has had different meanings in different disciplinary contexts. Although I do not consider the concept in detail, it is nonetheless important to be clear about what I mean by the term “structure,” especially when contrasting with the concept of “event” (for a recent reformulation and restatement of a theory of structure, see Sewell 2005:124-151). In this section, I briefly review different formulations of structure from history, anthropology, and sociology in order to explore how “structure” intersects with the “event.”

Fernand Braudel (1972; 1973; 1980), representing the second generation of *Annales* historians, equated structures with the long-term rhythms of history (*la longue durée*). In his estimation, change in these long duration forces is nearly imperceptible, and yet they provide the context for all human action. Long-term structures can include such things as technological adaptations, cultural characteristics such as ideology and worldview (*mentalité*), geography, and the physical environment. Braudel’s conception of structure assumes there is a range of geophysical constructions that confine human action and shape its outcome (Bintliff 1991b; Knapp 1992a). This general outline of structure continues through later generation *Annales* scholars, as well as the new social history of the 1960s and 1970s. According to Sewell (2005:28), for social historians “[s]ocial structures were objective and transpersonal patterns or forces of which actors were at best incompletely aware and that tightly constrained their actions and thoughts. These social structures [include] occupational distributions, business cycles, demographic patterns, inheritance systems, hierarchies of wealth, urban settlement patterns, systems of land tenure, and the like....”

During the twentieth century, two competing but related conceptions of structure dominated anthropological thought. The first was the functionalist notion of structure

represented by anthropologists such as Radcliffe-Brown, Malinowski, Firth, and Evans-Pritchard. Within functionalism (or structural-functionalism), structure was seen as a “fixed pattern” employed as part of the anatomical metaphor comparing society to a living organism, in which interrelated parts of the society work together to create a coherent whole (like an organism). Structure and function were used together in this analysis, with structure representing a particular cultural pattern, and function describing how the pattern operated as a system (Giddens 1979:60).

The second view of structure in anthropology comes from the structuralist movement of the mid- to late-twentieth century. Structuralism drew on semiotics (the study of human production and understanding of symbols and signs) as developed by Ferdinand de Saussure (Preucel 2006). Saussure is widely recognized for his structural linguistic approach and its focus on underlying grammatical codes and rules, and Saussure’s work formed the basis for Claude Lévi-Strauss’s structural anthropology. For Lévi-Strauss, structure was an underlying cultural code, consisting of interconnected elements, that orders the world and determines cultural behavior (Lévi-Strauss 1963). In archaeological research, a structuralist perspective viewed artifacts as communicating meaning in a manner analogous to language, with “systematic and recurrent rules of transformation linking different material and social practices...” (Tilley 2001:259). Saussure’s structuralist approach and its derivatives were criticized on a number of fronts by poststructuralist scholars—common critiques included structuralism’s failure to account for social practice and individual agency, its lack of attention to materiality, lack of verifiability and dismissal of history (Leone and Potter 1988). Hodder (1982) argued that structuralism, like earlier functionalist approaches, left no room for individual agency, as action was thought to be determined by larger cultural structures (see also Giddens 1979).

Contemporary anthropological ideas about structure borrow heavily from sociology, although there remains a fundamental disciplinary discrepancy between how sociologists and anthropologists view structure, especially in relation to the related concept of culture (Sewell 2005:126). Sociologists Pierre Bourdieu and Anthony Giddens were critical of structuralism’s lack of time perspective, and also rejected the notion of a “supra-organic” entity (culture or society) that attempts to maintain itself (Layton 2006:34). Their practice-based conceptions of structure and its relationship to agency and event are critical elements of my event-oriented archaeological perspective (Bourdieu 1977; Giddens 1979). Giddens’ concept of structure was incorporated as part of his theory of structuration. For Giddens, structure is the set of rules and resources that are organized as structuring properties of a social system (Giddens 1979:66). The “duality of structure” is a critical concept for the theory of structuration. Giddens (1979:69) explains that, “[b]y the duality of structure I mean that the structural properties of social systems are both the medium and the outcome of the practices that constitute those systems.” In this way, structure both enables and constrains human action. Structure is not the over-deterministic force that confines individual intention, and as Giddens (1979:69-70) notes, “[s]tructure thus is not to be conceptualised as a barrier to action, but as essentially involved in its production....”

Anthropologist Marshall Sahlins’ theoretical work on the nature of structure, especially compared to events, also informs modern anthropological conceptions of the subject. Sahlins’ structuralist history is inspired by Braudel’s historical framework and Lévi-Strauss’s structural anthropology. Sahlins’ vision, however, diverges sharply from Braudel and Lévi-Strauss in fundamental ways that separates his perspective from that of the *Annales* historians and other structural anthropologists. While Sahlins recognizes the theoretical and analytical value of the concept of structure as a long-term undercurrent that powerfully influences people’s lives, like

Giddens and Bourdieu he suggests it is not an unchanging entity suggested by previous researchers. Instead, structure is shaped and transformed by historically-situated events. Sahlins notes that “[i]n its global and most powerful representation, structure is processual: a dynamic development of the cultural categories and their relationships, amounting to a world system of generation and regeneration.... Yet precisely as this diachrony is structural and repetitive, it enters into dialogue with historic time, as an heroic project of encompassing the contingent event” (Sahlins 1981b:111). For Sahlins, structure—symbolic relations of cultural order—is an *historical object*, which is shaped by history and events. It has a recursive relationship with history or events, which negates previously-held oppositions between structure and history (Sahlins 1985).

For Sewell, structures are “constituted by mutually sustaining cultural schemas and sets of resources that empower and constrain social action and tend to be reproduced by that action” (Sewell 2005:151). Sewell’s use of the term “schema” is based on Giddens “rules and resources”—schema are the procedures that govern and reproduce social life (Sewell 2005:151). Resources not only include material objects, but also the ability to utilize them in social settings. It is the combination of schema and resources that is at the heart of Sewell’s conception of structure. At the same time, Sewell’s notion of structure is plural rather than singular. In his view, “[s]ocieties should be conceptualized as the sites of a multitude of overlapping and interlocking cultural structures” (Sewell 2005:209). A non-essentialized view of society is one that consists of multiple structures with different societal interests, each of which is linked to the others. Each of these structures can be the locus of structural change, and because of the linkages, changes can cascade throughout the structure (Sewell 2005:206-207).

Event

Sahlins’ view of events combines Braudel’s structural history and Lévi-Strauss’s structural anthropology in a way that moves beyond either of the previous scholars. A powerful thread in Sahlins’ theoretical contributions is how he ties the historical “event” to cultural transformation. Using his now-famous example of the Hawaiian reception of Cook as a manifestation of the *akua* (god) Lono, Sahlins foregrounds the notion of event in history, and seeks “not merely to know how events are ordered by culture, but how, in that process, the culture is reordered” (Sahlins 1981a:8). While cultural reproduction is always subject to transformation, according to Sahlins, significant cultural transformation occurs in the interaction between structure and event, that is, when a group’s underlying cultural logic (structure) is confronted by an entirely unique circumstance (event) that it must make sense of and incorporate into its realm of understanding. This is especially true when cultural groups encounter one another for the first time—each approaches the other with its own cultural logic and through such encounters both are transformed in a “structure of the conjuncture”—a new structure that results from a revised cultural understanding (Sahlins 1981a:68). In his regard for the event, Sahlins’ perspective is closer to third generation *Annalistes* such as Le Roy Ladurie than to Braudel.

Despite previous divisions between history and anthropology, Sahlins observes that traditional disciplinary roles have been reversed—contemporary anthropologists often focus on events and take a diachronic perspective, while historians may examine long-term structural forces with a synchronic outlook. The problem is therefore not about collaboration between disciplines, but about erasing the false dichotomy between structure and event, to “explode the

concept of history by the anthropological experience of culture” (Sahlins 1983:534). A focus of the event in history is evident in Sahlins’ earlier writing, however “exploding” the dichotomy between structure and event is the major focus of his later writings (e.g. Sahlins 1991). After reviewing both the historical and anthropological background that led to the view “that ‘event’ and ‘structure’ could not occupy the same epistemological space” (Sahlins 1991:38-39), Sahlins explicitly explores what makes an event historical rather than just another daily happening. He suggests that the significance of events are entirely situated within particular cultural contexts, and that each situation is unique and must be evaluated with reference to its historically-contingent condition (Sahlins 1991:44-45). In general, events are different from “actions or happenings that repeat themselves, from reproduction of the order. Not every action is a historical event....In the general category of human actions, historical events are a subclass only, consisting of these actions that *change the order of things*” (Sahlins 1991:46, emphasis added). Sahlins notes, the “event is a unique realization of a general structure...[while]...the other half is the realization of the unique event as a new general order” (Sahlins 1991:81). In other words, the event is dependent on structure for significance, and when significant, results in structural change.

Sahlins’ work not only thoroughly breaks down the prevalent dichotomy running through history and anthropology, but he challenges critiques of his earlier work that argued Sahlins’ theory of culture change relied solely on outside forces, not internal cultural factors (e.g. Friedman 1985:191; Thomas 1990:62-64). Importantly, Biersack notes that by theorizing the event,

Sahlins rehearses the imagery that held a generation of Annalists and structural anthropologists in thrall, inhibiting the development of event-centered analysis. Both Annalists and structuralists experienced a kind of metaphysical dread of the event, for whether seen as ‘external’ to the ‘order or structure’ or as an instantiation of it, the event as such lacked systematicity and eluded analysis. In integrating the problem of order with the problem of change, Sahlins renders events intelligible in terms of the dialectic’s shaping power. Sahlins’s recuperation of the event...arguably generalizes the orientation within the field (Biersack 1991b:5-6).

Sahlins thus lays the groundwork for what Biersack calls an “event-oriented anthropology” (Biersack 1991b:5-6).

Sewell recently synthesized and augmented Sahlins’ theory of the event, while generalizing it for application to his own discipline, as well as other social sciences (Sewell 2005). Like Sahlins, Sewell acknowledges the transformative power of historical events, but also suggests that one of the hallmarks of a historical event is that they “tend to transform social relations in ways that could not be fully predicted from gradual changes that may have made them possible...(Sewell 2005:227).” They are dependent on historical contingencies and the cultural context in which they occur. Rather than social change solely occurring through gradual production and reproduction of cultural practices, specific events can redirect historical trajectories in ways not predictable from knowledge of what came before. Theorizing the event becomes important because of the social transformations that events can initiate. Because of this, according to Sewell, “a theoretically robust conception of events is a necessary component of any adequate theory of social change” (Sewell 2005:227).

There are two key theoretical and methodological implications of Sahlins' and Sewell's theories of events. First, in order to argue Sahlins' point that short-term events can have long-term implications by initiating structural change, it is necessary to effectively demonstrate how structure has been altered. Demonstrating structural change therefore requires a detailed grasp of structure both before and after the event under study in order to know how structure has been changed. This requires a comprehensive grasp of the historical details surrounding the event in question (Sewell 2005:219). Second, a theory about the mechanism of structural change is also required to demonstrate how events cause culture change. Sahlins proposed such a mechanism: the structure of the conjuncture, that is, individuals applying existing cultural categories to novel circumstances, resulting in a wholly new reproduction of culture. This can be further amplified by what Sewell (2005:223) calls, in a reversal of Sahlins' term, the conjuncture of structures. Transformative events will always involve a novel conjuncture of structures, "a synergistic interaction between actors attempting to make structural sense of a highly volatile situation" (Sewell 2005:223).

In summary, in a practice-based view of structure versus event, events produce and reproduce structure, while structure constrains and enables events. There is a dialectical or recursive relationship between structure and event. When events are given equal theoretical footing as structure, it restores people as the primary force in historical change, a view that links key theoretical concepts of agency and event. According to Sahlins (1991), *happenings* (external to the structural order) and *incidents* (internal activity) repeat themselves, but *events* fundamentally change the order of things. An event has the power to engender change because of how it is interpreted, and an interpretation of an event as significant enough to cause change depends on the cultural context in which the event occurs. Sahlins notes that, "[o]nly as it is appropriated in and through the cultural scheme does it acquire an historical *significance*..." (Sahlins 1985:xiv, emphasis original). Researchers seeking to illuminate when and under what circumstances those significant events occur must demonstrate if and how the structural order has changed, and to convincingly attribute that change to the event in question rather than an internal source (Sewell 2005). Archaeology may offer a unique opportunity to address such questions about culture change and/or continuity.

Event-Oriented Archaeology

Beck et al. (2007) recently argued for the applications of Sewell's theory of the event within an archaeological framework. Similarly, for my purposes, an event-oriented archaeology is one that attempts to link a specific or short-term event, whether internally or externally generated, to either culture change or steady continuity. Archaeologically, one effective way to do this is to use a methodology similar to Le Roy Ladurie's (1979) structure-event-structure model. That is, to examine key variables that provide insight into structural conditions before an event, and look for fundamental change, continuity, or perhaps some combination, after the event. From an archaeological standpoint, this methodology is likely to be most effective by beginning with a known event, and investigating key cultural variables that existed both before and after it. An alternative approach, beginning with a particular set of structural conditions and working backwards to look for an event that precipitated it, may not be archaeologically productive, although such an approach may be possible using historical data (Le Roy Ladurie 1979).

Using terminology from non-linear modeling, Williamson (2004a) suggests a methodology for investigating cross-cultural encounters similar to what I am proposing, although she notes that the complex, long-term structures uncovered through archaeology would best be complemented with short-term events documented in historical records. Clarke (2000) raises a similar methodological point about whether short-term social changes are visible archaeologically without the aid of historical records or ethnographic observation. She suggests that the archaeology of cross-cultural encounters provides the best opportunity to study such short-term culture change. While I agree with these points, I further suggest that in certain circumstances, as in the case of an external event like a shipwreck that leaves a clear material signature, we do not have to rely on history to provide evidence for the events that spark change. We can instead use archaeology to identify significant events—acknowledging, of course, that archaeological interpretations are strengthened by using multiple lines of evidence in a holistic approach to studying the events (see, for example, Lightfoot 1995, 2005a; Lightfoot, et al. 1998). Williamson further argues that by integrating both historical and archaeological data about a cross-cultural encounter, it is possible to identify and track trajectories of behavior across the continuum of prehistory and history (Williamson 2004a:191). The notion of “trajectories” is at the heart of non-linear modeling, and can be used as a heuristic device for tracking changes from prehistory into postcontact periods (see also Duke 1992; Lightfoot 1995). According to Williamson, long-term structures guide action until significant, short-term events take over at certain “bifurcation points,” when human agency becomes paramount in precipitating culture change (Williamson 2004a:193).

This idea is similar to Sahlins’ (2004:155) “conjunctural agency.” Sahlins recently analyzed the issue of historical agency, primarily when and under what circumstances history is collective, and when it is individual. For Sahlins, “[i]t all depends on the kind of historical change at issue, whether it is a developmental trend or a revolutionary event of the kind that changes the order of things” (Sahlins 2004:9). The former is collective agency; the latter, individual. He further examines what he terms “structures of agency,” looking at those conditions that allow individual agency to have historical effect:

For granted that individuals may have historical effect, they have to be in a position to do so....We have to overcome certain received ideas of an unbridgeable opposition between cultural order and individual agency....It is true these contrasting aspects of human existence are irreducible the one to the other, which is one reason why historians and social scientists are often motivated to argue the inconsequentiality of either structures or persons. But what all this manichaeism ignores is the way persons can be empowered to represent collectives: to instantiate or personify them, sometimes even to bring them into existence, without, however, losing their own individuality (Sahlins 2004:155).

Sahlins ties this idea back into his thoughts on events, suggesting that when individuals have room to operate within their own cultural milieu, historically contingent events will reproduce or alter cultural systems in ways that are internally consistent—no matter the outcome, it is reasonable within the cultural order (Sahlins 2004:290-291). I believe this view of culture change is entirely consistent with a practice-oriented view that highlights continuous social change rather than a “punctuated equilibrium” model of change (Lightfoot 2001). A continuous cycle of cultural production and reproduction may go through periods of accelerated change as a

result of significant events—cultures may even be more susceptible to event-based change because they are not mired in static traditions, but are undergoing continual change.

I propose five key principles for an explicitly event-oriented archaeology focused on long-term implications of short-term events. First, following Sewell's (2005:83) use of the term, an event-oriented archaeology is *eventful*. While this may be self-evident, I believe it important to explicitly outline what an eventful archaeology means in practice. Sewell's theoretical perspective highlights the historical view that social life is punctuated by "turning points" or "watersheds," events that shape historical trajectories (Sewell 2005:8). According to the Sewell, "eventful" describes a type of temporality that acknowledges the role of events in transforming social practice:

Eventful temporality recognizes the power of events in history. Social life may be conceptualized as being composed of countless happenings or encounters in which persons and groups of persons engage in social action. Their actions are constrained and enabled by the constitutive structures of their societies. Most happenings...reproduce social and cultural structures without significant change ...Events may be defined as that relatively rare subclass of happenings that significantly transforms structures. An eventful conception of temporality, therefore, is one that takes into account the transformation of structures by events (Sewell 2005:100).

This argument is similar to that by Sahlins (1991; 2004), who instead uses the term "evenemential" to describe his orientation (both "eventful" and "evenemential," however, are anglicized forms of Braudel's *événementiel*, see Sewell 2005:83). For an event-oriented archaeology to be eventful, it should focus on the effects of discrete, short-term events—events that can be identified archaeologically by a distinctive material signature. It should highlight short-term events, which in many cases are characterized differently and have different outcomes than long-term processes such as colonialism. Early cross-cultural encounters between Europeans and indigenous populations, such as those that took place throughout the Pacific in the sixteenth to eighteenth centuries before the extended contact of colonialism, mercantilism, or missionary activities, are examples of the short-term events I envision. These brief, early interactions, however, may be relatively ephemeral archaeologically, and therefore difficult to analyze without relying heavily on historical records or oral traditions. This makes them particularly amenable to historical archaeology. Pre-colonial intercultural interactions resulting from shipwrecks, on the other hand, may represent uniquely-clear cases of event-oriented change, because they are singular events that leave a considerable quantity of introduced material culture available for archaeological investigation. Rare cases such as the one under study here, where the encounter can be easily distinguished from later colonial entanglements, are especially valuable test cases for examining the long-term implications of short-term events.

The second key principle for an event-oriented archaeology is that the investigations should be *diachronic* in nature (Sewell 2005). At first blush, it may seem paradoxical that analysis of a specific event should be diachronic, rather than synchronic. However, the ultimate object of study for the event-oriented study I am proposing here is not the event itself, but the potential long-term structural change that resulted from the event. To convincingly demonstrate such change took place requires a detailed diachronic analysis of structural conditions both before and after the event, in the vein of Le Roy Ladurie's (1979) structure-event-structure

model. A diachronic approach is also one of the cornerstones of Lightfoot's (1995; 2003; 2005a; Lightfoot, et al. 1998) archaeology of culture contact and colonialism, as he notes, "[t]he study of culture change, by its very definition, requires a broad-scale, diachronic approach. Evaluation of the consequences of the European world-system on native peoples requires that both prehistoric and historical archaeology be undertaken, the former to establish the baseline from which to measure changes taking place after European contact" (Lightfoot, et al. 1993:163). Silliman (2009:222) cautions, however, that the baseline needs to be of the appropriate temporal scale so that unjustified comparisons are made. A detailed concern for chronology is an important methodological corollary for a principle of diachrony (Sewell 2005:10). It is critical to have a detailed, accurate chronology in order to convincingly demonstrate a link between a specific event and subsequent structural change. This concern is as true for historical studies as it is for archaeological projects. For my current study, this will be a significant challenge given the notoriously difficult stratigraphic conditions in California archaeology. However, this may be ameliorated somewhat by an easily-dated "indicator artifact," such as the Chinese porcelain found in many *tamál-húye* sites, which provides a reliable *terminus post quem*.

Third, an event-oriented archaeology is *contingent* and *contextual*, not deterministic. Historians "assume that the outcome of any action, event, or trend is likely to be *contingent*, that its effects will depend upon the particular complex temporal sequence of which it is a part" (Sewell 2005:7, emphasis original). Most contemporary researchers acknowledge that local archaeological cases can only be understood fully when placed within a broader regional context, and there is widespread criticism of overly-deterministic causal explanations that dictate predetermined outcomes, such as world systems theory. An event's long-term effects cannot be assumed without a detailed understanding of the cultural context in which it takes place, as well as events leading up to it. As Sewell (2005:219) notes, "[t]here can be no adequate diachronic narrative of an event without a synchronic understanding of the structures that the event transforms." While agency and individual action are constrained by larger structural forces, it is the interplay between structure and agency/events that determines outcomes (Champion 1989; Dietler 1998; Lightfoot and Martinez 1995; Linnekin 1991). While Sahlins recognizes the theoretical and analytical value of structures and world systems as long-term undercurrents that powerfully influence people's lives, he suggests they do not determine culture change (Sahlins 1981a, 1985). Kirch and Sahlins (1992) operationalize these ideas about culture change and continuity in an archaeological context by examining European contact in the Anahulu Valley of Oahu, in the Hawaiian Islands. They examine the ramifications of European arrival in Hawaii and subsequent Hawaiian participation in the larger European economic system of Pacific trade by focusing on large-scale, and long-term, change in the Anahulu Valley, Oahu. They combine archaeological evidence with historical ethnography to construct an "integrated history" of Anahulu (Kirch 1992:1; Sahlins 1992:1). By constructing a prehistoric archaeological baseline "to comprehend the distinctively Hawaiian cultural and social structures by which the historical forces emanating from the larger world were mediated" (Kirch 1992:5), Kirch and Sahlins are able to move back and forth between archival documents and the archaeological record at the time of European contact to illuminate long-term changes. Likewise, Lightfoot (2005a; 2005b) outlines a comparative framework for the archaeology of colonialism that stresses the importance of examining the unique historical context of each colonial entanglement to understand specific outcomes. Other archaeological examples that highlight the role of contingency in examining causal processes include Cabak and Loring (2000), Crowell (1997), Farnsworth (1996), and Wilkie and Farnsworth (1999).

Equally important, outcomes of cross-cultural encounters between Europeans and indigenous populations cannot be assumed, especially an early, short-term encounter like the one under study here. Both Lightfoot (2005a; 2005b) and Stein (2002; 2005b) have stressed that study of colonial entanglements cannot begin with *a priori* assumptions about power relations between the colonizers and the colonized. Considering variability in power relations during cross-cultural encounters is especially relevant in the case of shipwrecks. Technological, military, and other material advantages held by European visitors are often negated during shipwreck scenarios, often giving indigenous populations an advantage during the resulting encounters (e.g. Keate 2002 [1788]; Nutley 1995; Playford 1996). This reinforces the need for a contingent, contextual approach.

The fourth key principle for event-oriented archaeological studies is a *multiscalar* approach to assessing culture change or continuity, from an individual or household level to a regional level of analysis (Lightfoot 1995, 2003; Lightfoot and Martinez 1995; Lightfoot, et al. 1998; Stein 2002, 2005b). This is true on both a theoretical and methodological level. According to Sahlins' theory, distinguishing an event from a happening is considered to be a matter of judgment, and it may be unclear if a specific happening represents a change that is large-scale enough to be considered an event. Sewell (2005:211) notes, "[t]he problem is often intractable, since what unambiguously qualifies as a local structural transformation may actually have the effect of reproducing a structure at a higher level...." Using his ideas about multiple structures, with different interest groups representing different cultural structures, however, "the happening is simultaneously an event from the point of view of the local family culture and an implementation of structure from the broader viewpoint" (Sewell 2005:211). In other words, culture change may occur at many different scales, and our level of analysis needs to take this into consideration.

Since social change can happen at different scales, archaeological analysis needs to examine a full, multiscalar array of material variables that may indicate change. In my current study, the variables under investigation include a variety of variables such as sociocultural organization, social relations and exchange networks, organization and use of space, foodways, ceremonial and mortuary practice, and material culture. Examining material remains at multiple scales allows me to ask a variety of provocative questions about the encounter at *tamál-húye* and its long-term implications. For example, did the encounters or introduced objects provoke a change in exchange networks in the area surrounding the Point Reyes peninsula? Did the local Coast Miwok groups of Point Reyes use the objects to negotiate new social relations with neighboring groups, use them to create a unique local or regional identity, or incorporate the objects into aspects of their ritual practice?

Finally, the fifth key principle for an event-oriented archaeology is to employ a *holistic*, historical anthropological approach that draws on multiple lines of evidence to make archaeological interpretations. Combining archaeological data with historical records, native oral traditions, and ethnography into a cohesive whole that allows a more unbiased view of the past allows scholars to present interpretations that consider multiple perspectives and give voice to multiple sides of the story (Lightfoot 1995, 2003; 2005a, 2005b; Lightfoot, et al. 1998). The holistic approach offered by a historical anthropological framework offers several advantages over a narrower perspective. Most significantly, combining multiple lines of evidence in this case strengthens archaeological inferences and statements about cultural processes. One source of data is not privileged over another; the various data sets emphasize different viewpoints and create a more balanced account of the past (Wylie 1999). For example, archaeological evidence

combined with native narratives and oral traditions gives voice to native laborers who are often silenced by traditional ethnohistorical and archival sources (Lightfoot 2005a:15-17). In all cases, it is widely acknowledged that we need to maintain a rigorous separation of data from different sources and careful independent evaluation that does not privilege one line of evidence over another (e.g. Feinman 1997; Kepecs 1997). Ultimately, this approach results in the most well-constructed and easily-defensible arguments and interpretations.

CONCLUSION

An “event-oriented archaeology” is rooted in the work of scholars such as Sahlins (1981a; 1985; 1991; 2004) and Sewell (2005), whose practice-based analyses consider “events” to be as theoretically-rich as the “structures” that shape them, suggesting in fact that events influence structure as much as structures transform events. Unique events, whether shipwrecks or short-term intercultural engagements, may represent “turning points” that initiate culture change. Sewell remarks that what makes these events unique is the particular cultural context in which they occur:

The specific nature of the structure of the conjuncture will, of course, be different in every event. But if Sahlins’s theory of the event is correct, it should always involve a novel conjuncture of structures. Hence, we cannot predict in advance what structure of the conjuncture will shape the novel acts of reference that constitute the core of a given event. But we do know what to look for: a conjunction of structures that sets off a synergetic interaction between actors attempting to make structural sense of a highly volatile situation (Sewell 2005:223).

Given this starting point outlined by Sewell, the encounter at *tamál-húye* is an exceptional set of circumstances in which to look for culture change precipitated by a short-term event.

My notion of an event-oriented archaeology is different than previous event-based archaeological analyses, such as Staniforth’s (1997; 2003a; 2003b) “archaeology of the event.” Staniforth draws on an *Annales* school perspective and outlines how specific events such as shipwrecks can be used to represent broad cultural patterns, in his case, British colonial worldviews. In this regard, Staniforth’s analyses highlight the cultural continuity reflected in shipwreck events. Although my theoretical orientation is also influenced by *Annales* historians, I focus instead on when events such as shipwrecks precipitate social transformation.

My concept of an event-oriented archaeology employs five key principles. First, it is *eventful*, acknowledging the transformational power of short-term events. Second, an event-oriented archaeology is *diachronic*, highlighting structural transformation from an established baseline prior to an event, and demonstrating change that took place as a result of the event. Third, my perspective is *contingent* and *contextual*, recognizing that unique historical trajectories and cultural context shape events as much as larger structural considerations. Fourth, an event-oriented approach is *multiscalar*, examining variables from individual to regional scale. Finally, fifth, the perspective I am advocating here is *holistic*, relying on multiple lines of evidence to provide a balanced approach to the event under study.

CHAPTER THREE

WRITTEN AND ORAL ACCOUNTS OF THE ENCOUNTERS AT *TAMÁL-HÚYE*

INTRODUCTION

In this chapter I analyze of the sixteenth-century encounters at *tamál-húye* based on available historical documents, native oral traditions, and ethnographic observations. I examine the background and world view of English and Spanish voyagers, as well as the Coast Miwok-speaking inhabitants of the Point Reyes Peninsula, in an attempt to understand the possible perceptions of each as they approached the encounter. As Lightfoot and Simmons (1998:148) note, the “respective world views and ideological constructs of natives and voyagers were critical factors in cultural encounters, influencing how participants presented themselves to strangers, how they interpreted the actions of ‘others,’ and ultimately how each responded to the other.” I use multiple lines of evidence to provide background and context for the sixteenth-century Tamal encounters at *tamál-húye* with Drake in 1579 and Cermeño in 1595. I then examine how those perceptions may have structured salvage and reuse of material culture from the *San Agustín* shipwreck. I pay particular attention to the unique circumstances that may have resulted from the 1595 shipwreck, which may have partially equalized power differentials between the cultural groups and contributed to different perceptions in 1595 than in 1579. I critically analyze the encounters using available historical evidence (written and oral, European and indigenous) to examine how the sources can be used to address the ways the Tamal recontextualized introduced material culture from the *San Agustín* shipwreck.

ENGLISH, SPANISH, AND TAMAL WORLD VIEW

Wolf (1982) argued that world history is systemic, but he suggested that the system should not highlight European expansion at the expense of other cultures. Instead, all peoples and cultures are part of an interconnected system that developed as Europeans drew together numerous pre-existing local exchange networks into a global complex. Although a perspective like Wallerstein’s (1974) world system theory might be an appropriate perspective for assessing the *San Agustín* shipwreck and its role in the Manila trade, the rise of trans-Pacific commerce, and development of a global maritime system in the Pacific (e.g. Delgado 2009), my study instead focuses on a different aspect of this story, viewed from the indigenous perspective. Following Wolf (1982), I underscore the fact that the intercultural engagement between the English, Spanish, and Tamal did not take place in a vacuum, but was an aspect of larger processes taking place on a global scale. As these processes unfolded, the histories of all peoples became inextricably linked into a shared, common history. Some societies prospered, others were decimated, but all were touched in some way. Thus, writes Wolf, “the history of these supposedly history-less peoples is in fact a part of the history of European expansion itself” (Wolf 1982:194). European and Tamal history intersected on the beaches of *tamál húye* on two brief occasions in the late-sixteenth century, and the histories of each were interconnected from that point forward—Tamal history became part of the history of global connections.

A rich historical record documents encounters between Europeans and native populations during early voyages along the California coast. A number of sixteenth-century chronicles from Alta California record the mariners’ views of their interactions with indigenous people (Bolton

1916; Nauman 1999; Nuttall 1914; Sanchez 2001; Vaux 1854; Wagner 1923, 1924). These accounts come from five documented European voyages to Alta California before the eighteenth century, including four Spanish voyages (Cabrillo-Ferrelo in 1542-1543, Unamuno in 1587, Cermeño in 1595, and Vizcaíno in 1602-1603) and the 1579 landfall by the Englishman Sir Francis Drake and his vessel the *Golden Hind*. Before permanent Spanish settlement of the Bay Area beginning in 1776, only Drake in 1579 and Cermeño in 1595 made landfall north of the Golden Gate. Beginning in 1565 the long-standing route of the Manila trade between the Philippines and Acapulco made landfall near Cape Mendocino after a north Pacific crossing, then followed the California coast south to New Spain (Schurz 1939:239-240). Undocumented encounters between Europeans (especially Spaniards) and northern California Indians during the nearly 170 years following Vizcaíno's 1602-1603 voyage, the last documented encounter until Spanish settlement at San Francisco in 1776, may have resulted.

English and Spanish World View

Both the English and the Spanish sixteenth-century adventures on the California coast were motivated by the search for profit during the early stages of European global expansion. While California's later, eighteenth and early-nineteenth century colonial history featured different European colonial regimes (Spanish and Russian) and different motivations for the encounters with indigenous populations (missionary and mercantile)(Lightfoot 2005a, 2005b), in the sixteenth century both the English and Spanish were on voyages seeking profit. The circumstances that brought them to the California coast in 1579 and 1595, respectively, were largely secondary.

Beginning in 1565, regular trade between Manila and Acapulco became an important aspect of the global Spanish mercantile system. Silver mined in New Spain (Mexico) and Tierra Firme (Peru) was shipped from Acapulco to Manila, exchanged for Chinese luxury goods such as silk and porcelain that were highly sought-after by European elites, and then shipped back to New Spain via a return route that passed northern California after a north Pacific crossing (Schurz 1939). The Manila trade, as it was called, was directly responsible for the *San Agustín*'s presence on the northern California coast in the fall of 1595; it also played a contributing role in bringing Sir Francis Drake to the region just 16 years before.

Balboa sighted the Mar del Sur from the coast of Central America in 1513, while Magellan's 1519 voyage established a route to the Spice Islands in the Moluccas (present-day Indonesia)(Spate 1979:33-37). Together, Balboa and Magellan marked Spain's entree into the Pacific. As an immediate consequence the first global circumnavigation, begun by Magellan in 1519 and completed by Elcano in 1522, Spain entered into competition with Portugal over control of the Spice Islands. Although several voyages failed to establish a permanent Spanish foothold in the region, they provided them with first-hand knowledge of sailing routes and conditions. In particular, a member of Loaysa's 1525 voyage, Andres de Urdaneta, who remained in the Moluccas until his return to Spain in 1536, learned about possible territories to the north of the Moluccas, in the "Islas de Poniente," or "Westerly Islands" (Philippines). Based on the reports from Urdaneta and other survivors of earlier voyages, in 1542 the Viceroy of New Spain Don Antonio de Mendoza appointed Ruy Lopez de Villalobos to seek a base in Cebu, in the Philippines, to establish trade with China, Formosa (Taiwan), and the Ryukyu Islands south of Japan; to spread Christianity; and to establish a return route to New Spain. Although Villalobos' voyage was a failure and accomplished none of its goals, it did determine that the

northern islands of the Philippines were free from Portuguese influence, and there was a ready source of food and timber present there for establishing a base of operations in the region (Spate 1979:90-98).

Philip II succeeded his father, Charles V, to the Spanish throne in 1556, and immediately renewed Spain's interest in the western Pacific. The young king commanded Don Luis de Velasco (the elder), Viceroy of New Spain, to mount a royal expedition to the Philippines. Velasco ordered Miguel Lopez de Legazpi, accompanied by Urdaneta (who was respected for his comprehensive knowledge of Pacific affairs) to set out with four ships from Acapulco on New Spain's Pacific coast in November 1564. Urdaneta had argued for Acapulco as their point of departure over the port city of Navidad, and according to Spate (1979:101), "his insistence on by-passing Navidad on the return voyage may be said to have fixed Acapulco as the Mexican terminal of the Galleon route." The expedition's goals were to establish a settlement in the Philippines if possible, but to fix a return route from the western Pacific to New Spain with certainty (Spate 1979:100-101). In April 1565, Legazpi arrived in Cebu and soon established the settlement of San Miguel (Cebu City). Urdaneta departed June 1, 1565 in the expedition's fastest ship to secure the return route, which previous failures suggested was to the north. After a grueling north Pacific crossing, Urdaneta intersected North America near Cape Mendocino in northern California, and sailed down the west coast to Acapulco, completing the return voyage on October 8, 1565. Urdaneta's voyage initiated the Manila galleon trade, which lasted into the nineteenth century. This northern route across the Pacific became the standard return-route for the trade—a route that brought the galleons within sight of northern California and its indigenous inhabitants annually (Spate 1979:104-105).

In 1571, Legazpi, now Governor and Captain-General of the Philippines, moved the primary Spanish settlement of the islands to Manila, which had a good harbor, abundant resources, and was more favorably situated for trade with China than Cebu (Spate 1979:103). Manila became a critical trading center for the Spanish, and while the Philippine colony had nominal religious and military roles, its *raison d'être* was the link to China. As Spate notes, "its supreme function was to be the pumping-station in a channel through which the silver of New Spain drew the luxuries of the Orient, above all Chinese silks, to America and to Seville" (Spate 1979:104). As such, there was very little production or export of Philippine goods. In exchange for silver, the various Asian goods exported to New Spain from Manila included a variety of food products (spices and palm wine), raw materials and drugs (amber, benzoin, borax, Manila hemp, raw cotton and silk, iron, sandalwood, dyestuffs, tin, and wax), and manufactured goods (ceramics, silk and cotton textiles, jewelry, escritorios, screens, fancy boxes, and other assorted curios and knick-knacks). Above all, however, Spate remarks that the "the trade remained the exchange of silver for silk, much of which reached Europe itself" (Spate 1979:222; see also Wallerstein 1974:336).

Spain did not establish colonies in the Philippines in the way they did the Americas, but nonetheless Spanish bases there extended Iberian political and social influence (Spate 1979:220). Although the Spaniards initially attempted to incorporate an *encomienda* system in the Philippines similar to that in the Americas, the "international commerce was insufficient to sustain the costs and they reverted to the Portuguese pattern" of maintaining isolated trading enclaves (Wallerstein 1974:336). Neither the Spanish nor Portuguese displaced the Asian regional carrying trade, but the Europeans merely extended it globally. As a Spanish possession, Manila was more than a trading post, but less than a full-fledged colony. The city was dependent on a *situados* (economic support) of 500,000 pesos a year from New Spain, which paid for

military costs and the clergy. Manila also relied on a large influx of private silver from Acapulco to pay for Chinese imports, which “greatly exceeded the permitted 500,000 pesos a year” (Spate 1979:221-222). While the Manila trade drew silver from the mines of New Spain and Tierra Firme away from Seville, only about two-thirds to three-quarters as much went to Manila as to Europe (Spate 1979:201). Annual Manila galleons voyages began with the founding of Manila in 1571, and increased to two annual voyages in 1593—a pattern that persisted until nearly the end of the trade in the nineteenth century.

Just six years after the Spanish established the annual voyage of the Manila galleons, Sir Francis Drake departed England in November 1577 on a global circumnavigation. This voyage ultimately led to his visit to northern California to careen his vessel before crossing the Pacific Ocean nearly two years later in June 1579. Drake’s voyage was part of a series of English ventures that aimed to open a viable oceanic route to Asian trade partners, and his expedition’s stated goal was to open an English route to the Spice Islands of the western Pacific. Although England was officially at peace with both Portugal and Spain at the time, the English believed that Spain’s restrictive colonial trade policy impinged on their rights to free trade, and they sought to challenge Spain and Portugal’s claim of sole trading rights with the East (Wagner 1926:13). Raiding Spanish possessions on the west coast of the Americas, including the rich Manila galleons, was probably Drake’s intention all along, while it is extremely unlikely that establishing an English colony in the Americas was one of his goals. As Wagner notes, “Drake was a product of his country and his age, and what Englishmen were looking for in those days were profits derived from trade,” not colonial possessions (Wagner 1926:20). Profit was the voyage’s main motivation, and was undoubtedly Drake’s primary concern. In sixteenth-century England, even many naval voyages were conducted on a joint-stock basis, which created an inherent profit motive (Fury 2002:52). For a quasi-naval voyage like Drake’s, which almost certainly had Queen Elizabeth as a financial backer, as she had been on numerous voyages both before and after Drake’s, profit was surely the overriding concern and the main motivation for all involved (Wagner 1926:25). This motivation led to a different approach to interactions with indigenous populations than voyages whose motivation was more overtly religious or colonial in nature, such as a number of Spanish voyages into the Pacific including Mendaña’s failed attempt to colonize the Solomon Islands in 1568-1569.

While it is easy to refer to Drake and his crew as “English,” English ships in the sixteenth century typically had multicultural crews that drew sailors from across Europe—Drake’s crew was no exception (Fury 2002:20). The expedition’s initial crew in 1577 was comprised of a number of English gentlemen and merchants, sailors from various nationalities (English, French, Danish, Flemish, Scotch, and Biscayans), and several cabin boys and servants, at least one of whom was an enslaved African. Total crew for the voyage numbered between 140 to 164 men, all sailing on five small vessels—the largest ship was the *Pelican* (which Drake later renamed the *Golden Hind*) of 100-120 tons (Wagner 1926:32). By the time the expedition arrived in Alta California nearly two years later, in the summer of 1579, Drake had just two vessels, the *Golden Hind* and a small vessel he had obtained in Guatulco, Mexico; the crew numbered between 75 and 90, including three cabin boys and three enslaved Africans (Wagner 1926:148). Each of these individual crewmembers would have brought his own biases to the interactions with indigenous populations like the Tamal in northern California.

Despite numerous differences in the crew’s backgrounds, however, most of them probably shared both a common “maritime” subculture. Sixteenth-century sailors had their own shared subculture, including shared attitudes, values, rituals, and even language (especially

cursing and swearing), despite their varied national backgrounds (Fury 2002:87). The sailors also shared a dichotomous mix of religious observance and superstition. Shipboard life was outwardly quite spiritual, as most English sailors were devout Protestants, and religious observance was used by officers as a mechanism to foster unity and quell dissension (Fury 2002:57, 114). But sixteenth-century sailors were also incredibly superstitious, and superstition likely took precedence over religious devotion during daily life (Fury 2002:91). Overall, this shared maritime subculture was particularly rich because it was cultivated in isolation, as voyages often spent months on the open sea between landfalls (Fury 2002:93).

The crew also undoubtedly shared a primary profit motivation for undertaking a dangerous voyage like Drake's circumnavigation, especially since dangerous routes and voyages attracted substantially higher wages than normal voyages. Frobisher's Northwest Passage voyages in 1576-1578, for example, offered wages that were twice the normal rate, and this may also have been true for Drake's voyage (Fury 2002:18). This would have been an attractive proposition for any sailor in the sixteenth century. In addition, wages may have been combined with shares of captured cargo on a privateering voyage, although it is uncertain if Drake's voyage was an officially-sanctioned privateering venture (Fury 2002:102-108). Nonetheless, this reinforces the fact that financial concern was the primary motivation for everyone on board the *Golden Hind* as they settled it into its *tamal-húye* careenage in 1579. This background would certainly have influenced Drake and his crew's interactions with indigenous populations, with profit, not exploration or religious conversion, as motivating factors for their actions.

During the course of Drake's epic voyage and in subsequent years, the Spanish were attempting to settle the Manila trade into a standard routine. Don Luis de Velasco (the younger), Viceroy of New Spain beginning in 1590, was concerned about difficult conditions on the latter part of return voyages from Manila, and authorized exploration of the California coast for an appropriate port that could be used for re-provisioning and repairing vessels after the long Pacific crossing (Cutter 1969:29). This task was given to Sebastián Rodríguez Cermeño, a well-regarded pilot of the Carrera de Filipinas (Philippine Route). Cermeño was a Portuguese pilot who had caught the attention of officials in New Spain after his role in saving passengers and crew from the Manila galleon *Santa Ana* after it was captured and burned by the English corsair Thomas Cavendish in 1587 (Mathes 1965:117; see also Schurz 1939:305-313). In 1594, Velasco gave Cermeño command of a voyage to the Philippines, with the task of surveying the California coast for protected harbors on his return voyage from Manila to New Spain. As incentive to undertake the voyage, the crown gave Cermeño special permission to legally carry private merchandise on his return voyage (Cutter 1969:29).

Cermeño, along with a crew and passengers of between 70-80 men, departed Manila in the galleon *San Agustín* on July 5, 1595 (Sanchez 2001:223). At 200 tons, the *San Agustín* was an average-size Spanish trading vessel at the end of the sixteenth century, and probably measured about 80 feet in length, 20 feet in breadth, with a 13-foot depth of hold (Aker 1965:71-72; Perez-Mallaina 1998:93). While an 80-foot ship may seem small to carry nearly 80 men, it was an average size for the time. Spanish ordinances issued in 1534 limited the number of passengers to 60 for every 100 toneladas on the Carrera de Indias (Atlantic Route)—70-80 sailors and passengers aboard a 200-ton vessel was therefore not exceptional (Perez-Mallaina 1998:130).

Like the English crew aboard the *Golden Hind*, the *San Agustín*'s crew represented a pluralistic shipboard society typical for the period aboard Spanish ships. In the late-sixteenth century, Spanish ship's crews were typically about 20% non-Spaniard (Perez-Mallaina 1998:57),

which if true for the *San Agustín* means approximately 16 of the vessel's 80-member crew would have been foreigners—as mentioned before, even Cermeño himself was Portuguese, not Spanish. In addition to the sailors and officers, the ship's company included at least seven enslaved Africans and seven Filipino cabin boys (Mathes 1965:129). While the ship's officers may have been literate members of the lower nobility, the majority of those onboard likely had humble social origins. In the sixteenth century, men usually became sailors as a last resort—the life of sailor was notoriously difficult and fraught with hardship, and the pay was among the lowest in society. As a result, men chose to go to sea not out of desire, but because they ran out of opportunities on land and had no other options (Perez-Mallaina 1998:23-36).

Like the English crew, Spanish sailors in the sixteenth century had a world view that was a dichotomous mix of religious devotion and irreligious zeal. On the one hand, most ships were named after religious figures, and the ship's company meticulously followed religious observances while on board. On the other hand, sailors were notoriously superstitious and often had a low moral character, which made their spiritual perspective contradictory (Perez-Mallaina 1998:237-245). Also similar to Drake's voyage, profit was the primary personal motivation for the voyage, for both officers and crew. Cermeño had a substantial financial stake in the voyage (Cutter 1969:29), but he was not the only person on board who had much to lose. Traditionally, a portion of each sailor's pay was in the form of a *quintalada*, or space for merchandise. If sailors did not have the capital to purchase merchandise, they could rent the space to a merchant and collect freight charge. In the late-sixteenth century, while it was more common for the *quintalada* to be added to a sailor's salary, they still shared in the proceeds of the voyage as part of their salary, according to a complex system for determining shares among the crew (Perez-Mallaina 1998:99-100). In the case of shipwreck and loss of the cargo, sailors lost the right to collect their salary for the voyage—they only received a salary if the cargo was safely delivered to its destination. More than a year after the *San Agustín*'s crew returned to Mexico City, for example, Joan Balanta, one of the Filipino cabin boys, was still trying to collect his salary from the voyage, but was unable to because his certification papers had been lost with the *San Agustín* (Martínez 1597). Finally, because of the ubiquity of illegal smuggling, it is almost certain that many members of the crew, including the officers, had contraband merchandise on board that they hoped to sell for profit after arriving in Acapulco (Perez-Mallaina 1998:104-105). Everyone on board, therefore, had a significant financial stake in the success of the voyage, and lost a great deal when the *San Agustín* wrecked.

How do these English and Spanish cultural and historical backgrounds potentially affect their perspectives on the cross-cultural encounters with the Tamal in 1579 and 1595? The Spanish had encountered indigenous peoples in the Americas on many occasions and in many settings for more than a century before the encounters at *tamál húye*, so they had a well-developed cultural sense of the indigenous “other,” and how such meetings could unfold (see, for example, Schieffelin 1991). In many examples of sixteenth century intercultural interactions, Spanish motivations were imperial with a thin veneer of proselytizing. The outcomes were often violent—examples in the Pacific include Mendaña's attempts to settle the Solomon Islands in 1568 and 1595, which resulted in vicious encounters at nearly every landfall (Amherst and Thomson 1901; Markham 1904). In the Marquesas alone, Spanish intruders killed more than 200 islanders, often indiscriminately, for perceived infractions (Dening 1980; Markham 1904:15-30).

The English did not have the same colonial experiences as the Spanish in the Americas, and the 1579 and 1595 intercultural interactions between the Tamal and the English and Spanish

at *tamál-húye* were very different than previous Spanish experiences. Neither the English nor the Spaniards had imperial or religious motivations. They were each passing through the region on a commercial voyage, and they had every reason to move along as quickly as possible after completing their business at *tamál-húye*—making repairs to the *Golden Hind* in the case of the English, and modifying a coastal launch after the *San Agustín* wrecked in the case of the Spanish. The Spanish, after the shipwreck, had good reason to maintain civil relations with the Tamal, as they modified their launch to continue their voyage to Acapulco, and collected enough provisions and water to sustain themselves on the trip. In addition, Cermeño lost a considerable personal fortune when the *San Agustín* wrecked, and the rest of the crew suffered their own losses to greater or lesser degrees. Their main goal, therefore, was to complete the launch, provision the vessel, and depart as quickly as possible. In this regard, it is possible the circumstances of the shipwreck itself influenced the character of the encounter, equalizing power differentials that may otherwise have been present.

Tamal World View

California Indians have occupied and exploited the *tamál-húye* area and its adjacent estuaries for at least 2,500 years, and probably much longer. Based on comparative data from surrounding regions, Early and Middle Holocene (8000–2500 B.P.) occupation of Point Reyes is likely, although no sites from that period have been located. The earliest sites on Drakes Estero are from the Upper Archaic period (500 B.C.–A.D. 1000), and may be associated with Miwokan expansion into the region. Ancestors of the ethnographic Coast Miwok-speaking groups (whose descendents still reside in the area today as the federally-recognized Federated Indians of Graton Rancheria) were complex hunter-gatherers who exploited a variety of terrestrial, estuarine, and marine resources. They occupied a series of permanent and seasonal habitation sites, hunted terrestrial game and sea mammals, foraged for wild plants, and collected shellfish and other coastal resources (Stewart 2003). Ethnohistoric evidence indicates the Tamal, like neighboring groups, used tule balsas (reed canoes, or *sákas*), for estuarine and nearshore marine resource exploitation (Sanchez 2001; Vaux 1854).

Sociopolitical Organization

California was inhabited by a dense population of complex hunter-gatherers organized into a series of small, independent polities, sometimes referred to as village communities (Kroeber 1925:831), tribelets (Kroeber 1932:258-259, 1962:29-33), or tiny tribes or nations (Milliken 1995). As Milliken notes, “[t]here were no higher levels of government in the region. The tiny nations were involved with one another in ever-changing alliances and conflicts” (Milliken 1995:21). Because present-day members of the Federated Indians of Graton Rancheria, which includes descendents of the Coast Miwok-speaking inhabitants of Marin County, find the term “tribelet” demeaning (Emberson, et al. 1999:38), I instead use the terms “tribe” or “village community” interchangeably when discussing these independent polities.

According to Kroeber, village communities in California, like larger tribes in other regions of North America, were autonomous, self-governing polities that controlled a loosely defined territory for resource exploitation (Kroeber 1925:831, 1962:29, 49). Each community claimed the territory surrounding its settlements, which often included a portion of one or more watersheds, and they maintained exclusive access to the available resources there. This territory

might range in size from 8-12 miles (13-19 km) across (Milliken 1995:21), and it provided the majority of the tribe's necessary resources, including plants and animals for food, clothing, shelter, tools and other manufactured objects, medicinal needs, and ceremonial regalia. Village communities obtained certain rare materials, such as obsidian, steatite, and shell (for non-coastal village communities), however, from other tribes through extensive exchange networks (Kroeber 1962:52-57).

Each village community consisted of one or more primary villages and a number of smaller surrounding hamlets. The primary village was probably permanent, although it may have been a winter village, while the surrounding villages may have been occupied seasonally, being abandoned and reoccupied periodically (Kroeber 1925:831; Lightfoot and Parrish 2009:133; Milliken 1995:20-21). Villages were spaced every 3 to 5 miles (5 to 8 km) and might have populations of 60-90 individuals. Each village within the tribe probably consisted of family groups related through lines of kinship and intermarriage. The aggregated village communities might have populations of 200-400 individuals (Milliken 1995:19-21). In general, community size was likely large enough to maintain enough territory to provide a buffer during lean years, yet small enough to remain manageable (Lightfoot and Parrish 2009:80). In summarizing the sociopolitical landscape of native California, Lightfoot and Parrish note that,

[i]t may be fruitful in the future to consider late prehistoric and early historic California not so much as a series of distinctive, inflexible, and rigidly bounded tribal nations, but rather as a more open network of individuals, families, and local groups intertwined across the landscape through various social, kin, political, and religious relationships. Some outlying areas may have been claimed and used by several local groups.... This model... deemphasizes clear-cut polity boundaries in favor of a networked fabric of social relationships radiating across the landscape... (Lightfoot and Parrish 2009:136).

Each independent village community acknowledged the leadership of a chief, or headman, who had an important position in the tribe that included such tasks as resolving disputes and presiding over feasts, dances, and other ceremonies. These leaders also had to be skilled orators, proficient in several languages, because they had an important role representing their communities by welcoming outside visitors (Heizer 1978:5; Kelly 1978a:419; Kroeber 1962:44-46; Lightfoot and Parrish 2009:72; Milliken 1995:21-22). In addition to headmen, there were a number of other hierarchical social divisions within native California village communities, including various religious and political retainers, curing doctors or shamans, ceremonial specialists, and craft experts (Lightfoot and Parrish 2009:33). Each smaller settlement within the tribe likely had a lesser chief or headman (Kroeber 1925:831; Milliken 1995:21). While little is known about leadership role of women in California Indian societies, Kelly suggests that tribes had a number of important female leaders that may have presided over various aspects of ceremonial life, as well as having important overall stature within the community (Kelly 1978a:419).

Ethnographic Units

The individual polities, or village communities, were often grouped together with their neighboring tribes who spoke the same language, and are referred to by their larger linguistic

associations. These language groupings, or ethnolinguistic units, are based on a four-level classificatory system of stock, family, language, and dialect—within each stock are multiple families, which are in turn made up of related languages and dialects. These ethnolinguistic divisions were useful to early scholars to help make sense of the incredible diversity of native California, but probably have little meaning in terms of actual sociopolitical organization. While it has become commonplace to refer to these specific language groups as "tribes," both in scholarly work and the popular media, this was never the intent. In native California, ethnolinguistic units rarely functioned as autonomous sociopolitical entities. Rather, they were in turn divided into the numerous smaller, independent polities discussed above (Lightfoot 2005a:34-38; Lightfoot and Parrish 2009:74).

From a linguistic standpoint, the indigenous inhabitants of the Point Reyes area at the time of European contact were, and still are today, members of the Coast Miwok-speaking language group. As a result, they are often referred to collectively as the Coast Miwok. The Coast Miwok language is part of the Penutian Stock, the Utian (Miwok-Costanoan) Family, and is the Western division of the Miwokan subfamily (Dixon and Kroeber 1919; Moratto 1984:533; Shipley 1978:84). Two different dialects of Coast Miwok were spoken: Western or Bodega, around Bodega Bay; and Southern or Marin in the remainder of territory, which included all of present-day Marin County and parts of southern Sonoma County (Barrett 1908:302; Callaghan 1970, 1997). Based on linguistic evidence, early Penutian speakers (Proto-Miwok) may have moved into the Bay Area after 4000 BP from the California interior, and between 2500-2000 BP ancestral Coast Miwok-speakers may have moved west into what is now Marin County (Golla 2007:75-76; Moratto 1984:553-555). At the time of contact with Europeans in the late sixteenth century, there were between 1,500 to 2,000 Coast Miwok-speaking individuals living in Marin County, although there may have been as many as 5,000 (Cook 1976:182; Kroeber 1925:275; Milliken 2009).

Coast Miwok Village Communities

When European voyagers encountered California Indians at *tamál-húye*, however, they did not encounter members of the "Coast Miwok" tribe. They encountered members of an independent, Coast Miwok-speaking village community that had a number of small hamlets distributed across the Point Reyes Peninsula. The tribe that inhabited the Point Reyes Peninsula spoke the same language and shared similar cultural traits with a number of other village communities in the surrounding region, but they were nonetheless a distinct, autonomous tribal group. For more than a century, anthropologists and ethnohistorians have collected data that can help to reconstruct the specific village communities that comprised the Coast Miwok-speaking inhabitants of present-day Marin and Southern Sonoma Counties, and which can be used to identify the specific people who directly interacted with Drake and Cermeño at *tamál-húye* in 1579 and 1595.

A number of nineteenth-century sources identify specific Coast Miwok-speaking groups in Marin County. Powell (1891:93) identified 12 different divisions present in Marin County (Bollanos, Chokuyem, Guimen, Likatuit, Nicassias, Numpali, Olamentke, Olumpali, Sonomi, Tamal, Tulare, and Utchium), but he did not give specific locations for each. In addition, in the March 30, 1860 edition of *The California Farmer*, Taylor (1860) noted that, "[t]he Bollanos and Tamales, Tamallos, or Tamalanos, had rancherias on Reed's farm, Bollenos Bay, Tamales Bay, Punto de los Reyes and their vicinities, and probably as far up as Bodega Bay..." (Taylor 1860).

Possibly citing Taylor, Bancroft (1884:363) states that "...on the ocean-coast of Marin County were the *Bolanos* and *Tamales*..."

The earliest efforts to specifically identify pre-contact languages and settlements in Marin County took place in the early-twentieth century, and were primarily based on ethnographic and historical data. Two of the earliest anthropologists working in Marin County with Coast Miwok-speaking informants were Samuel A. Barrett and C. Hart Merriam. Barrett was associated with U.C. Berkeley's Department of Anthropology, and worked in Marin County in 1903, 1904, and 1906 as part of the Ethnological and Archaeological Survey of California (Barrett 1908:7). Although Barrett's primary focus was the Pomo language group, and he specifically investigated the number of dialects spoken and the territorial boundaries of each, he was also interested in establishing "the locations of the various ancient and modern villages and camp sites" of both the Pomo and the surrounding California Indian groups (Barrett 1908:7). Regarding Coast Miwok-speaking communities in Marin County, Barrett found that,

...[o]wing to the fact that almost all of the former inhabitants of this area have disappeared and that the few who remain have been long removed from the old villages or were born at one of the missions and have, therefore, no first hand knowledge concerning the old villages, it has been unusually difficult to obtain accurate information, and so far it has been impossible to obtain full knowledge concerning the old sites.

At Bolinas bay is the site of an old village the name of which has been forgotten by the informant. According to another informant there are no old village sites along the coast-line from the town of Sausalito to Point Reyes (tamal-hūīye, bay point). This, however, seems very improbable [given references cited by Taylor and Bancroft noted above](Barrett 1908:307).

None of the place names Barrett recorded appear in contact-period mission records (Milliken 2009:14).

C. Hart Merriam was a naturalist who was affiliated with, but did not work for, the Smithsonian Institution. He conducted extensive ethnographic research in northern and central California in the early-twentieth century. According to Heizer,

Merriam worked alone, or more accurately usually with a member of his family, driving around, inquiring about Indians living in the neighborhood and if it could be arranged, sitting down, talking with them, and recording place names, names of tribes and word lists. Judging from a large collection of letters addressed to him by Native Californians, he got along well with these people and became long term friends with many of them. Some informants he visited repeatedly to check and verify or expand information secured earlier. He did all this with the aim of securing as detailed and accurate a record as was possible. Merriam clearly had a special aptitude for finding last survivors of tribes in some out-of-the-way place where they were spinning out their remaining years, and by becoming friendly with them secured many data which would otherwise have not been made a matter of record (Merriam 1977:i).

Although Merriam worked in Marin County among Coast Miwok-speaking informants in 1905, about the same time as Barrett, he interviewed different individuals and recorded slightly

different information about the native sociopolitical landscape of Marin County than Barrett. Merriam correctly noted that the *Me'-wan* [Miwok] linguistic stock was spoken in several disconnected areas of central California, including the coastal area north of the Golden Gate. He noted, however, that this area was composed of just three distinct groups that spoke slightly different dialects (as compared to Barrett, who identified two dialects, see above). The group encompassing Marin County, including the Point Reyes Peninsula, he called *Hoo'-koo-e'-ko*, while a smaller group to the north around Bodega Bay he referred to as the *Oh'-lah-ment'-ko*, with the *Lek-kah'-te-wut'-ko* just to the east of them (Merriam 1907:338-339). Merriam noted that his informant, Bill Smith of Bodega Bay, regarded the *Lek-kah'-te-wut'-ko* as a distinct tribe, though they spoke a related language (Merriam 1967:365). The information Merriam collected gives some information on language distribution and village names and locations, but does not offer any concrete data on sociopolitical organization (Milliken 2009:13)

Barrett and Merriam differed slightly on their division of the Coast Miwok language in Marin and southern Sonoma Counties, although the two researchers, who worked completely independent of one another, largely agreed in their linguistic division of the Miwok language group as a whole (Kroeber 1908:369). Both researchers recognized a distinct dialect spoken around Bodega Bay (Barrett's Western, or Bodega, dialect and Merriam's *Oh'-lah-ment'-ko*), but Barrett combined the rest of the Coast Miwok language into a single dialect (Southern, or Marin), while Merriam recognized two: *Hoo'-koo-e'-ko* and *Lek-kah'-te-wut'-ko*. Kroeber comments, however, that Merriam stated the latter two dialects were essentially the same, and Kroeber suggests they were arbitrarily divided because Merriam recorded two main settlements in Marin County, after which he named the dialects (Kroeber 1908:380). Kroeber wrote,

...the name of the Lekahtewutko is taken from Lekahtewut, a rancheria near Petaluma, and that the name Hookoeko, which was not encountered by Mr. Barrett, is unexplained. It would seem therefore that in this region also a true but nameless unit of division, a homogeneous dialectic group, has been split and the two fragments more or less arbitrarily designated by terms which in native usage were the names only of single villages, comprised, with numerous others, in a larger dialectic but non-tribal group (Kroeber 1908:380).

Nonetheless, Kroeber summarizes, Barrett's Bodega, or Western, and Marin, or Southern dialects are co-terminous with Merriam's *Hoo'-koo-e'-ko*, *Lek-kah'-te-wut'-ko*, and *Oh'-lah-ment'-ko*, and Kroeber indicates they all comprise the Coast Miwok language (Kroeber 1911:292). He further notes that Merriam's three divisions may have been village names or place names that corresponded to three different village communities, and that the "...selection of any of them as denotations of larger linguistic or national bodies seems somewhat fortuitous" (Kroeber 1925:273). According to Kroeber, there were most likely many more village communities in the Coast Miwok language area, but because the divisions only existed at that time as village names recorded by Barrett and Merriam, they are therefore difficult to distinguish (Kroeber 1925:274).

More recent attempts to reconstruct the sociopolitical landscape of the Coast Miwok language group use Mission records combined with ethnographic, historical, and archaeological evidence (Slaymaker 1982). Using Mission documents, Slaymaker identified ten independent village communities (which he called *naciones*) within the Coast Miwok language group (Slaymaker 1982:45). According to Spanish documents, the largest of these at the beginning of

the historic period were the Tamales, whose territory included much of central Marin County, including the Point Reyes Peninsula. Slaymaker suggests the Tamales tribe had the largest population (more than 900 individuals), the largest territory, and the highest number of settlements of all the Coast Miwok village communities (Slaymaker 1982:333). The primary village may have been Olemoloque, near the modern town of Olema at the southern end of Tomales Bay, but the population was probably widely dispersed across the territory. Based on archaeological data summarized by Edwards (1970), Slaymaker hypothesized that the large-size of the Tamales tribe indicates in pre-contact times it may have been three separate village communities (Olema, Echacolom, and Seqloque) that coalesced into one by the historic period (Slaymaker 1982:339).

Milliken (1995) developed a different model of Coast Miwok sociopolitical divisions at the beginning of the historic period based on Mission registers, intermarriage patterns, and relative time of baptism of each group. He included 13 separate tribes within the Coast Miwok language group in his model. His data indicated the Tamal occupied an inland territory in central Marin County, while the Olema inhabited a broad coastal swath that included the Point Reyes Peninsula (Milliken 1995:228, 248-249).

More recently, Milliken has revised his understanding of Coast Miwok organization using a more sophisticated analysis of Mission records, and using additional historic and ecological clues (Milliken 2009). His recent model also includes 13 separate village communities comprising the larger Coast Miwok language group, but it includes a more fine-grained understanding of their distribution across the landscape (Milliken 2009:2). One of the most important changes from previous models, according to the Milliken, is that “Coast Miwok people labeled ‘Tamales’ in the mission records hailed from five contiguous regions across much of the Marin Peninsula, suggesting that the place-name ‘Tamal’ does not reflect any political reality of the time” (Milliken 2009:ii). Instead, he suggests, the coastal area stretching from Olema in the south to Bodega Bay in the north, which appears in the Spanish records as the land of the “Tamal,” may not have been occupied by larger village communities, each comprised of many villages, like the rest of the Coast Miwok territory, but may have been organized into independent villages or mobile bands. Milliken divides this territory into regions that are the size-equivalent of the other tribal areas in Marin County, and he designates the area that encompasses the Point Reyes Peninsula as part of the South Tomales Bay Region (Milliken 2009:62). The boundary between the South Tomales Bay Region and the other communities to the north and south is indistinct and arbitrary, and it is therefore unclear what the reality at the time of contact may have been. Historically identified village names in the South Tomales Bay Region include Etcakólum, on the eastern shore of Tomales Bay, Sichqui, Olemoloque, Mottococha, Echajutti, Pusuluma and Yuipa—the latter two may have been villages on the Point Reyes Peninsula itself (Milliken 2009:80-82).

Milliken’s sophisticated analysis of Spanish mission records may indicate that both historical and ethnographic sources are limited in their ability to specifically identify the Coast Miwok-speaking inhabitants of the Point Reyes Peninsula and *tamál-húye* at the time of sixteenth-century contact with European voyagers, or to definitively delineate the boundaries of the village community to which they belonged. Utilizing all available sources discussed above, the Federated Indians of Graton Rancheria themselves conclude that, “[t]he *nacion* of the Indians of the Point Reyes area was called Tamal” (Emberson, et al. 1999:42). In the absence of specific data related to a larger village community in what Milliken refers to as the South Tomales Bay Region, I follow the identification preferred by the Federated Indians of Graton Rancheria and

refer to the inhabitants of the Point Reyes Peninsula as members of the Tamal tribe, acknowledging that this term may refer to a larger aggregate of village communities within central Marin County and that the actual name of the inhabitants of Point Reyes may, in fact, have been different. In addition, a number of different models of polity boundaries have been proposed for the residents of the Peninsula itself (i.e., the region west of Inverness Ridge), but most indicate that residents of sites on Point Reyes and around Drakes Estero are part of a larger village community whose territorial lands spanned Inverness Ridge, crossed Tomales Bay, and included portions of the Lagunitas Valley to the east (Edwards 1968, 1970; Milliken 1995). Models differ, however, on whether the Olema Valley, south of Drakes Estero and Limantour Spit, was part of this same village community or was part of a separate village community's territory that extended from there to the south (Milliken 2009).

Turning to the archaeological record, we can infer a great deal about the sociopolitical landscape of the Point Reyes Peninsula at the time of the encounters with Drake and Cermeño using known archaeological sites. Dozens of sites are located on the Peninsula, although the lack of chronological controls makes it unclear in many cases what sites were occupied contemporaneously. Porcelain and other artifacts from the *San Agustín* have been used as one chronological marker to indicate, at the very least, which sites were occupied during or after the sixteenth-century contacts (Heizer 1941; Meighan and Heizer 1952). Using this evidence, at least 17 different sites around *tamál-húye* were occupied at the end of the sixteenth century or afterwards—although the lack of porcelain does not necessarily indicate that a site was not occupied at least seasonally during this time period. Of these sites, as many as five were large sites that were likely home to 10 or more families, with a total population of as many as 100 people (or more) each (Edwards 1968:17); Polansky (1998:108), however, only designates three of these as permanent village sites. Whether any of these identified sites were primary village sites that were the focal point of their respective village community, or whether these were all secondary or even seasonal villages, is an open question—there is some evidence to suggest that a number of sites around the Point Reyes Peninsula were only occupied seasonally, during the winter and early spring (Follett 1964; Henn 1970). Despite the difficulty in assigning a specific historical identity to the Tamal, however, we can infer much about their community and daily lives based on comparison to their Marin County neighbors, about whom we know much based on historical and ethnographic observations.

Cosmology

The Tamal people undoubtedly shared many cultural characteristics with their fellow Coast Miwok-speaking neighbors, as well as neighboring ethnolinguistic inhabitants of surrounding areas, such as the Pomo (Kroeber 1925:275). These aspects of cultural practice and material culture have been extensively described elsewhere based on detailed ethnographic (Collier and Thalman 1996; Kelly 1978a; Kroeber 1925), historical (Beardsley 1954a; Heizer 1947; Kroeber 1925), and archaeological data (Beardsley 1947, 1948, 1954a, 1954b; Elsasser 1978; Milliken, et al. 2007), and I will not review them here (see also Slaymaker 1982). The Tamal also undoubtedly shared a common world view with surrounding village communities and engaged in similar religious practices. Although probably the most difficult aspect of cultural practice to understand, especially for pre-contact populations, cosmology or world view is also one of the most important to consider when examining how the Tamal incorporated sixteenth-century introduced objects into their daily lives. Ethnographic accounts and oral traditions

recorded in the early-twentieth century provide a basic understanding of the Coast Miwok-language group's cosmology. While it is impossible to uncritically project these beliefs to pre-contact times, they at least allow a basis for interpreting how the inhabitants of Point Reyes may have perceived sixteenth-century European visitors, and how they may have subsequently incorporated material cultural from the *San Agustín* into their cultural practices.

Limitations in data sources prevent us from ever knowing precise details about the world view and religious practices of the Tamal living at *tamál-húye* at the end of the sixteenth-century, but we can infer a basic understanding based on a variety of historical and ethnographic sources (Kroeber 1907, 1922:299-328, 1932:391-420; Loeb 1926, 1932). Among the most important sources is the body of work of a number of anthropologists affiliated with the University of California, Berkeley in the early part of the twentieth century, especially Isabel Kelly's work with Coast Miwok-speaking informants Tom Smith and Maria Copa (Collier and Thalman 1996; Kelly 1978a, 1978b).

California Indian cosmology is similar throughout the central part of the state, including the San Francisco Bay Area, although there are clear distinctions made by individual tribes. In general, central California Indians had an animistic world view, believing that not only humans, but all of nature (animals, plants, rocks, celestial phenomena, features on the landscape, etc.) had spirits that together formed the complex tapestry of life. Ghosts also played an important role in the spiritual beliefs of California Indians, although they did not interact with the spirit world (Loeb 1926:302-303). Among the Coast Miwok-speaking tribes, there was a "recurrent theme" of death, resurrection, ghosts, and poison that touched many aspects of tribal world view (Kelly 1978a:421)

Central California tribes share a common conception about the creation of the world, although details can differ. In some cases the creator is a divine anthropomorphic figure, while the mythological figure Coyote plays a supporting role as the antagonist; in other cases, Coyote is the primary mythological figure, and is responsible for creating the world and all that is in it, including humankind (Kroeber 1907:343). Oral traditions collected from Coast Miwok-speaking individuals in the early twentieth-century generally highlight the latter case (Kelly 1978b; Loeb 1932:113; Merriam 1910). These oral traditions (*a'kala*), told by both women and men, especially during long, winter nights, were considered important for teaching young people about tribal lore (Kelly 1978b:23). According to the tales, the earth was covered in water and Coyote (*óye-óyis*) came from the west, across the ocean, on a tule raft. He landed on a peak sticking above the water, and then created the land by shaking his *walik* (blanket or mat) to the four directions. He later created the people from feathers, sticks, and mud (Kelly 1978b:28; Merriam 1910:203).

Because the land to the west, beyond the ocean, is the realm of Coyote, Coast Miwok-speaking peoples believed that after death, an individual went west across the ocean to be with Coyote (Kelly 1978b:23-24, 28). According to Kelly's informant Maria Copa,

The dead travel over the land on a cloud path. They say that a long time ago, at Point Reyes...was the trail of the dead; there was a kind of string leading west through the surf....Dead people are called *uteko* and they go to be with Coyote, where the sun goes down. Coyote went back there (Kelly 1978b:39).

Similarly, Tom Smith, another of Kelly's informants, noted that,

The dead go toward Point Reyes and go down there. They say there is a little chunk of wood there, which they use to make a fire. A piece of rock about two feet long is at the spot where they jump into the ocean and then follow a road back of the breakers (Kelly 1978b:39).

Copa and Smith's stories are similar to another story told to Merriam, who recorded that,

When a person dies his Wal'-le or Ghost goes to Hel'-wah the West, crossing the great ocean to Oo-tā-yo'-me, the Village of the Dead. In making this long journey it follows hinnan mooka, the path of the Wind. Sometimes Ghosts come back and dance in the roundhouse; sometimes people hear them dancing inside but never see them (Merriam 1910:217)

The view that the Coast Miwok-speaking deceased went west was also documented during the historic period. In 1814, Duran and Fortuny wrote, “[t]hey [Coast Miwok] relate that their departed relatives live in other lands or on the other side of the sea (depending on which side they are); that they play, etc., go about and dance; that they are happy, etc.” (quoted in Milliken 1995:28). The widespread central California belief in the land of the dead being located toward the west, across the ocean, makes it probable the Tamal shared this belief, particularly because Point Reyes, the stepping-off place for the dead, was within their tribal territory. Although Heizer suggests it may be possible this belief is an outgrowth of the Drake encounter (see below), Kelly disagrees, noting there is abundant indication that the west has long-term meaning to Coast Miwok-speaking peoples due to Coyote (Collier and Thalman 1996:452).

Religious Practice

According to Kroeber, California Indian religious practices fell into three categories: (1) customary observances by individuals; (2) shamanism, which involves individual communication with the supernatural world; and (3) community ceremonial observances, often performed by secret societies (Kroeber 1907:321). The first category included individual mourning observances, but among Coast Miwok-speaking groups these tended to be less important than community-based mourning ceremonies. Kroeber noted that, in general, California Indians did not practice personal mutilation as a part of mourning the dead, although oftentimes women (who almost always participated in mourning observances with more vigor than men) cut or burned off their hair (Kroeber 1907:322). In addition to personal observances by individual community members, property that belonged to the dead was shunned or destroyed (Kroeber 1907:323).

The second category of religious practice among California Indians, including the Tamal and other Coast Miwok-speaking tribes, was shamanism. For California Indians, like many other tribal groups in North America, the basis for shamanistic practice was individual power based on control of the supernatural world (Kroeber 1907:327). In general, shamanism centered on curing disease and preventing (or sometimes causing) death (Kroeber 1907:331). Disease was thought to be caused by an object invading the body, and curing centered on removing that object, after diagnosis through singing, dancing, or smoking, by sucking it out (Kelly 1978a:419-421; Kroeber 1922:299). Among the Pomo, closely-related neighbors to the north of the Coast Miwok-speaking tribes, there were a number of types of shamans, including the outfit doctor

(*walimitca*) who diagnosed ailments and the sucking doctor (*temnepa* or *wakilapi*) who cured them (Loeb 1932:114). Pomo shamans used a variety of amulets or fetishes to wield their power, including stones, animal parts, and other objects (Kroeber 1907:349, 1922:301). Illness could also be cured by having secret society members perform dances, and this was considered more effective than the curing power of the sucking doctors (Loeb 1932:114).

The third category of ritual practice in native California was a rich and complex ceremonial calendar of dances, often performed by secret societies, for the benefit of the entire community. Specially-trained ritual practitioners performed dances and rituals “to maintain good relations with forces in the environment” (Milliken 1995:27). Each tribal group had a distinctive set of dances, ceremonies, and rituals that they performed throughout the year, but there was a common thread that ran throughout central California connecting the various tribes through a shared system of belief. Rituals and dances were usually performed in specialized structures, and in central California these dance-houses were domed, semi-subterranean, oval-shaped structures. A variety of extravagant costumes, adorned with shell ornaments, beads, and feathers, and specialized regalia, including foot drums, bone whistles, rattles, clappers, and bullroarers, were used during the dances (Kroeber 1907:341-342). Kroeber sub-divides California Indian ceremonies into three categories: (1) mourning ceremonies; (2) secret society initiation ceremonies and dances; and (3) specific tribal dances or ceremonies performed for a variety of purposes, but that generally ensure balance in the natural world. He further noted, however, that mourning ceremonies were not practiced by a number of California Indian groups along the northern coast, including the Coast Miwok-speaking groups (Kroeber 1907:335).

The secret society initiation ceremonies included dances that were a part of what was known as the Kuksu cult system, which was widespread among north-central California Indian tribes, but that probably did not extend beyond the region. Groups outside the region practiced similar initiation ceremonies analogous to the Kuksu, but they lacked the overall systematic organization of the secret societies (Kroeber 1907:336). The purpose and social function of the secret societies, as well as the specifics of the dances and enactments, varied between California Indian tribal groups (Kroeber 1932:394), but seemed to center on the initiation and instruction of new members (which included the majority of men in the community, but also included women) and on the performance of healing rites (Kroeber 1907:336, 1922:306, 1932:394-397; Loeb 1926:354). In addition to the mixed secret society, there was also a secret society that was open only to women (Kelly 1978a:422). It is important to note that the Kuksu rites long pre-date, and are therefore distinct, from the various rituals that came about as part of the 1872 Ghost Dance movement (Kroeber 1932:392).

The Kuksu cult differed somewhat among north-central California Indian tribes, but it generally fell into two primary variations, one practiced on the coast (including presumably by the Tamal) and the other practiced by inland tribal groups. While both traditions included the Kuksu ceremonies as part of the overall Kuksu cult, according to Kroeber only the western (coastal) form included a second initiating society, called the ghost society, that impersonated spirits or ghosts of the dead (Kroeber 1932:396, 423). While Kroeber suggested both societies were two different aspects of the Kuksu cult, Loeb, on the other hand, separated the Kuksu rituals and the Ghost ceremony into two distinct sets of rites (Loeb 1926:338). He wrote, “[t]he Ghost ceremony was *not* given by the members of the secret society, and had no connection with the society (Loeb 1932:115, emphasis mine). Importantly, however, according to Loeb, although the Ghost ceremony was not performed as part of a secret society, and was therefore separate from

the Kuksu rites, a ceremony similar to the ghost rites, called the Pololo dance, were performed by the secret society among Coast Miwok-speaking groups (Loeb 1932:115-116).

Performance of the Kuksu and ghost society ceremonies took place on alternate years, usually in June, early in the ceremonial calendar. The ceremonies took place over a four-day period and included the initiating rites for new members, as well as a number of other specific ceremonies associated with the secret society. Women were included in the Kuksu cult ceremonies (Kroeber 1932:404; Loeb 1926:338). The Kuksu cult was characterized by a series of ceremonies performed by society members who impersonated supernatural figures (*shalnis*), including the mythological character Kuksu (Kroeber 1932:396-400, 423; Loeb 1926:354-364). Impersonators of Kuksu and the other characters wore elaborate disguises, including a large feather headdress and cape known as the “big head,” and painted their bodies to represent the mythic character (Kroeber 1907:337, 1922:307). Among the Coast Miwok-speaking tribes, the Kuksu cult members performed the Pololo, the Kuksui, and the Kilak dances—non-members could observe the Kuksui and the Kilak dances, although the Pololo dance was only open to society members. The Pololo dance featured ghosts, impersonated by both men and women, who symbolized the return of the dead, while the Kuksui dance was a healing ceremony performed when requested by members of the community who were ill (Loeb 1932:116-118). Both Kroeber (1932:404) and Loeb (1926:354-364; 1932:103-118) described the Kuksu ceremonies in detail.

As described by Loeb (1926; 1932), the Ghost ceremony, which was distinct from the Kuksu, was a tribal initiation for boys in the village community. As a result, women were excluded from Ghost ceremony activities (Kroeber 1932:404; Loeb 1926:338). Loeb wrote, “[s]o sacred and taboo to women was the Ghost ceremony considered that...a special house had to be built for the occasion” (Loeb 1932:115-116). The Ghost ceremony rotated between villages within the tribe, and each constructed the ghost house and hosted the ceremonies about every seven years. The timing of the ceremony followed the death of an important community member (Loeb 1926:342). The Ghost ceremony, which Loeb described in detail, included the return of the dead, the initiation of new members, and the use of the bullroarer (Loeb 1926:338-354, 1932:116). Kelly noted, however, that Loeb’s description does not highlight the fact that during the Ghost ceremony, the participants did not believe that the ghosts were impersonated, but that they actually believed the performers to be the dead returned to life (Kelly 1978a:422).

In addition to the Kuksu rites and the Ghost ceremony, there were a wide variety of other dances performed by the Coast Miwok-speaking tribes about which little is known. Many involved impersonation, such as the Kuksu, Ghost ceremony, several animal dances, and a large number of other spirit-impersonation dances. Other dances were associated with hunting or first fruits. Ethnographic data suggests that there are many aspects of spiritual practice about which little is known (Kelly 1978a:422-423). Numerous other dances and rituals were performed along with the Kuksu rites on a regular schedule throughout the year (Collier and Thalman 1996; Kelly 1978a)

A final aspect of central California Indian cosmology and religion was the importance of charms to various aspects of religious and spiritual practice. Charms could be used to ensure success in fishing, hunting, or gambling. They could be natural objects, such as feathers or stones, but always needed to be something unusual. Further, however, the object needed to have its power invoked through a specific ceremony to guarantee its efficacy. Important charms were often handed down to the next generation (Loeb 1926:309-310).

The background and world view of each of the participants during the sixteenth-century cross-cultural encounters at *tamál-húye* undoubtedly influenced the course of the interactions and may have structured subsequent outcomes. Although I have not undertaken a comprehensive review here, understanding these varied backgrounds is critical for understanding the specific encounters. I now turn to a detailed review of each encounter and consider how the Europeans and the California Indians perceived each other.

ENGLISH, SPANISH, AND TAMAL PERCEPTIONS

Limitations of Source Material

Despite the wealth of European sources documenting sixteenth-century encounters at *tamál-húye*, European accounts of indigenous peoples have their own inherent biases, and researchers must critically evaluate each account to identify both personal biases of the authors and systemic bias of a European world view (Wood 1990:82-84). As Calder et al. note, “[i]t is no longer possible to write about early cultural contact between Europe and the Pacific without also negotiating a complex set of positions on the nature of the surviving documentary evidence. We have been taught to be suspicious of imperial designs, to beware not to replicate the assumptions of Eurocentrism, and therefore not to take these documents at face value” (Calder, et al. 1999:15). Europeans had a strong attitude of moral and technological superiority over indigenous populations, as well as shifting conceptions of the “noble savage” vs. the “ignoble savage” over the course of the sixteenth to eighteenth centuries. Both of these undoubtedly influenced their accounts. However, using multiple historical sources for independent confirmation of events (Trigger 1986:258), as well as the historical anthropological method of multiple, independently evaluated lines of evidence (Lightfoot 2005a:15), it is possible to construct valid interpretations from multiple points of view, including indigenous perceptions.

Within a historical anthropological framework each source has its own biases, interpretive problems and analytical constraints, but contribute distinct historical perspectives from different points of view. According to Lightfoot, European historical documents are “not so much biased representations of history as culturally constructed texts that present eyewitness accounts from the vantage point of elite, literate, Western males....These sources are particularly helpful in constructing [colonial] policies and practices” (Lightfoot 2005a:16). He goes on to note the documents “present a necessary European perspective on events and encounters that unfolded in each colony” and that they illuminate the “colonial structures” in which the contact was situated (Lightfoot 2005a:16). Similarly, Sahlins notes: “For an ethnographic history, the so-called distortions of firsthand observers and participants are more usefully taken as *values* than as *errors*. They represent the cultural forces in play” (Sahlins 1992:14).

Despite the limitations, these accounts are invaluable sources because they describe native circumstances at the moment of contact, before change had taken place; record details and differences at each location visited, showing the diversity of indigenous life; and are unsurpassed for cumulative detail and accuracy of observations (Salmond 1991:295-296). Care must be used when using historical documents to identify indigenous responses to those encounters, however, and historical documents should not be used as simple analogues, but as “revelations of the time at which they were recorded, and as additional sources for comparison with archaeological interpretations” (Lightfoot 1995:211). Despite these limitations, the accounts are valuable sources because they describe certain aspects of California Indian life at the moment of contact,

before significant change had taken place. In this regard, they are a vital source of information about contact-era California society.

Native oral traditions, passed down through the generations, document some Indian perceptions of the sixteenth-century interactions, and using them can help ameliorate problems identified with using historical documents. Just as the historical and ethnohistorical documents produced by European observers are biased in their tendency to overlook or distort crucial aspects indigenous daily existence, the native narratives and oral traditions are potentially biased or misrepresent actuality due to the passage of time since they were first passed-down (Lightfoot 2005a:15-16). Traditional Coast Miwok or closely-related Pomo oral histories, for example, although collected after contact, nonetheless offer a native perspective not found in other sources. These native narratives may be especially vital for understanding ritual and symbolic aspects of cross-cultural encounters. Each alternative source must be carefully compared and balanced against the others, and the result must be nuanced to provide the most complete picture of the past.

European and Tamal Perceptions of the Sixteenth-Century Encounters

Drake (1579)

The 1579 encounter between Tamal hunter-gatherers and Sir Francis Drake and his crew is the first recorded meeting of California Indians and Europeans in northern California. Drake and his crew landed somewhere on the northern California coast and spent five weeks preparing his vessel *Golden Hind* for a long Pacific crossing and eventual return to England (Vaux 1854; Wagner 1926). Scholars debate the precise location of the landfall, but most agree based on ethnographic and linguistic evidence it was within the territory of Coast Miwok-speaking inhabitants of the northern Bay Area, encompassing *tamál-húye* (Heizer 1974; Heizer and Elmendorf 1942; Kroeber 1925:276-278). Because a number of excellent analyses of the engagement between Drake and the Tamal have been produced over the years, here I only summarize the details relevant to the present project.

Descriptions of Drake's interactions with the Tamal are documented in at least three detailed accounts. The most comprehensive account is *The World Encompassed by Sir Francis Drake*, which was compiled by Drake's nephew (also named Sir Francis Drake) in 1628 from observations recorded during the voyage by Francis Fletcher, the ship's chaplain (Vaux 1854:1-162). Another account, Hakluyt's *Famous Voyage* (1600), was compiled from several sources, including Fletcher's, and it follows very closely *The World Encompassed by Sir Francis Drake* (Vaux 1854:219-226; see also Wagner 1926:241). Finally, there are two brief accounts written by John Drake (Sir Francis's cousin, also on the voyage) after his later capture by the Spanish, that corroborate some of the details of the more comprehensive accounts (Nuttall 1914:31-32, 50-51).

Because of significant historical interest in identifying the precise location of Drake's landfall on the California coast, in addition to the vast body of historical literature analyzing the primary accounts of Drake's voyage (i.e. Wagner 1926), there has also been a number of anthropological analyses of the accounts attempting to identify the California Indian group that Drake encountered. Based on combined ethnographic and linguistic evidence recorded in the primary accounts, Kroeber (1925:276-277) concluded that Drake encountered a Coast Miwok-speaking population during his stay; later scholars also examined the documents and agreed with

Kroeber's assessment (e.g. Heizer 1947, 1974; Heizer and Elmendorf 1942; Meighan 1981). Nonetheless there is still disagreement among historians about the exact location of Drake's stay, although most agree that present-day Drakes Bay in Point Reyes National Seashore is the most likely location.

Texts of the encounter between the Tamal and Drake's crew are of interest to both historians and anthropologists because the Drake accounts consistently record a series of unusual and seemingly ritualized scenes after *Golden Hind's* arrival in California. The day after anchoring the *Golden Hind*, a lone individual in a canoe approached the ship and addressed Drake and his crew in an oratory greeting. *The World Encompassed* account records the scene:

[T]he people of the countrey shewed themselves; sending off a man with great expedition to us in a canow. Who being yet but a little from the shoare, and a great way from our ship, spake to us continually as he came rowing on. And at last at a reasonable distance staying himselfe, he began more solemnly a long and tedious oration, after his manner: using in the deliverie thereof, many gestures and signes; moving his hands, turning his head and body many wayes; and after his oration ended, with great shew of reverence and submission, returned back to shoare againe. He shortly came againe the second time in like manner, and so the third time: When he brought with him (as a present from the rest) a bunch of feathers, much like the feathers of a blacke crow, very neatly and artificially gathered upon a string, and drawne together into a round bundle; being verie cleane and finely cut, and bearing in length an equall proportion one with another; a speciall cognizance (as wee afterwards observed) which they that guard their kings person, weare on their heads. With this also he brought a little basket made of rushes, and filled with an herbe which they called [Tabah]. Both which being tyed to a short rodde, he cast into our boate (Vaux 1854:119).

The individual in the "canow," probably a tule balsa (*sákas*), may have been the headman of the village community (if the primary village was one of those close-by on the shores of the estero) or one of the lesser headman of a nearby secondary village—someone tasked with the oratory greeting of strangers to their territory. We cannot know with certainty since the political boundaries of the Tamal village community is unknown (see above). This description does indicate that at least one village on the Point Reyes Peninsula was occupied during the summer—despite archaeological evidence that some of the sites around Drakes Bay may have only been occupied during winter and early spring (Follett 1964; Henn 1970). The boat-based greeting was remarkably similar to the greeting given to Cermeño 16 years later (although without the offering of the feather bundle and herb-filled basket, see below).

The Drake accounts go on to record a series of what appear to be highly-ritualized events following the initial reception given the voyagers. Several days after their arrival in *tamál-húye*, and after constructing a fort on shore and beginning to careen the *Golden Hind*, *The World Encompassed* notes the Tamal "...came downe unto us; standing when they drew neere, as men ravished in their mindes, with the sight of such things as they never had seene, or heard of before that time..." (Vaux 1854:120). Afterwards, the English crew observed that the assembled native inhabitants appeared to weep and scratch their faces in an elaborate display of anguish. John Drake observed: "...many Indians came there and when they saw the Englishmen they wept and scratched their faces with their nails until they drew blood, as though this were an act of homage

or adoration. By signs Captain Francis told them not to do that, for the Englishmen were not God” (Nuttall 1914:50-51). Later, after the Tamal departed, *The World Encompassed* records,

As soone as they were returned to their houses, they began amongst themselves a kind of most lamentable weeping & crying out; which they continued also a great while together, in such sort, that in the place where they left us (being neere about 3 quarters of an English mile distant from them) we very plainely, with wonder and admiration did heare the same: the women especially, extending their voices, in a most miserable and dolefull manner of shrieking (Vaux 1854:122).

A variety of other scenes ensued over the course of several weeks while Drake and his crew repaired their ship in preparation for their voyage across the Pacific, each recorded in *The World Encompassed*. The most notable, perhaps, is a ceremony in which the California Indians “crowned” Drake as their *hioh* (or, “king,” according to the English chronicler) in an act that the English presumed was one of submission and that they were ceding their land to the English (Vaux 1854:128). According to Wagner, “[n]othing can be more certain of course, than that the Indians had no such idea, but with the lingering feudal notions characteristic of Englishmen of the day, Drake might have believed that the ceremony had such significance” (Wagner 1926:147) This was followed by more ritualizing crying, shrieking, weeping, and face-scratching. The Tamal people spread out among the Englishmen, choosing individuals and “...offered their sacrifices unto them, crying out with lamentable shreekes and moanes, weeping, and scratching, and tearing their very flesh off their faces with their nailes, neither were it the women alone which did this, but even old men, roaring and crying out, were as violent as the women were...” (Vaux 1854:129). Finally, “...they then began to shew & make knowne unto us their griefes and diseases which they carried about them...in most lamentable manner craving helpe and cure thereof from us: making signes, that if we did but blowe upon their griefes, or but touched the diseased places, they would be whole...” (Vaux 1854:130).

Based on anthropological assessment of the historical accounts, the encounter with Drake and his crew in 1579 may have had important ritual connotations for the Tamal (Heizer 1947; Kroeber 1925:276-278; Meighan 1981). Many scholars argue the native inhabitant’s actions may represent a variation of either the Kuksu ceremony or the Ghost ceremony, both of which took place during the summer months. Kroeber noted that the “bunch of feathers” presented when the *Golden Hind* first arrived is similar to specimens used by Pomo and Maidu in the Kuksu ceremonies (Kroeber 1925:277). Heizer analyzed the actions and objects noted in the Drake accounts in detail, and he attributes them to variations of the Kuksu rituals or Ghost ceremony (Heizer 1947:261-273). Other rituals are also a possibility—Kelly noted that the actions of the Tamal during the Drake encounter are suggestive of the *súy-a* Dance, which is marked by “mass hysteria,” and which her informant Maria Copa described as “a kind of fit” (Kelly 1978a:422). Accounts of Pomo mourning ceremonies include references to women lamenting and scratching their faces (Kostromitinov 1974:10), although both Kroeber and Kelly noted that Coast Miwok-speaking tribes did not practice a specific mourning ceremony (Kelly 1978a:421; Kroeber 1907:321-322). Within this ritual context, Kroeber, Heizer, and others have suggested that the Tamal perceived the English as returned spirits or ghosts of dead ancestors (Heizer 1947; Kroeber 1925:276-278; Meighan 1981). Kroeber wrote, “[t]here is no doubt that...Drake was received with marked kindness. Only the extreme veneration accorded him is difficult to understand. The simplest explanation is that the Indians regarded the whites as the

returned dead. Such a belief would account for their repeated wailing and self-laceration, as well as the burned ‘sacrifice’ of feathers” (Kroeber 1925:277). Heizer (1947:263, 271, 277), echoing Kroeber, also suggested that because of this cultural context, the Drake accounts indicate the Tamal perceived the English as returned spirits or ghosts of dead ancestors, based on the timing of the events (i.e. arrival during the Kuksu period), ethnographic information, and Tamal association of Point Reyes with the realm of the dead.

Lightfoot and Simmons (1998) agree with previous researchers that Drake’s reception was ceremonial, and that ethnographic evidence points to the Kuksu, Ghost ceremony, or some other ritual performance. In a more nuanced interpretation, they suggest the Tamal perceived symbolic individuals who had arrived in *tamál-húye* to participate in the ceremonial context of the Kuksu performances (Lightfoot and Simmons 1998). They note that, “[i]n this interpretation, the world view of the Kuksu and Ghost Dance ceremonies provided the cultural context for making sense of the voyagers and for eliciting the proper behavioral responses to them” (Lightfoot and Simmons 1998:150). Instead of suggesting the Tamal literally took the visiting Europeans to be ghosts or spirits, however, Lightfoot and Simmons suggest that “[i]n the eyes of the Coast Miwok [Tamal], the strangers may not have been perceived as gods, supernatural beings, or returned ghosts per se; rather, they were individuals who had arrived to participate in the sacred dances and to portray mythical figures in the specific context of the Kuksu and Ghost Dance performances” (Lightfoot and Simmons 1998:152). Regardless of the specific ceremony underway during the Drake encounter and represented in Fletcher’s account, it seems the *Golden Hind* arrived during an important time of the year, which likely contributed to the unusual behavior described during the encounter.

Although we can never know their true perceptions of these early encounters, there is at least one native oral tradition recorded about pre-colonial European encounters in northern California that offers some insight, and which supports some of the ideas discussed above. It comes from the Kashaya Pomo, closely related neighbors of the Tamal to the north, as told by elder Essie Parrish to Berkeley linguist Robert L. Oswalt in 1958. As the story goes,

In the old days, before the white people came up here, there was a boat sailing on the ocean from the south. Because before that they had never seen a boat, they said, ‘Our world must be coming to an end. Couldn't we do something? This big bird floating on the ocean is from somewhere, probably from up high. Let us plan a feast. Let us have a dance.’ They followed its course with their eyes to see what it would do. Having done so, they promised Our Father [a feast] saying that destruction was upon them.... When they had done so, they watched [the ship] sail way up north and disappear. They thought that [the ship] had not done anything but sail northwards because of the feast they had promised. They were saying that nothing had happened to them—the big bird person had sailed northward without doing anything—because of the promise of a feast; because of that they thought it had not done anything. Consequently they held a feast and a big dance...(Oswalt 1966:245-247).

This tradition provides a glimpse into the California Indian perspective on early encounters, albeit filtered through many generations of oral tradition, and illuminates how at least one California Indian group made sense of their initial contact with European outsiders. Native perceptions of early encounters with European voyagers may be the product of an

indigenous cosmology or world view that is very different than a European perspective. Interpreting archeological remains that resulted from the encounters needs to consider that native populations may have thought about introduced material culture in very different ways than the Europeans who were the primary consumers of the objects. Although there is no way to determine if this tradition refers to a specific encounter, and if so, which voyager it refers to, and whether this oral tradition should be taken as a literal interpretation of events can be debated. Its real value, however, is that it gives us a glimpse into the California Indian world view in their own words, and in that regard, the story gives insight into how one specific indigenous group made sense of their initial contact with European outsiders.

Cermeño and the San Agustín (1595)

From an archeological perspective, the wreck of the *San Agustín* that took place just 16 years after Drake's California stopover was more important than Drake's encounter because of the large quantity of material remains that can be attributed to the ship, which form the basis for this project, while there are no material remains unambiguously attributable to Drake. The *San Agustín*, carrying a diverse cargo of Chinese trade goods including porcelain, silk, and other luxury items, wrecked in *tamál-húye* in November 1595 while en route from the Philippines to New Spain (Sanchez 2001; Wagner 1924). After a four-month Pacific crossing, the *San Agustín* reached California and Cermeño anchored in a large, sheltered bay (which he named Bahía de San Francisco, which was later renamed Drakes Bay) to re-provision and assemble a small launch for coastal exploration. Cermeño's crew interacted with the Tamal population for more than a month during this stopover as a result of the *San Agustín* being driven ashore during a storm shortly after the crew's arrival in *tamál-húye* and wrecked. The Spaniards were forced to modify the launch to accommodate the entire crew to continue to Mexico, and to abandon the *San Agustín* and its cargo. After the *San Agustín*'s loss, interactions between the Spanish and Tamal became more strained, and at least one conflict erupted over material from the wreck as both sought to salvage goods from the ship (Wagner 1924:23). The interactions are documented in an account written by Cermeño upon his return to Mexico, as well as other contemporary "declarations" by a number of crew members [for translations and detailed analyses of these documents, as well as narratives of the voyage, see Wagner (1924), Sanchez (2001) and Aker (1965)]. The documents record a number of observations and events from the voyage, including several observations about the indigenous populations the Spaniards encountered, and descriptions of several interactions between the Spanish and Tamal at *tamál-húye* (see Lightfoot and Simmons 1998 for additional analysis of these encounters). Here I highlight the fact that historical evidence may suggest the loss of the ship and the aftermath, as the crew struggled to feed themselves and collect provisions for their continuing voyage in the small boat, possibly led to a fundamental shift in the way the Tamal perceived the Spaniards.

Cermeño described the Tamal as "a well-disposed and robust people, with long hair, and [they] go naked, with their private parts out, only the women cover their private parts with grass and some with deerskins" (Sanchez 2001:241, see also Wagner 1924:12-13). He also noted that, "[t]he people were painted in certain parts although the paint is not so thick... (Sanchez 2001:242). Other crew members observed that "the Indians wore their hair long but most lacked facial hair. Those who did have beards shaved them" (Sanchez 2001:241). Because archaeological evidence indicates the Tamal inhabited coastal sites during the winter months (Follett 1964; Henn 1970), the population along the bay shore and esteros was likely at its

seasonal height. The historical narratives reflect this large population density—accounts indicate the Spanish visited at least four different villages, and they observed populations varying between 50 to 150 people at each village (Sanchez 2001:242, 243, 243-244; Wagner 1924:14).

After entering *tamál-húye* on November 6, 1595, Cermeño anchored the *San Agustín* outside of the mouth to Drakes Estero, which at that time was situated immediately west of present-day Drakes Head and west of the entrance to Estero de Limantour.¹ Cermeño noted that fresh water was plentiful in Estero de Limantour, and that a Tamal village was located at the entrance to that estero.² After the *San Agustín* anchored in *tamál-húye*, the initial encounter unfolded in a way that was remarkably similar to the greeting Drake received more than 16 years before. Cermeño wrote,

[h]aving anchored in the said bay on the sixth of said [month], shortly an Indian of one of those living on the beach came alongside in his small boat made of grass which looks like the bullrushes of the lake of Mexico. The said Indian was seated in the middle, and he had in his hand an oar with two blades with which he rowed with great swiftness. He came alongside our ship, where he remained talking in his language a good while without anyone understanding what he was saying. Having lured him with endearing words, he came closer to the ship and there we gave him things such as pieces of silk and blankets and other trifles, which the ship carried, and with which he returned to shore very contented. The next day, the seventh of said [month], four other Indians came out to the ship in the said boats. They came aboard and did the same as the first one (Sanchez 2001:241-242).

After the *San Agustín*'s arrival, it seems that the Tamal received the visitors in a similar way as their previous visitors in 1579, possibly as a result of the similarly unexpected arrival of the strangers in the unfamiliar vessel. As with the Drake encounter, the individual in the tule balsa (*sákas*) was probably the village community headman or one of the lesser headman of a nearby secondary village—someone tasked with the oratory greeting of strangers to their territory.

The deferential reaction to Cermeño and his crew continued: the day after the Spanish arrived, on November 7, 1595, Cermeño wrote,

¹ Francisco de Bolaños, a crewmember aboard the *San Agustín* in 1595, later described *tamál-húye* in the Bolaños-Asension *derrotero*, which chronicled his experiences with Vizcaino in 1603. Describing the bay, he wrote, “On its [Point Reyes] northeast side this furnishes a very good shelter, making it a good port for all ships....On the northeast side there are three white cliffs very near the sea, and in front of the one in the middle an *estero* enters with a very good mouth without breakers. On going in this, you will soon encounter friendly Indians, and can easily find fresh water” (Wagner 1929:55-56). The “three white cliffs” with the *estero* mouth in front of them are easily distinguishable on the modern landscape. Bolaños’s description does two things: first, it indicates the location of the *estero* mouth in 1595, which has shifted east and west hundreds of meters in an unpredictable pattern since that time, in 1595; second, it implies that the *San Agustín*'s anchorage was outside the *estero* mouth, in front of the “three white cliffs.” This allows us to put the rest of the description of the landscape in perspective and possibly identify the features of the landscape and villages discussed by Cermeño and others in their accounts.

² This may correspond to the large village site found at MRN-232, the Estero Site. Heizer (1940d) wrote that MRN-242, the Cauley Site, was “[p]robably the first village seen by Cermeño in 1595,” however, given that MRN-242 is located nearly 2 mi. north of the *estero* entrance, and not directly visible from there along the eastern shore of Drakes Estero, I think it more likely that the village Cermeño saw was MRN-232, which is $\frac{3}{4}$ mi. (1.2 km) away from the *estero* entrance and within line of sight visibility.

In order to see the character of the land... I joined twenty-two men in the ship's boat, seventeen arquebusiers and three shield bearers, and my ensign and the sergeant. I went ashore and disembarked on the beach, where, nearby, I found many Indians—men, women, and children—who had their dwellings there. These were caves [semi-subterranean houses] made in the sand and covered with grass....They have bows and arrows and, among them, we could not find any other kind of iron with which to fashion a weapon or anything else (Sanchez 2001:242).

Another crewmember observed that,

[o]n the 7th [of November]...they [Cermeño and the crewmembers that accompanied him] went to a rancheria about an arquebus-shot from the beach³, where there were about fifty adult Indians, looking on with much wonderment in seeing people never before seen by them. All were very peaceable, and their arms, which up to that time they were not known to have had, were in their houses...(Wagner 1924:14, fn 19).

A third crewmember, Alonso Gómez, noted that the he Indians viewed the Spanish as “curiosities” (Sanchez 2001:242 fn 62).

This type of reaction continued as the Spanish explored the territory surrounding their landing place:

That same day the Captain with his men, going inland about half a league, came upon a band of Indians in a warlike attitude, who, as soon as they saw the Spaniards, began prancing around and dancing a war-dance..., and giving loud howls. Soon one of them who carried a tall banner of black feathers began to advance to where the Spaniards were, and having looked them over, stopped to examine the men. But two Indians of those on the beach with whom the Spaniards had made friends and who were along, spoke to them, and soon they all lowered their arms and put them on the ground and came towards the Spaniards. The one who carried the banner brought it and delivered it to the Captain, and then all came up in a humble manner as if terrorized; but the Spaniards pacified them and reassured them, giving them taffeta sashes. The Indians then took their bows and arrows and gave them to the Spaniards. They all had their faces painted in black and red (Wagner 1924:14, see also Sanchez 2001: 242).

It appears the Spanish first encountered the Tamal on Limantour Spit, who then accompanied them as they explored the surrounding territory. The second group encountered, probably coming from one of the inland villages who have not yet seen the Spanish, but who have heard of the foreigner's arrival, appear to be dressed in ceremonial regalia, with their faces decorated with black and red paint, a tall banner of black feathers, and they began a ritual dance as they

³ An arquebus-shot is approximately 500 ft. (152 m)(Aker 1965:74). This suggest that this village was likely one of the village sites on Limantour Spit, which are approximately 400-550 ft. (120-170 m) from the water's edge, on the north side of the low coastal dunes (Aker 1965:24).

approached the Spanish. Red and black facial paint may indicate association with the Pololo dance or some other ritual (e.g., Loeb 1932:117), although it is possible this type of reception may have been a standard challenge to foreigners arriving in their territory. After the Tamal from the village on the beach explained who the Spaniards were, however, the attitude of the second groups changed abruptly to one of deference. Although the details differ, this is reminiscent of the earlier encounters between the Tamal and Drake. It is unclear precisely what was going on here, and we only have the Spanish accounts to offer clues, but one possibility is that the Tamal had recalled the earlier encounter with Drake and the ceremonial context that accompanied it, and that this same perception was afforded to the Spanish during the initial stages of this visit.

Despite some similarities, there are a number of differences between the encounters with Drake and his crew in 1579 and the *San Agustín*'s crew in 1595, including the lack of ritualized visits to the European camp by the indigenous population, and the distinctive behavior noted in *The World Encompassed*. Lightfoot and Simmons attribute the different reception given to Cermeño than to Drake (after the initial greeting) to be a matter of timing. As discussed above, they (and others) have suggested that Drake arrived in summer during the "first fruit celebrations," which included Kuksu and sometimes Ghost ceremony rituals (Lightfoot and Simmons 1998:151), and therefore he and his men became actors in those rites. Cermeño, on the other hand, arrived in fall, well outside the ceremonial calendar that included the Kuksu and Ghost ceremonies. As a consequence they were treated differently, and Lightfoot and Simmons believe the Tamal "may have been taken by surprise because the Spaniards arrived unexpectedly outside the ceremonial cycle of the Kuksu and Ghost Dance rituals" (Lightfoot and Simmons 1998:153).

The Spanish did not record any further encounters with the Tamal until after the loss of the *San Agustín*, which although the exact date is not recorded seems to have occurred sometime after November 15 (Sanchez 2001:243-244 fn 66). After the wreck, and as the Spanish evidently neared completion of their launch that would eventually carry them home, they began to collect provisions for their voyage back to New Spain. Gómez mentioned two provisioning trips to the hinterland, one on November 30 and the other on December 2, where the Spaniards collected a quantity of acorns, nuts, and other foods for their voyage (Sanchez 2001:243 fn 65; Wagner 1924:21).

One account, however, may indicate that the Spanish were in a desperate condition, and that the behavior of the Tamal towards them had fundamentally changed since their initial arrival earlier in the month. The declaration of Juan del Rio, recorded by Pedro de Lugo, *escribano* of the King, noted that the Spanish party searching for provisions:

...having gone inland...found a number of settled Indians – men, women and children – some of whom had bows and arrows; and while they were there there came twenty more Indians who lived on the beach near where the launch was being made at the camp. These had gone away because they had been deprived of some wood they had taken which had come from the wreck of the ship, and they defended themselves with their bows and arrows against the Captain and Don Garcia de Paredes and the pilot, Juan de Morgana, who had gone to take the wood away from them and were running to the aid of our side. The Indians shot arrows at the Spaniards, and one of them planted an arrow in the breast of a Spaniard and wounded him, and they fled. There was taken from them the food they had,--

about a sack and a half of dry bitter acorns—and if it had not been for these, all the people would have suffered and died. These twenty Indians were those who led all the Spaniards to their rancheria near there, where they gave them of the food they had, which was acorns and a fruit the shape of a hazel [nut] and other things to sustain them. These rancherias are on the banks of a lagoon of fresh water (Wagner 1924:23).

Although Juan del Rio's account lacks detail and is somewhat confusing, it seems to suggest that after the *San Agustín* wrecked and the Spanish were constructing their launch, the Spanish had lost most of their provisions and were close to starvation. At the same time, the Tamal, perhaps observing the Spaniard's weakness, tried to salvage material from the shipwreck or perhaps that had washed ashore from the wreck valued by the Spanish, resulting in the conflict described by del Rio. This would seem to indicate that the deferential treatment of the Spanish they noted early in the encounter was no longer being observed. Whether this is due to the shipwreck and observing the weakened state of the Spaniards, due to the length of the Spaniards stay in *tamál-húye*, or because of other, unrecorded, encounters that soured relations between the two groups, is unknown. It seems, however, that Tamal perceptions of the Spanish had changed during the course of the extended encounter, especially after the *San Agustín* shipwreck.

This notion of changing perceptions of European visitors has been noted extensively in the anthropological and archaeological literature. This idea, for example, is discussed at length by Miller and Hamell (1986), who suggest that Woodland Indians in the Northeast not only viewed European trade goods as primarily ceremonial or ideological objects, but also incorporated Europeans themselves into native world views. They noted, “[b]y fitting the object and the people who bore them into familiar categories, the Woodland Indians transformed what ought to have been an incomprehensible series of events into something understandable and desirable” (Miller and Hamell 1986:326). They emphasize, however, that native perceptions changed with the disillusionment that came with extended contact, especially during the fur trade, as the “ritual context” of trade was destroyed (Miller and Hamell 1986:326; see also Trigger 1991). Whether this same kind of disillusionment developed at *tamál-húye* during the course of the month-long encounter with Cermeño and the crew of the *San Agustín* is unknown.

From the Tamal perspective, the Spanish departure must have been just the beginning of their utilization of the shipwreck. They likely engaged in small-scale collecting, opportunistic salvage, or possibly systematic exploitation for some time. The sustained interaction between the Spanish sailors and Tamal hunter-gatherers, and especially the indigenous people's salvage of the shipwreck, left the richest archeological record of early cross-cultural encounters in California identified to date and included a considerable quantity of European and Asian material culture from the wreck reused by Tamal villagers. Interpretations of the Drake encounter (discussed previously) provide the cultural context for making sense of how the Tamal received Drake and his crew, and may aid in understanding how the Tamal may have at least initially perceived their next visitors, Cermeño and the *San Agustín*, as well as the material remains from the shipwreck—a critical point for my project. Lightfoot and Simmons (1998:160) suggest the Tamal may have collected porcelain vessels, sherds, iron spikes and other material because they were valued as symbols of previous encounters and as objects that signified unknown worlds. In this dissertation I examine the notion that the Tamal may have symbolically incorporated introduced material culture from the Spanish into their cultural practices. This notion is predicated on the idea that indigenous peoples may have received the European outsiders, both

English and Spanish, as something other than simple visitors, that is, that they imbued the Europeans with some kind of ceremonial, symbolic or supernatural interpretation. In addition, this interpretation takes into account that the Tamal had many different objects they used as “charms,” or items they imbued with symbolic significance, as discussed previously. The interpretation is based on the cosmology and world view of the Tamal, and not a simple assumption of reuse of European and Asian material culture based on notions of utilitarian value or technical superiority of foreign materials. Rather, it relies on a culturally-informed view of history that preserves indigenous agency and culture (Sahlins 2000).

The “Apotheosis” Debate and Native Agency

Shifting perspective from the encounters at *tamál-húye* specifically, to examine cross-cultural encounters more generally, a number of researchers have argued that cultural groups approached intercultural engagements from their own native perspective or world view (i.e. Sahlins 1981a, 1985; Salmond 1991, 1997). As a result, under certain circumstances, indigenous groups may have viewed strangers, and subsequently their material culture, in more than strictly utilitarian terms. For example, some may have looked at the encounters in the context of creating new relationships with powerful outsiders; others, under historically-contingent circumstances, may have associated symbolic or ideological meaning to the foreign encounters, as well as to subsequent incorporation of introduced material culture into their daily practice. As discussed above, important variables structuring the significance of cross-cultural encounters are the circumstances under which the outsiders were met and how they were perceived. I suggest based on evidence from specific European encounters with California Indians and broader trends identified in Pacific voyaging literature, that historical documentation supports the idea that Tamal hunter-gatherers perceived European voyagers in ceremonial, symbolic, or possibly supernatural terms, which may have subsequently influenced salvage and reuse of material culture from the *San Agustín* shipwreck. Within the framework of the “apotheosis debate” in anthropology, I suggest that historical and anthropological literature demonstrates that indigenous peoples throughout the Pacific made sense of early European encounters by incorporating strangers into established world views, which often meant perceiving them in ceremonial, symbolic, or possibly supernatural terms. Historical documentation, therefore, does not contradict the idea that Tamal perceived early English and Spanish voyagers in ceremonial terms, which in turn may have structured subsequent incorporation of foreign material culture into their daily practice.

Many scholars, however, take issue with this interpretation, and argue that to suggest indigenous peoples perceived Europeans in ritual contexts or in supernatural terms is ethnocentric and represents nothing more than European bias in the historical record (e.g. Hamlin 1996; Obeyesekere 1992; Townsend 2003). They instead suggest that historical accounts of European apotheosis are a European myth, reflecting a Eurocentric bias inherent in historical narratives of early encounters. Hamlin (1996) argues that there may in fact be a “myth model” inherent in many early travel narratives, from Columbus to Cook, that, consciously or unconsciously, reinforced the dominant European hierarchy. The theme that indigenous peoples perceived Europeans as “gods” does seem to run as a thread throughout early travel narratives—not universally, but appearing in enough notable cases to warrant explanation.

The case that has been most written about in the anthropological and historical literature is that of Captain James Cook’s reception in Hawaii in 1778. The debate between Marshall

Sahlins and Gananath Obeyesekere, and its aftermath, over the so-called “apotheosis” of Cook upon his arrival in Hawaii, has been a central topic in Pacific anthropology and history for nearly 30 years. The apotheosis debate revolves around Sahlins’s suggestion that Hawaiians perceived Cook as a manifestation of the *akua* (sometimes translated as “god”) Lono, which he discussed in a number of influential publications (Sahlins 1981a, 1982, 1985). Obeyesekere, who disagreed with Sahlins’s interpretations, responded in a well-received book that Hawaiians could not have mistaken a British navigator for a Hawaiian god, and he argued instead that the “apotheosis” myth is a European construction based on a fundamentally ethnocentric view of indigenous peoples as “primitive” (Obeyesekere 1992, 1995). Obeyesekere suggested instead that Hawaiians shared a universal “practical rationality” that allowed them to make common sense interpretations like any other people. He argued that Hawaiian historical narratives that recount the apotheosis of Cook were influenced by later European missionaries, and therefore perpetuate a European, not Hawaiian, world view (Obeyesekere 1992:19-21). Because of the positive response to Obeyesekere’s book, Sahlins (1995) responded with a book-length rebuttal that not only called into question Obeyesekere’s scholarship, but, importantly, shifted the debate to a fundamental question about indigenous “voice” and who speaks for native peoples (see also Borofsky 1997; Parker 1995).

Sahlins noted that Hawaiians were not the only people to interpret Europeans as spiritual, but “there is no uniformity to the spiritual status of the Europeans in these early encounters, if only because the local concepts of divinity vary, as would the relevant historical circumstances” (Sahlins 1995:177). There is also much evidence to suggest that receiving strangers as special was not unusual, in fact Sahlins (1981b) demonstrated that in many Polynesian traditions, rulers often come from outside in a dramatic reversal, or overthrow, of the ruling order.

Within the apotheosis debate, Sahlins raised a larger issue about those who would defend indigenous peoples from “imperialist” scholarship, and who speaks for native agency. Although Obeyesekere’s intent was to defend Hawaiians from what he saw as a Eurocentric bias against indigenous populations that assumes “primitive” people will recognize European superiority and perceive them as gods, Sahlins argued that Obeyesekere was actually guilty of something worse. He argued that by advocating a universal “practical rationality,” Obeyesekere denied Hawaiians their own culturally-informed views of history, which “deprives the Hawaiians of their own voice” (Sahlins 1995:5). According to Sahlins, Obeyesekere assumed that Hawaiians think like Europeans, and reduced their own native narratives to nothing more than imperialist-tainted reflections of European will. As Sahlins noted, “[d]eprived thus of agency and culture, their history is reduced to classic meaninglessness...” (Sahlins 1995:198). Therefore, “[i]n the final analysis, Obeyesekere’s anti-ethnocentrism turns into a symmetrical and inverse ethnocentrism, the Hawaiians consistently practicing a bourgeois rationality, and the Europeans for over two hundred years unable to do anything but reproduce the myth that ‘natives’ take them for gods” (Sahlins 1995:8). Sahlins described Obeyesekere’s work as “imperialist hegemony masquerading as subaltern resistance” (Sahlins 1995:197), a perspective shared by Lamb et al. (2000:xv) and Calder et al., who refer to Obeyesekere’s argument as the “inescapable Eurocentricity of the anti-Eurocentric gesture...” (Calder, et al. 1999:4). In a recent article attacking Obeyesekere’s (1998) critique of cannibalism among Pacific Islanders as another European myth, Sahlins continues in the same vein, noting Obeyesekere’s work as “[e]mancipatory social scientists and post-modernist types...dismantling cultures in the name of various subaltern subjects, deconstructing historical and ethnographic descriptions on the grounds that such ‘facts’ are themselves constructed in the service of some deeper and darker

reality such as power or domination...” (Sahlins 2003:3). In this way, the apotheosis debate carries Pacific studies into the twenty-first century (see, for example, Goldsmith 2006, for a recent commentary on the debate).

Working in New Zealand, Salmond (1993) also disagreed with Obeyesekere’s dismissal of native histories, noting that supernatural perception of Europeans is entirely consistent with Maori cosmology, yet in no way implies deification (Salmond 1993:52). Tribal histories written by first-hand observers to Cook’s initial arrival in New Zealand in 1769 recorded that during early encounters some Maori viewed Europeans as *tupua*, strange beings or goblins, and the ship as *atua* (same as *akua* in other Pacific cultures)(Salmond 1991:87). At another location, oral tradition records that Cook’s ship was thought to be a large bird, filled with divinities (Salmond 1991:124). Salmond noted, “[i]t is obvious from Te Taniwha’s account that the local reactions he described rested firmly on Maori assumptions about the world, and that Europeans and their behaviors were grasped (with some puzzlement) in the light of local experience and expectations” (Salmond 1991:89). Salmond included additional examples of supernatural reception of Europeans from New Zealand in a later work (Salmond 1997).

Similarly, Dening (1986) wrote a detailed interpretation of Wallis’s arrival at Tahiti aboard HMS *Dolphin* in 1767, and what it meant to both Europeans and Tahitians (see also Salmond 2003). Dening noted that “[h]ow the natives saw the Strangers is, by any standard of objective discourse, nothing more than informed guess. Yet to say that the meeting on the part of the natives was a co-ordinated and dramatised reception seems certain....What the Tahitians saw on the *Dolphin* was Tahitian gods, divine in the Tahitian way” (Dening 1986:107). For Dening, this in no way implies the Europeans were received as gods, to be worshipped in a Western sense. He noted, “[w]hat always embarrasses the Stranger’s effort to understand the Native is the Stranger’s insistence that the native perceptions should be literal, while the Stranger’s own perceptions are allowed to be metaphoric” (Dening 1986:107). Other anthropological or historical interpretations of indigenous peoples across the Pacific receiving Europeans as supernatural, but not suggesting they were literally mistaken for gods include those by Adams (1984) and Connolly and Anderson (1987). Each of these examples offers an anthropological interpretation of historical records that supports the view that, in certain cases, indigenous world view and cosmology are entirely consistent with perception of outsiders in ceremonial, symbolic, or supernatural terms. It is important to recognize that most accounts of initial indigenous perception of Europeans in symbolic or ideological terms are based on native sources from oral history or oral tradition (see, for example, Adams 1984; Dening 1980, 2004; Sahlins 1995; Salmond 1991, 1993, 1997).

Although it is may be true there was a tendency for some European voyagers to mythologize their reception by indigenous populations, it would be a mistake to presume that just because of this the opposite was true, that they were always perceived as merely human. Rather, if Europeans believed they were received as “gods,” it may have been a misconception by travelers who misunderstood a highly nuanced reception by indigenous people who saw the strangers as something completely outside their experience. The Europeans, in turn, interpreted the reception in the only way that made sense to them, that is, deification. Chroniclers who documented encounters by Drake, Wallis, and Cook wrote, and may even have believed, that their expedition leaders were seen as divine. Whether one accepts these observations at face value or not, what is clear is that the authors were responding to highly unusual receptions that were outside their normal experiences. In California, Tahiti, and Hawaii there is strong anthropological evidence based on native sources to suggest the Europeans probably *were*

received within a ceremonial, and possibly supernatural, context. Furthermore, in the majority of these initial encounters in which there was a supernatural connections, Europeans read nothing unusual into their reception because they were able to make sense of it within their own preconceived notions of how outsiders should be greeted. Even when there may have been a ceremonial context to particular encounters, for example, Pacific Islanders presenting plantain branches as *ta'ata meia roa* or “man-long-bananas,” a universal Polynesian symbolic substitute for human sacrifices (Denig 1992:197), European chroniclers instead interpreted the actions as general “signs of friendship” (Robertson 1948 [1766-1768]:136). When something completely different and unexplainable occurred, however, their interpretations were colored by their own world views and became more fanciful.

CONCLUSION

It is clear that reception of European voyagers by indigenous populations in California and across the Pacific were unique events of cross-cultural interaction, whose details were contingent on historically-specific, but culturally-constructed, foundations. In many circumstances, anthropological evidence suggests that indigenous populations may have imbued European strangers with ceremonial, symbolic, or in some cases, supernatural significance. These circumstances likely varied not only with each new region, island group, or island, but with each individual landfall as Europeans moved throughout the Pacific coast of North America and across the broader Pacific. As Sahlins noted, “there is no uniformity to the spiritual status of the Europeans in these early encounters, if only because the local concepts of divinity vary, as would the relevant historical circumstances” (Sahlins 1995:177), a point exemplified by Salmond’s accounts of different Maori reception of Cook’s expedition in New Zealand in 1769 (Salmond 1991, 1997). Even within each population undoubtedly not everyone perceived the outsiders in the same way—variation must have existed across class and gender lines (this was particularly evident in Hawaii, see Sahlins 1981a:51-55), and may even have shifted seasonally with the changing ceremonial calendar (Lightfoot and Simmons 1998:151-153).

Even though native perception of European strangers during initial encounters varied considerably, some of these early intercultural engagements proceeded in remarkably similar ways. Ritualized oratory greetings and aggressive posturing were a common element to many early encounters recorded by European navigators from the sixteenth to eighteenth centuries. Although European chroniclers documented these encounters in a variety of ways—most often as signs of friendship for powerful newcomers or as defense against armed intruders, and occasionally as supernatural or divine visitations—the real meaning of these events for the California Indians and Pacific Islanders are harder to recover. Only through study of native oral traditions, tribal histories, and/or by interpreting events through the clouded lens of European accounts, can we hope to understand the significance of these events from multiple perspectives. Ultimately, this diversity is necessary to allow a deeper and more comprehensive understanding of the material remains from these transitory events recovered by archaeologists.

A variety of scholars have pointed out that ceremonial, symbolic, or supernatural perceptions of Europeans and their goods probably did not last beyond early encounters (i.e. Miller and Hamell 1986; Sahlins 1981a; Trigger 1991). These beliefs quickly wore off as the reality of the long-term presence of European traders, missionaries and colonists set in. The relevant question for the present study is, how long did that process take? After a month-long Tamal encounter with shipwrecked Spaniards, did salvage and reuse of material culture from the

San Agustín retain a symbolic component, or had it reverted to a purely practical, utilitarian activity. This is one of the questions my larger research project will seek to answer.

Historical and anthropological literature from California and the Pacific suggests that supernatural reception of outsiders by indigenous populations was not uncommon. This in no way suggests a “primitivism” on the part of the native groups. I must emphasize that this interpretation is meant to highlight the enormous complexity and diversity of California Indian and Pacific Islander world views, not to homogenize their beliefs into an essentialized indigenous viewpoint. Although some European chroniclers had a tendency to “apotheosize” themselves or their leaders in contemporary accounts, there is evidence to suggest this was in response to unusual, ritualized receptions, and it would therefore be a mistake to suggest that the opposite were true, that they were only perceived as human visitors. Based on specific evidence from Drake and Cermeño’s encounters with the Tamal, a detailed examination of Coast Miwok-speaking tribes’ cosmology and world view, and broader trends identified in Pacific voyaging literature, there is reason to believe the Tamal may have perceived a spiritual connection with the European outsiders. This may, in turn, have been passed on to European material culture left behind by the *San Agustín* shipwreck—a notion that I will examine through a detailed analysis of the archaeological record in the following chapters.

CHAPTER FOUR

A HISTORY OF ARCHAEOLOGICAL RESEARCH OF THE ENCOUNTERS AT *TAMÁL-HÚYE*

INTRODUCTION

Archaeologists have recovered sixteenth-century introduced artifacts from 15 sites on the Point Reyes Peninsula that were once occupied by the Tamal people (Figure 4.1 and Table 4.1). While the collections from these sites form the primary data source for this project, they do not all have enough recovery data available to make reasonable interpretations about Tamal recontextualization of the introduced material culture from the *San Agustín*. In this chapter, I highlight a history of investigation on the Point Reyes Peninsula that focuses on six key sites that do have enough excavation data available to reconstruct them within a Geographic Information System (GIS) for exploratory spatial data analysis (ESDA). These six sites were excavated by numerous different institutions and individuals, using a variety of excavation strategies—a detailed analysis of the excavation methodologies for each site and how it affected my GIS analysis is described in Chapter Six.

The other nine sites had either limited testing or excavation conducted and therefore no secure contexts for the recovered material, or surviving records are incomplete and reconstruction of the original excavations impossible. While these latter sites cannot contribute to my study of spatial contexts to investigate potential Tamal uses and meaning of introduced material culture, I did examine the sixteenth-century introduced artifacts from each of these sites and included them in my analyses presented in Chapter Eight.

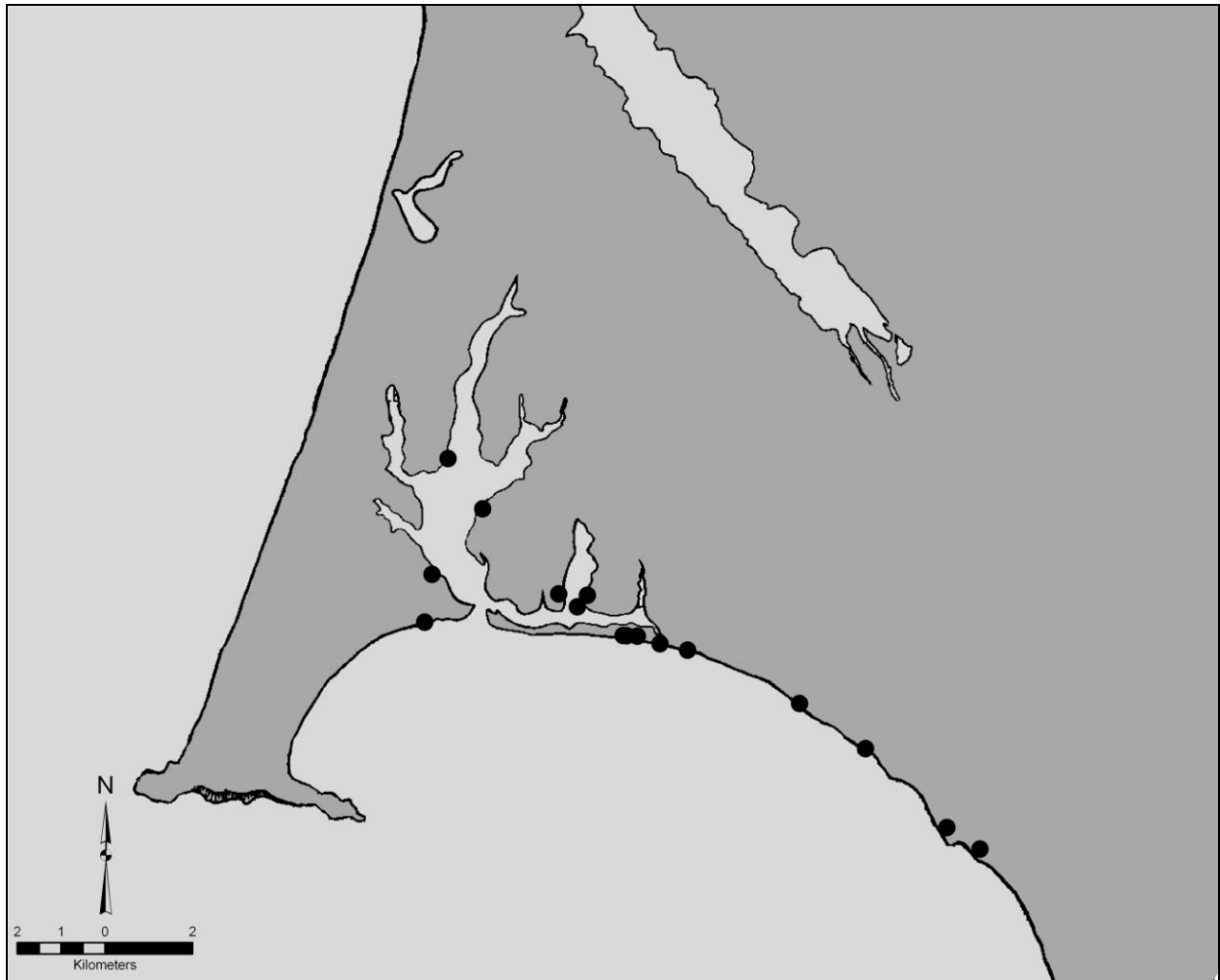
SITE DESCRIPTIONS OF SIX KEY SITES

The six archaeological sites that form the basis of my GIS analysis represent a cross-section of Tamal occupation sites in and around *tamál-húye*. These sites include CA-MRN-232 (Estero Site), CA-MRN-242 (Cauley Site), CA-MRN-271 (Bear Valley Site), CA-MRN-307 (Stoneware Site), CA-MRN-216 (no site name), and CA-MRN-298 (Adams Site)(Figure 4.2). Many of the archaeological sites on the Point Reyes Peninsula were first recorded during a series of surveys conducted by Jesse Peter in the 1910s and Stewart Bryant in the early 1930s. Two of the most extensively-excavated sites on the Peninsula, CA-MRN-232 and CA-MRN-242, were both initially recorded during the Peter-Bryant surveys of the 1910s and 1930s.

CA-MRN-232

Bryant initially recorded site CA-MRN-232, the Estero Site, in 1934 (Bryant 1934a; Peter 1923). The Estero Site is located on a small point on the eastern shore of Estero de Limantour, situated on a bluff about 20 ft. (6 m) above the estero. It is across the estero from Limantour Spit, and within line-of-sight to three other sites in this study (CA-MRN-216, CA-MRN-298, and CA-MRN-308). Maps from the Peter-Bryant surveys indicate that in the 1910s Jesse Peter recorded a site originally designated as Site No. 232 on Drakes Head, on the western shore of Estero de Limantour opposite the present CA-MRN-232. In 1934, Bryant re-surveyed the same area, and located two additional sites on the eastern shore of Estero de Limantour, which he

Figure 4.1. Approximate locations of the 15 archaeological sites on the Point Reyes Peninsula where introduced sixteenth-century artifacts from the *San Agustín* shipwreck have been recovered. Actual locations are confidential based on the wishes of the National Park Service and the Federated Indians of Graton Rancheria.



designated as Site Nos. 232b and 232c. When the University of California Archaeological Survey (UCAS) converted existing site numbers to the present trinomial system, Peter-Bryant (PB)-232b became CA-MRN-232.

Recent attempts to locate the original Site No. 232 (which UCAS later designated as CA-MRN-306) have been unsuccessful (NPS Archaeologist Mark Rudo, personal communication), leading to speculation that perhaps Jesse Peter actually found the Estero Site, but misplaced the site on his survey map. This was likely due to challenging terrain and inaccurate maps. In a September 1934 letter to E. W. Gifford, Bryant noted that the “few mounds that we found inaccurately plotted [by Peter] were certainly not a result of careless copying. We found that most of the locations were exceedingly difficult to plot with certainty, due to the lack of triangulation marks and other signs and due to the great similarity of many bays and indentations” (Bryant 1934a). When Bryant conducted his survey in 1934, he probably located the same site as Peter, but since it was in a different location than where Peter recorded Site No. 232, Bryant gave the “new” site a new number: Site No. 232b.

Table 4.1. List of 15 archaeological sites on the Point Reyes Peninsula where introduced sixteenth-century artifacts from the *San Agustín* shipwreck have been recovered.

Site	Name	Previous Designation
CA-MRN-216	n/a	n/a
CA-MRN-230	Gallagher Mound	PB-230
CA-MRN-232	Estero Site	PB-232b
CA-MRN-235/301	Hall Site	PB-235
CA-MRN-236	No. 236A	PB-236
CA-MRN-242	Cauley Site	PB-242
CA-MRN-271	Bear Valley Site	PB-271
CA-MRN-274	Hidden Site	PB-274
CA-MRN-280	n/a	n/a
CA-MRN-298	Adams Site	DNG 1 and DNG 2
CA-MRN-307	Stoneware Site	PB-232c
CA-MRN-308	Murphy Site	n/a
CA-MRN-389	Oven Site	DNG 6
CA-MRN-392	n/a	n/a
CA-MRN-394	n/a	DNG 4

When Bryant surveyed CA-MRN-232 in 1934, he described it as a “main camp site” (Peter 1923). He observed a “large main site” that measured 44 yards (40 m) by 40 yards (37 m), with a maximum depth of 4 ft. (1.2 m). Bryant also noted that, “[w]earing away of cliff exposes four foot depth easy for exploration,” apparently observing that the site midden was exposed on the eroding bluff edge, about 20 ft. (6 m) above a small beach on Estero de Limantour (Bryant 1934a). Bryant made no further observations about CA-MRN-232 at that time, and it is unknown if he collected artifacts from the site. Later, site CA-MRN-232 was one of the first six sites that Heizer (1941) associated with introduced objects from sixteenth-century encounters between the Tamal and Europeans in *tamál-húye* (along with CA-MRN-242 and CA-MRN-271 described below). This association was based on artifacts found during extensive excavation at these sites by the University of California under Heizer’s direction beginning in 1940, which I describe in detail below.

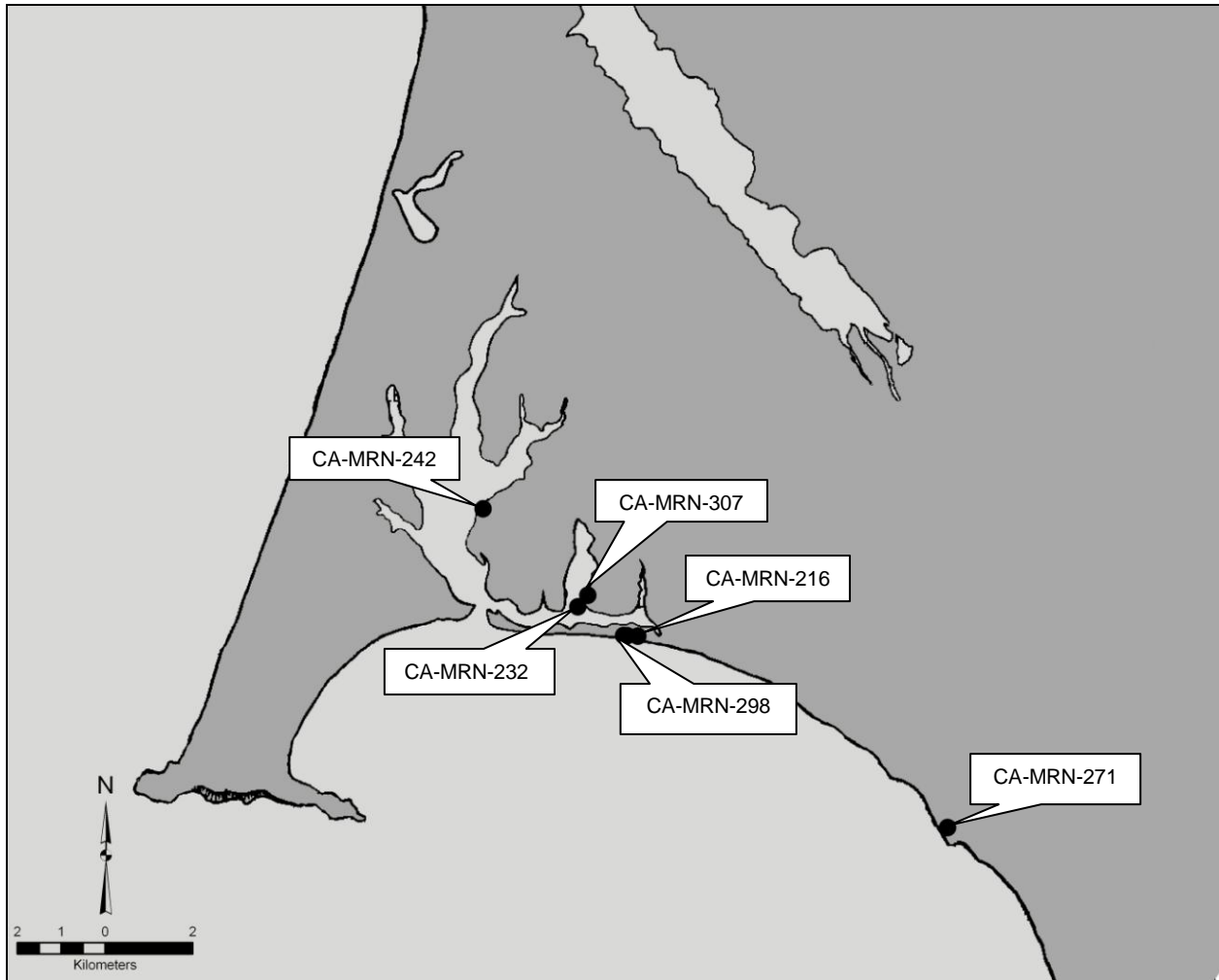
CA-MRN-242

Site CA-MRN-242, the Cauley Site, is a rich shell midden deposit located on top of a 40 ft. (12 m) cliff overlooking the eastern arm of Drakes Estero, about 1.6 mi. north of the estero entrance (Beardsley 1954a:21). Jesse Peter initially recorded the site in the 1910s, but made few observations at that time (Bryant 1934a; Peter 1923). Bryant recorded nearby CA-MRN-304 during his survey of Point Reyes in 1934, and he undoubtedly visited the Cauley Site at that time.

CA-MRN-271

Stewart Bryant initially recorded site CA-MRN-271, the Bear Valley Site, in 1934 (Bryant 1934a; Peter 1923). The site is located in Bear Valley, on the north side of Coast Creek, just inland from where the creek empties into the Pacific Ocean at Arch Rock. CA-MRN-271

Figure 4.2. Approximate locations of the six archaeological sites on the Point Reyes Peninsula with excavations reconstructed in a Geographic Information System (GIS).



(along with nearby CA-MRN-274) is the furthest site from Drakes Estero in this study, situated more than 7 mi. (11.3 km) southeast of the estero entrance on the rocky coastline. In 1934, Bryant observed that the site is a “[l]arge but apparently shallow mound,” with the “[s]urface well picked over” and a picnic site located on the mound. Further, he writes, “[i]t is difficult to get permission to go through Bear Valley. Colonel Langdon, owner of the ranch at entrance near Olema is much opposed to allowing visitors of any sort in this area” (Bryant 1934a, 1934b). Despite this difficulty, the University of California team was granted permission to excavate the site in 1941 (see below).

CA-MRN-307

Site CA-MRN-307 is a small, shallow midden located on the eastern shore of Estero de Limantour, approximately 380 yards (350 m) up the coast from CA-MRN-232. The site is situated in a narrow drainage, with the western edge exposed along the beach on the estero and the southern edge cut by a small, spring-fed stream. The site is somewhat protected from the

prevailing northwesterly winds on its northern side by a small rise (Meighan 1950d). Stewart Bryant initially recorded this “secondary site” in 1934, and he described it as a “[s]mall shell mound, [v]isible section exposed at beach” (Bryant 1934a; Peter 1923). On two earlier survey maps, Bryant recorded the site in the wrong location, inadvertently placing it several hundred meters north of its actual location (Peter 1923). On a later map however, the erroneous location is scratched out and the correct location noted in pencil (Bryant 1934a). Bryant made no further observations about the site at that time, and it is unknown if he collected artifacts during his visit.

CA-MRN-216

Site CA-MRN-216 is an oval-shaped midden, approximately 130 ft. (40 m) in diameter, located on the southern shore of Estero de Limantour, the north shore of Limantour Spit. It is located in a hollow surrounded by stabilized dunes on three sides and open to Estero de Limantour on the north (Treganza and King 1968:17). The site is nestled just north of a line of high beach dunes, which shelters the site from the open waters of Drakes Bay to the south, and its northern edge is bounded by the shoreline of Estero de Limantour. Neither Jesse Peter nor Stewart Bryant located site CA-MRN-216 during their surveys in the 1910s and 1930s (Bryant 1934a; Peter 1923). Instead, members of the Drake Navigators Guild (DNG) initially located the site in the mid-1950s. The DNG was founded in 1949 to conduct historical research into Drake’s 1579 California landfall, with the goal of pinpointing the exact location of the voyager’s encampment. In 1951, DNG members began to conduct archaeological research around the Drakes Bay area in an attempt to locate evidence of Drake’s presence in Tamal middens (Von der Porten 1963:3). Their research included excavation at a number of sites previously investigated by the University of California, as well as extensive survey that resulted in discovery of several previously unrecorded sites, such as CA-MRN-216 and CA-MRN-298.

CA-MRN-298

Site CA-MRN-298 is also located on Limantour Spit, approximately 270 yards (250 m) west of CA-MRN-216. The site is nestled just north of a line of high beach dunes, which shelters the site from the open waters of Drakes Bay to the south, and its northern edge is bounded by the shoreline of Estero de Limantour. It is composed of two distinct loci, CA-MRN-298E and CA-MRN-298W, located within 100 ft. (30 m) of each other, but separated by a small, marshy inlet, on the northern edge of Limantour Spit. The site’s eastern loci, CA-MRN-298E lies in a level, sheltered location on the spit. The southern part of the western loci, CA-MRN-298W, is now partially covered by the migrating sand dune, while the northern edge of the site may be intermittently inundated by the waters of Estero de Limantour at high tide (Treganza and King 1968:20; Von der Porten 1963:31). A light scatter of surface shell connects the two loci. In 1967, Edwards described the site as “[d]ark brown sand midden,” with dimensions of 150 m x 35 m and a depth of 1.2 m (Edwards 1967b). These dimensions are similar to those recorded in 2009 during the present project. Like CA-MRN-216, members of the DNG initially located both site loci in the mid-1950s, but designated them as separate sites (Dillingham 1956). Treganza later designated the two DNG loci as a single site, CA-MRN-298, because of their proximity (Von der Porten 1963:42).

UNIVERSITY OF CALIFORNIA INVESTIGATIONS, 1940-1951

The Department of Anthropology at the University of California, Berkeley began an extensive program of excavations on the Point Reyes Peninsula under Prof. Robert F. Heizer in June 1940. In addition to addressing questions of culture history and establishing site occupation sequences for California Indian sites before Spanish colonizers arrived in the late-eighteenth century, a motivating factor for the Berkeley excavations was to locate material evidence of Sir Francis Drake's 1579 northern California landfall (Heizer 1974:18-19; Kroeber 1942:1). Because of the 1936 discovery of what many then believed to be Drake's Plate of Brass (which was found near San Quentin in eastern Marin County, but originally located near Drakes Bay—it is now known to be a forgery), Heizer believed that Tamal shell middens in the vicinity of Drakes Bay would be the most likely source of further material remains associated with sixteenth-century encounters between the indigenous population and European visitors, specifically Drake. Not only would such a discovery provide the answer to a long-running historical puzzle in California, it would also (and more importantly, in Heizer's view) provide a chronological marker to accurately date the California Indian cultural horizon associated with the artifacts. This chronological datum could then be applied to other sites in northern California and to date cultural sequences that occurred both before and after the late-sixteenth century (Heizer 1941:319-320). As it turns out, Heizer's speculation was correct—excavating indigenous sites at Point Reyes did yield an abundance of sixteenth-century European and Asian material culture, mostly blue-and-white Chinese export porcelain fragments and iron ship's fasteners, but the evidence suggested to Heizer and his colleagues that they had not actually located evidence of Drake, but had instead uncovered evidence of the 1595 wreck of Cermeño's Manila galleon *San Agustín* (Heizer 1941, 1974; Kroeber 1942; Meighan and Heizer 1952).

1940 Excavations: CA-MRN-232 and CA-MRN-242

The Berkeley team's 1940 field season began May 26 at CA-MRN-275, the Mendoza Site, located on the shore of Drakes Bay about 3 mi. (4.8 km) southwest of the Drakes Estero entrance (Heizer 1940a). The four-member team (Heizer, Richard Beardsley, Howard Stackpole, and Paul Blak) excavated the Mendoza site for two weeks. On May 31, Heizer wrote to Alfred Kroeber, noting that the "first of the three sites we plan to excavate [i.e., CA-MRN-275] is interesting aside from the fact we have found no indications of Drake in 1579" (Heizer 1940c). Heizer later wrote,

[r]elics of numerous burials and cremations were recovered [from CA-MRN-275], but the site showed no evidence of historic contact material in any form. The conclusion therefore was reached that this site was probably unoccupied at the time of Cermeño's sojourn, and perhaps was a dead and abandoned village by that date. At any rate, the site was unproductive from the standpoint of the historic material for which the party was searching. Operations were therefore shifted around the bay to the shores of Drake's [sic] and Limantour *esteros*, where excavations were carried on in two sites which we felt certain were among those described and visited by Cermeño in 1595 (Heizer 1941:320-321).

After finishing work at the Mendoza Site, the team moved their field camp closer to the Estero Site, where they began work on June 11. Beardsley later described the site:

Estero Site (232b)...is within an estuarine environment....It is situated atop a 25-foot cliff on the eastern shore of the largest north-pointing arm of Limantour Estero, nearly at the base of the arm....Dimensions are 150 feet along-shore (north-south) by 80 feet inland (east-west). Estero Site overlooks [a] sandbar on the south, and lacks shelter from the fog and wind. The eroding cliff face looks out on mudflats where birds are exceedingly numerous. Wood is now available only across these mudflats among the flotsam on the sandbar. Drinking water has to come from trickling shore seepages. The nearest creek is a full mile away (Beardsley 1954a:22).

The site record from 1940 indicates the site measured 120 ft. (36.5 m) by 75-85 ft. (23-26 m) and was 40 in. (1 m) deep. From the eastern edge of the site, up to 50 ft. (15 m) of midden had been cultivated for artichoke farming, while the west side was noted as eroding along the exposed bluff face (Anonymous 1940).

On their first day at the Estero Site, the crew “[l]ined out a main Tr. A running 20° W. of N. Divided into 10 foot sections (thus: Sect. 1N, 2N, 1S, etc)” (Heizer 1940a:6). This initial trench guided all future investigations at the site, as additional trenches were added to Trench A, “each cut farther inland until the heart of the site was completely excavated” (Beardsley 1954a:23). The team also established Datum A, on the southwest corner of Trench A, Section 1N, between Section 1N and Section 1S. Datum A was used to measure artifact locations throughout the excavation.

Almost immediately after beginning the dig, Heizer and his crew noticed that the Estero Site was different than what they had found at the Mendoza Site. After the first full day of excavation, Heizer noted that CA-MRN-232 had no mussel shells, more clam shells, abundant bird bone, and few large mammal bones, the opposite of what they had observed at CA-MRN-275 (Heizer 1940a:6). In the field notebook he kept during the excavation, Heizer recorded a clear stratigraphic break occurring at about 20 in. (50 cm) depth, which they had not observed at the Mendoza Site. He noted that the top 20 in. (50 cm) of the site contained the usual mix of crushed clam shell, bird bone, and ash, while bottom 20 in. (50 cm) was “damp, heavy black dirt full of whole clam shells” (Heizer 1940a:7). After several days of excavation and after exposing a complete site profile, Heizer wrote that he,

“[l]ooked over the stratigraphy carefully, and think that Level I (dense black deposit with whole unbroken clamshells imbedded) represents a different occupation. Artifact returns are too sparse to prove this, but different conditions are evident. Level I has very few bird and animal bone, few stones, no ash accumulations, bones look different, etc....Level II is ‘normal’ shellmound – crushed shell, as lenses, quantities of bird bone, some animal bone, burned rocks (from stone-boiling) etc.” (Heizer 1940a:10).

Beardsley described the stratigraphic break at CA-MRN-232 as a “whole-shell layer...sandwiched between a relatively loose, black Level II on the surface and a more compact and sterile Level I extending to a yellow clay base at 54 inches [1.4 m] maximum depth near the

face. This subsurface shell cap over Level I deposit is 18 inches [46 cm] thick at the cliff face and thins out to disappear thirty to thirty-five feet [9-11 m] back from the cliff” (Beardsley 1954a:22).

While CA-MRN-232 yielded historic-period iron fasteners and ceramic fragments during the initial investigation of the site, the team did not at first realize the significance of the material they had recovered. On June 14, after just four days of work on the site, Heizer wrote that they had found a “few artifacts, but none very worthwhile, and little hope. There are a few Caucasian objects near the surface, but as yet nothing to indicate that we have the Drake or Cermeno [sic] site” (Heizer 1940a:8). A few days later, Heizer wrote to Kroeber in Berkeley, noting, “[w]e have now been at our new camp for about a week. The site, on the s. branch of the estero, is producing fairly well, but burials are more rare than in the first sites undertaken. We have found, in the top 12”, some iron and crockery, but whether it will be significant of anything is impossible to say now. We are looking for 16th c. stuff in burials” (Heizer 1940b).

Heizer became more confident about the finds the team made during their second week on the site. On June 19, Heizer reported, “[t]he few iron spikes from 8”-12” may be old, and if so are the only Caucasian evidence. Burials unfortunately do not have grave offerings” (Heizer 1940a:11). The next day, for the first time Heizer expressed the possibility that in fact the European material they had recovered from the site may in fact represent the sixteenth-century encounters. He wrote in his journal on June 20, “[n]ot a bad artifact yield including several more iron spikes.... This concentration, if these are spikes from the San Agustin [sic], may indicate driftwood planks were brought up by the Indians and used for roof-covering” (Heizer 1940a:11-12). The site continued to yield iron spikes and porcelain fragments throughout the excavation (Heizer 1940a:14).

Heizer and his team completed 1940 field operations at CA-MRN-232 on June 28, after about 2½ weeks of excavation (Heizer 1940a:15). In total, they excavated the primary Trench A (approximately 70 ft. [21 m] by 6 ft. [2 m]), a secondary Trench B (approx. 12 ft. [3.6 m] by 4 ft. [1.2 m]), and seven smaller test pits ranging in size from 4 ft. [1.2 m] by 4 ft. [1.2 m] (Pit 3) to 15 ft. [4.5 m] by 4 ft. [1.2 m] (Pit 6)—a total of more than 700 sq. ft. [65 sq. m]. According to Beardsley (1954a:22), cultural stratification at the site was present, although difficult to discern because “cultural material was disappointingly poor and scarce.” This “poor and scarce” yield, however, included at least 425 flaked stone, ground stone, shell and bone artifacts—including 266 burnt, prismatic obsidian flakes associated with a single burial. The excavators also recovered a large number of faunal remains, including more than 250 mammal, bird, and fish bones; 38 shellfish specimens; and six soil samples. Finally, the researchers excavated one cremation and five burials during the 1940 field season (Beardsley 1946c).

While the Berkeley team may have considered the results “poor,” they recovered more “rusty, archaic-looking iron spikes” and fragments of “blue chinaware” than from any other site investigated to that time (Beardsley 1954a:22; Heizer 1941:321). In total, during 1940 field operations the team recovered nine fragments of what they identified as Wan Li porcelain (although one of the fragments is actually made up of three individual mended sherds, so they recovered 11 Wan Li fragments altogether) and one fragment of what they referred to as Late Ming porcelain from CA-MRN-232 (Heizer 1941:321). They also found a total of 18 “crude, hand wrought iron ship’s spikes” at CA-MRN-232 during the 1940 field season (Heizer 1941:322) (Phoebe A. Hearst Museum of Anthropology [PAHMA] Catalog).

While working at CA-MRN-232 in June 1940, the Berkeley team also began excavations at the Cauley Site, CA-MRN-242, located approximately 3 mi. (4.8 km) to the northwest on the

shore of Drakes Estero. Heizer (1940d) initially described the site as a “[s]hellmound; on small high point. Commands a view towards all arms of the estero.” He noted that the site measured 200 ft. (61 m) by 50 ft. (15 m), with an average depth of 36 in. (0.9 m). He also commented that the Cauley Site was “[p]robably the first village seen by Cermeño in 1595” (Heizer 1940d). Beardsley described the site as,

somewhat sheltered from the shore, although to the north and northeast it faces a wide expanse of water and mudflat. Less than 200 yards up the hill behind the site seepage springs provide water both for Cauley and for a smaller site (242a)[CA-MRN-304], two hundred yards northeast along the shore. To-day there is no firewood nearby and access to the beach is difficult. Yet the richness of deposit indicates that Cauley Site was a favored location from the Indian viewpoint (Beardsley 1954a:21).

The UC Berkeley field investigation at CA-MRN-242 began June 21, 1940. Heizer noted in his field notebook, “...Beardsley took charge and started excavation of our third, and last, site – it has been named the Cauley site” (Heizer 1940a:12). Beardsley noted that the site measured 120 ft. (36.5 m) by 90 ft. (27 m) with a maximum depth of 76 in. (1.9 m). The crew began the excavation with a single large north-south trench (Trench A, oriented 35° west of true north), and on the second day of excavation located an iron spike similar to those found at CA-MRN-232. Heizer observed, “[o]ne of the iron spikes with the uneven flat head came to light in the Cauley site; this looks like some confirmation of the Estero site pieces. Why should unusual pieces like these show up in the upper levels of two sites?” (Heizer 1940a:13). The excavation progressed from the initial north-south oriented Trench A eastward from the bluff edge in additional trenches and test pits (Beardsley 1954a:21).

In addition to finding sixteenth-century European and Asian artifacts at CA-MRN-242 similar to those found at CA-MRN-232, the excavators also found a similar stratigraphy. On the Estero site, Heizer had recorded a clear stratigraphic break occurring about 20 in. (50 cm) deep, with what he considered a “normal” midden consisting of crushed shell, bird bone and ash in the upper Level II, and “damp, heavy black dirt full of whole clam shells” in the lower Level I (Heizer 1940a:7). Just three days into the 1940 excavation at CA-MRN-242, Heizer wrote that “[t]oward late afternoon I found a burial lying in Level I. The head had lain above the top of the Level & had disappeared. The Level I, Level II characteristics are present on the Cauley as well as Estero site” (Heizer 1940a:16). At CA-MRN-242, the stratigraphic break occurred at 30-40 in. (75-100 cm) below the surface, where “a ‘whole-shell layer’ separates a lower compact, relatively sterile soil horizon (Level I) from the upper deposit of loose black dirt and shell (Level II)(Beardsley 1954a:22). Heizer considered this stratigraphic break to represent two different occupations (Heizer 1940a:10). Beardsley later also found this stratigraphic break at a number of other sites in Marin County, which became the basis for his well-known division of northern California archaeology into distinct “facies” (Beardsley 1947, 1948, 1954a, 1954b). At CA-MRN-242, Beardsley termed the two distinct components Cauley A and B. He found that Cauley A roughly corresponded to the upper Level II soil, while Cauley B corresponded with the lower portions of Level II and all of Level I – based on burial and artifact data, the whole shell layer was deposited during the Cauley B occupation, and itself did not mark the transition to Cauley A occupation (Beardsley 1954a 22, 25-26).

The 1940 field season at CA-MRN-242 lasted only a week, concluding on June 29 (Heizer 1940a:15). During that time, the team recovered 248 artifacts, mostly of indigenous manufacture. Results also included, however, a single fragment of what researchers referred to as “Late Ming” Chinese porcelain and one “crude, handwrought iron ship’s spike” (Heizer 1941:321-322). Heizer later wrote about the findings at both CA-MRN-232 and CA-MRN-242,

[t]hese looked promising, but we remained unconvinced that they were the materials we were seeking. When, however, we found similar spikes and chinaware fragments in the Cauley site [CA-MRN-242] some three shoreline miles away to the northwest on the east shore of the main arm of Drake’s [sic] Estero we became more sanguine, for from the occurrence in two sites we had reason to suspect that the spikes might have been part of the *San Agustín* and the chinaware may have been either a remnant of her cargo or some of the mess equipment of the same ship” (Heizer 1941:321).

Heizer’s suspicions were reinforced in June 1941 when Theodore Hobby of the Metropolitan Museum of Art definitively identified the porcelain fragments as Chinese porcelain from the Late Ming dynasty (ca. 1600)—most could be specifically dated to the Wan Li period (1573-1619) (Heizer 1941:321). The team had definitely found material remains representing the sixteenth-century encounters at *tamál-húye*.

1941 Excavations: CA-MRN-232, CA-MRN-242, and CA-MRN-271

Because of the University of California team’s success during the 1940 field operations, the department funded a second season in 1941, this time under the direction of graduate student Richard K. Beardsley (Heizer 1941:321). Beardsley proposed a crew of 5-6 for summer field operations, and he wrote that the purpose of the work was to “[c]ontinue the survey of the Drake’s Bay...to locate large middens. Emphasis to be laid on thorough survey of Drake’s Bay, with excavation of any sites found. Object: historical material” (Beardsley 1941f, emphasis original). Once again, the emphasis (or at least the justification) for excavations was to locate material remains from the sixteenth-century encounters at *tamál-húye*.

The 1941 excavations began at the McClure Site (CA-MRN-266) on Tomales Bay, before shifting back to the vicinity of Drakes Estero in late June to continue work on CA-MRN-232, CA-MRN-242, and other sites. In a June 20, 1941 letter from Beardsley to Alfred Kroeber, Beardsley noted that his crew of five were working on the Estero Site and hoped to finish the excavation there within two weeks, but that the Cauley site (CA-MRN-242) still “needs working over completely” (Beardsley 1941d). He continued,

I’m hoping for very satisfactory results in the way of a cultural inventory from these sites. There is, in the first place, a good block of deposit with burials, etc. showing late culture complex. By this I mean, of course, a culture temporally located in the beginning 17th century and existing for an uncertain length of time previously. Moreover, in the subsoil of both Estero and Cauley Sites have occurred several burials apparently corresponding to the lower level burials on McClure Site. In other words, by virtue of the McClure information, a good

archaeological tie-up with the Bay and Delta mounds should be possible, in addition to the culture inventory at contact time (Beardsley 1941d).

By July 9, Beardsley reported to Kroeber that the team had almost finished “clearing out” the Estero Site (Beardsley 1941b). They found the Cauley Site, though smaller than Estero, had a richer deposit, so they postponed work at Cauley to focus on Estero (Beardsley 1941b). They then turned their attention to CA-MRN-242 in mid-July. On July 24, Beardsley wrote to Kroeber, and reported that CA-MRN-232 and CA-MRN-242 would be “finished up by the beginning of next week.” He continued, “[f]rom Cauley we have been getting burials regularly, but the china, occurring so frequently on Estero Site, is pretty rare. A week’s digging has given us just one china frag. and one spike” (Beardsley 1941c). In terms of the protohistoric period artifacts the team was searching for, the 1941 field season at CA-MRN-242 resulted in one fragment of Chia Ching porcelain (this is object no. 1-60316 in the PAHMA, erroneously listed with the CA-MRN-232 objects) and two fragments of Late Ming porcelain (Heizer 1941:321). The 1941 excavation at CA-MRN-232 and CA-MRN-242 was completed by the end of July, and the team shifted their focus to smaller, secondary sites around the Point Reyes Peninsula (Beardsley 1941c).

During the 1941 excavation at CA-MRN-232, Beardsley and his crew completed a series of trenches parallel and adjacent to Trench A, each 6 ft. (1.8 m) wide and moving progressively towards the east (away from the bluff)—these include Trenches C, D, E, F, CC, DD, EE, and FF. They also completed four additional shorter and narrower trenches, labeled Trenches G, H, I, and J, as well as two smaller units, labeled Pits 9 and 10. Artifacts recovered by the team in 1941 included at least 229 flaked stone, ground stone, shell and bone artifacts (as well as several miscellaneous artifacts of indigenous manufacture). The excavators also recovered a large number of faunal remains, including more than 770 mammal, bird, and fish bones; 39 shellfish specimens; as well as 3 soil samples and 1 ash sample. Researchers also excavated five burials and two cremations during the 1941 field season. Beardsley’s 1941 excavation yielded a total of 34 sixteenth-century Chinese porcelain fragments (although two are made-up of multiple sherds, so 37 individual fragments were recovered in total) and 31 iron spikes attributed to *San Agustín*, along with three fragments of more recent ceramic and glass, ten spike fragments of unknown origin, and a variety of more modern iron and brass objects, mostly collected from the beach below the site (PAHMA Catalog).

Beardsley also commented on site preservation issues at CA-MRN-232. He noted, “we have apparently only the tail end of deposit from a much larger mound which has been lost by erosion over the cliff. The result has not been so much a lowering of artifact yield as a paucity of burials” (Beardsley 1941b). Both Heizer and Beardsley believed the site was being subjected to rapid erosion. Beardsley observed, “[l]ocal farmers’ estimates of cliff erosion in Drake’s Bay go as high as five feet per year. If this be reduced to one foot each year, a not unreasonable figure, up to three hundred feet may have disappeared since the terminal 16th century” (Beardsley 1954a:fn 67). While minor erosion is still evident on the site today (during an April 2009 site visit, we observed cultural materials present on the beach below the site, which had eroded from the site along the bluff edge above), I believe Heizer and Beardsley over-estimated the rate of erosion. Since CA-MRN-232 was first recorded in 1934, various researchers have recorded site dimensions that have not changed dramatically from Bryant’s original observations. Beardsley and Heizer estimated the site extended approximately 80 ft. (24 m) east of the bluff edge—if the erosion rate were 5 ft. (1.5 m) per year, the site would have disappeared by the late-1950s. Even

if we use Beardsley's "not unreasonable" figure of 1 ft. (30 cm) of erosion per year, the site should have all but eroded away by now. Instead, the site width was reported as approximately 50 ft. (15 m) in 1967, 80 ft. (24 m) in 1976, and 165 ft. (50 m) in 1997 (Edwards 1967a; Polansky 1998; Riley 1976)—during a 2009 site visit, I estimated site width at approximately 70 ft. (21 m). While clearly there is a range of variability in measuring site dimensions (probably due to variability in the amount of archaeological material visible on the surface), the trend does not indicate rapid site loss due to erosion. I would suggest that the rate of erosion is much smaller than Beardsley estimated, and the site has not lost considerable integrity since the 1940-1941 excavations.

The University of California archaeologists excavated just under half of CA-MRN-232's estimated 25,000 cu. ft. (708 cu. m) total site volume (Figure 4.3 and Table 4.2). Beardsley noted that the "remaining half of the deposit extending around the periphery is extremely shallow material cut through by rows and furrows of the artichoke field" (Beardsley 1954a:23). In addition to a substantial amount of indigenous-manufactured objects, which I discuss in more detail in Chapter Five, CA-MRN-232 yielded a total of 45 fragments of sixteenth-century Chinese blue-and-white export porcelain. In addition, researchers recovered a total of 46 "crude, handwrought iron ship's spikes" from CA-MRN-232 during the 1940-1941 field seasons (Heizer 1941:321-322)—this is slightly less than those listed in the PAHMA catalog.

During two field seasons (23 days total) at CA-MRN-242, the crews excavated about 31.5% of the total deposit (Figure 4.4; see Table 4.2) (Beardsley 1954a:21). The excavations yielded four fragments of sixteenth-century Chinese porcelain and two "crude, handwrought iron ship's spikes," in addition to four historic period artifacts; ten samples of bone, shell, and soil; and more than 1,500 indigenous-manufactured artifacts (Heizer 1941:322; Meighan 1950a:32).

In addition to CA-MRN-232 and CA-MRN-242, Richard Beardsley and his crew received permission to access CA-MRN-271, the Bear Valley Site, and they excavated a portion of the site in July and August 1941. In a July 24, 1941 letter to Alfred Kroeber, Beardsley wrote, "[w]e tested a site in Bear Valley, about six miles south of the Estero – in a single test pit we collected three pieces of china. The site is big enough, moreover to provide us some burials, etc. Although a couple of small middens on the Estero yet to be dug may give us more china, this Bear Valley site looks like the best bet. To clean up Cauley [CA-MRN-242] and the small middens, and to do a reasonable job on Bear Valley, we will need about three weeks more digging..." (Beardsley 1941c).

In Beardsley's next communication to Kroeber on August 11 he notes the project had officially ended. About CA-MRN-271 he wrote, "[w]e were able to accomplish the task of getting into Bear Valley.... We spent this last week digging as much of the surface area as possible, with a pit to the depth of 24 inches.... The result of the week's work is that we have [a] china-bearing site to add to the list, but a not impressive yield of aboriginal material. The usual run of artifacts in deposit, a couple of caches of fragmented mortars (one of which has a good piece of blue china in definit [sic], but probably accidental, association) and a single burial" (Beardsley 1941a). He goes on, "[s]ince Bear Valley was dug specifically for china, we screened all the dirt from the first foot level, and a good portion from the second foot level. We have something less than 100% recovery, but the percentage is high. The deposit was not very rich, and gave us a low yield on good artifacts, though we have a fair series of obsidian points. When we finished about a thousand cubic feet we cleaned up, leaving the pit clear so that it may be dug again to bottom, and came home" (Beardsley 1941a).

Table 4.2. Total excavation area and artifacts recovered for each of the sites discussed in this chapter.

<u>Site</u>	<u>Years Excavated</u>	<u>Artifacts Recovered</u>	<u>Area Excavated (cu. ft.)</u>	<u>Area Excavated (cu. m)</u>
CA-MRN-216	1964-1967	2,460	8,300	771
CA-MRN-232	1940-1949	1,374	16,000	453
CA-MRN-242	1940-1941	1,539	6,500	184
CA-MRN-271	1941	299	1,000	28
CA-MRN-298E	1961-1966	1,620	4,000	372
CA-MRN-298W	1956-1973	1,350	5,100	474
CA-MRN-307	1949-1951	561	6,200	176

Site CA-MRN-271 was one of the first six sites associated with introduced objects from sixteenth-century encounters between Tamal and Europeans (Heizer 1941). In the first scholarly treatment of these sites, Heizer does not give any details about CA-MRN-271 other than to note that Beardsley’s field crew had recovered 17 sixteenth-century porcelain fragments from it. Adan Treganza, then a graduate student at the University of California, along with his wife, conducted additional, smaller-scale excavations at CA-MRN-271 in June 1945 (Figure 4.5). His excavation added a small amount of material to the collections at the Phoebe A. Hearst Museum of Anthropology (PAHMA), including two additional fragments of sixteenth-century Chinese porcelain (Gifford 1945).

Despite University of California researcher’s extensive excavations at the site, little analysis has specifically focused on CA-MRN-271. The site has consistently been referenced as one of the Point Reyes sites that produced introduced material from sixteenth-century encounters in *tamál-húye*, but as one of the smaller sites, it was never discussed in detail (Heizer 1941; Meighan 1950a; Meighan and Heizer 1952). Beardsley included material he excavated from the Bear Valley site in his detailed work linking Central California archaeological chronologies to the San Francisco Bay Area (Beardsley 1947, 1954a, 1954b), but he considered it one of his “secondary” sites. He noted that his crew conducted only minor excavations at the site, and that it “yielded very little cultural material in twelve days of excavation” (Beardsley 1954a:24). No detailed analysis of artifacts and spatial relationships from the site has been attempted since Beardsley’s work in the 1940s.

In summarizing the 1940-1941 Berkeley fieldwork on the Point Reyes Peninsula, Beardsley wrote,

[t]wo ends were served by excavations made by University of California field parties in Marin County coast sites in 1940 and 1941. Historically significant information was gained from finds of Chinese porcelain and antique iron spikes scattered through the archeological sites. It was possible as well to extend knowledge of culture horizons to a new area of Central California (Beardsley 1954a:5).

1946 Site Visits: CA-MRN-232 and CA-MRN-242

After the 1941 field season, the Berkeley archaeologist’s investigations at Point Reyes were postponed by the onset of World War Two, and field operations at Point Reyes did not

Figure 4.4. University of California excavation map of CA-MRN-242, 1940-1941 (Beardsley 1947:53).

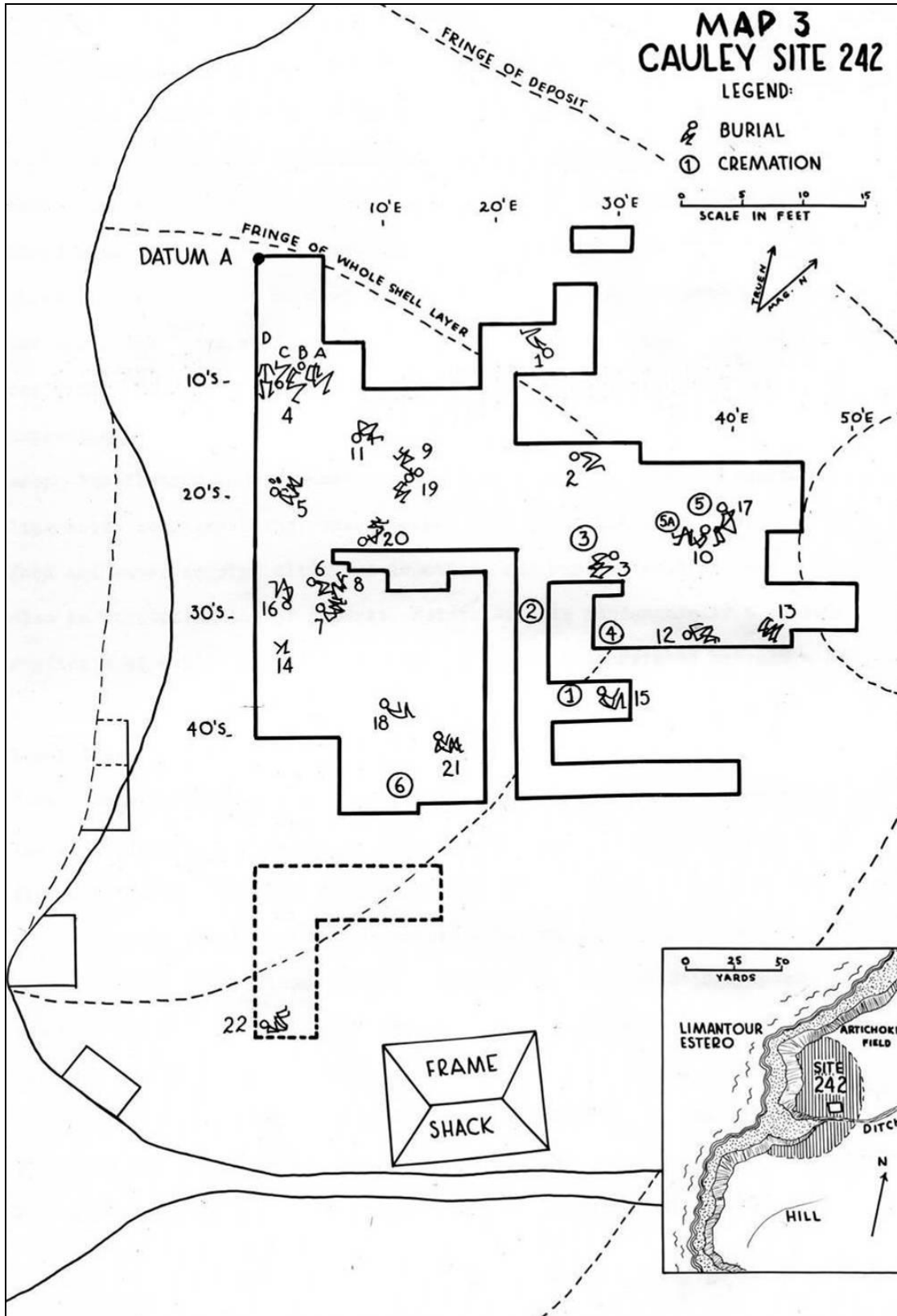
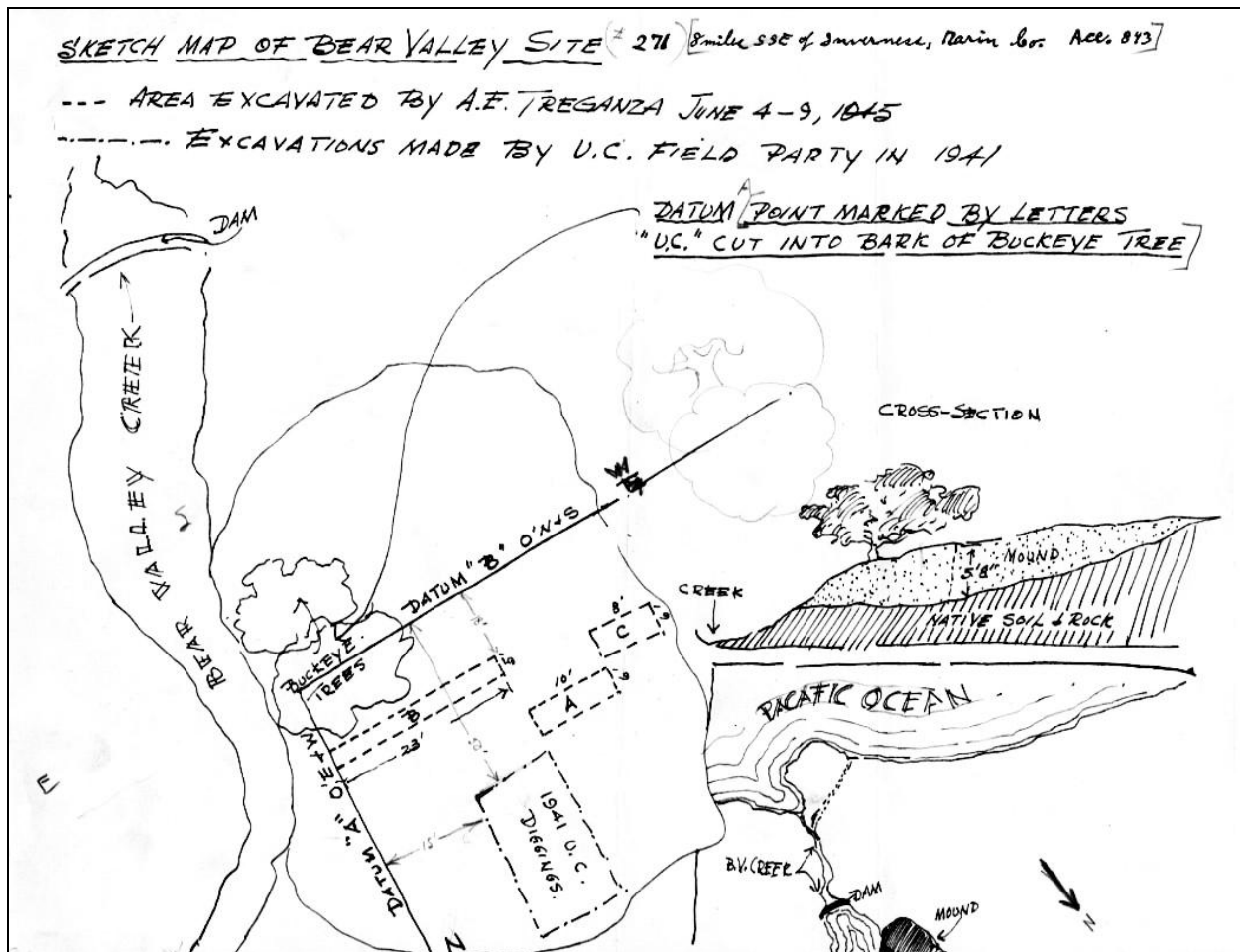


Figure 4.5. University of California sketch map of CA-MRN-271, 1941-1945 (Beardsley 1946).



resume until after the war. At that time, University of California archaeologists re-visited the Estero Site, CA-MRN-232, at least twice in 1946. First, Beardsley visited the site in July 1946, noting in a new site record that the site was a shellmound with black dirt along the edge of a rapidly eroding siltstone bluff, and that the site had been “completely trenched, except for fringes” in 1940-1941 (Beardsley 1946b). He collected a single obsidian biface from the site surface during his visit. Next, Heizer visited the site in October 1946. He collected a number of artifacts from the beach below the site, including flaked stone, ground stone, and worked shell artifacts (PAHMA Catalog).

U.C. Berkeley researchers also revisited the Cauley Site, CA-MRN-242, in 1946 to conduct additional analyses. Beardsley accompanied colleagues from the UC Berkeley School of Agriculture, Division of Soils, who collected soil samples from CA-MRN-242 in April 1946. During that visit, Beardsley described the site as a “[b]lack-dirt shell-mound” that measured 130 ft. (40 m) by 75 ft. (23 m) with a 48 in. (1.2 m) maximum depth (Beardsley 1946d). He also noted that “[m]uch site lost by erosion over bluff; 6’ wide gully cuts thru [sic] 1 side, starting from 15’ x 15’ shack” (Beardsley 1946d). Erosion at CA-MRN-242 has continued to be a concern over the decades, and in recent years the National Park Service (NPS) has expended considerable effort to measure and mitigate the problem (see below).

1949-1951 Excavations at CA-MRN-232 and CA-MRN-307

The University of California began extensive field investigations at CA-MRN-232 again in 1949, this time in partnership with the California Historical Society (CHS). In early 1949, the CHS expressed its interest in re-starting the search for sixteenth-century material remains associated with Drake and Cermeño in Point Reyes. They requested that the University of California renew investigations at CA-MRN-232, which up until that point had yielded the most sixteenth-century introduced objects from the encounters, primarily Chinese porcelain and iron spikes. The CHS funded a crew of four to “excavate completely and screen the Estero mound,” with work planned for approximately August 20-September 15, 1949 (Heizer 1949a:344). In securing permission to excavate the site from the landowners, the Berkeley crew agreed that “[o]rdinary aboriginal artifacts and the expected historic objects (Ming porcelain fragments and iron spikes) will go to the University, but special and potentially valuable objects, such as coins, will belong to the property owners” (Heizer 1949a:344).

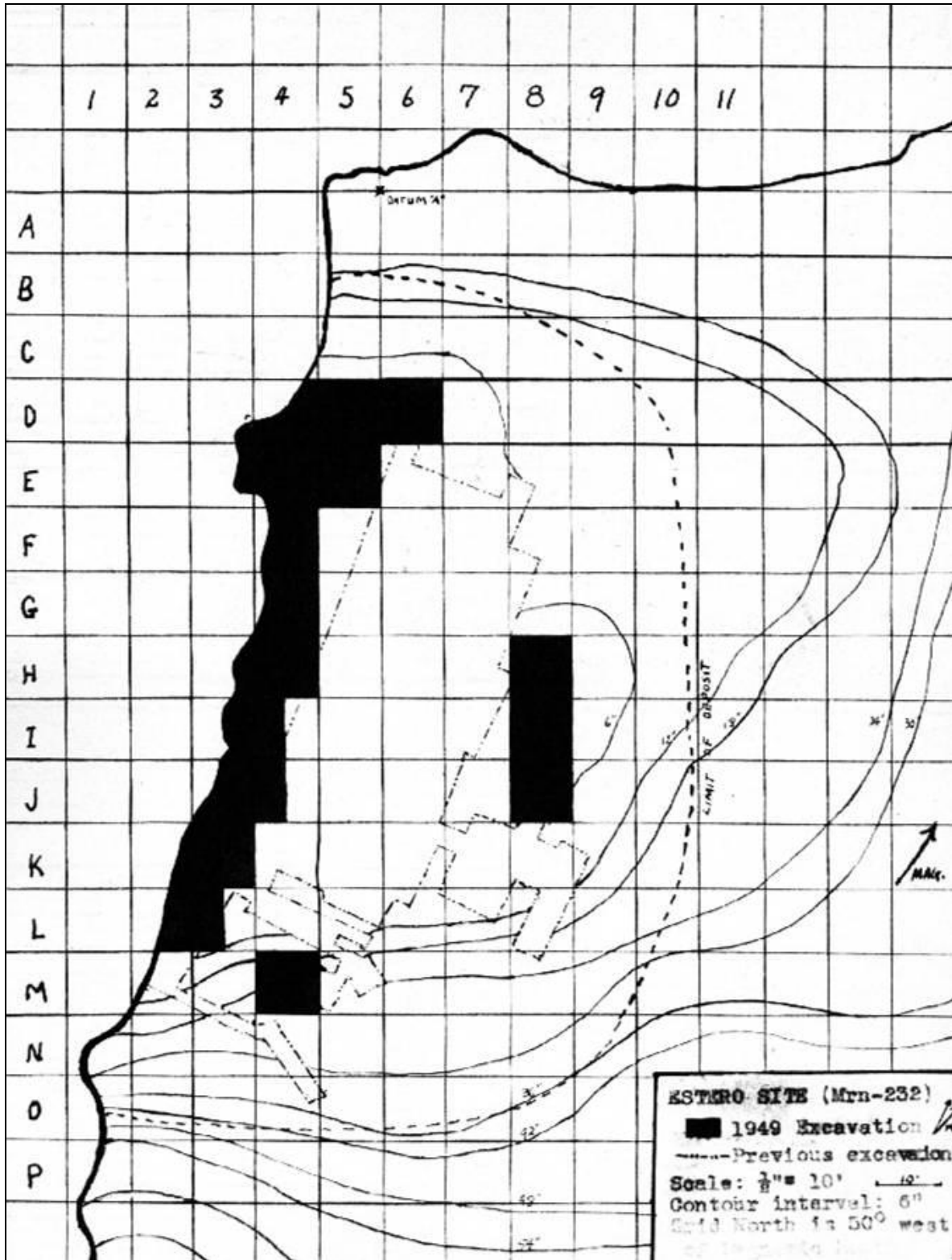
Clement Meighan, who had recently obtained his B.A. from UC Berkeley and planned to enter the University’s Department of Anthropology graduate program in the fall of 1949, directed excavation at the site, under contract with the California Archaeological Survey (CAS). According to Heizer’s instructions to Meighan,

[t]he site is to be screened in toto, and the understanding is that Estero is the site contracted for – this to prevent scattering of endeavors. The boys agree to work until ca. Sept. 10 @ 5.00 per day. A 150.00 advance will be drawn to cover food and necessary equipment (boards for a chute, ½” hardware, cloth, etc.). They can be paid weekly, and I will countersign the payroll. Crew will work 6 days per week and subsist themselves. CAS will furnish equipment (tent, stove, utensils, tools, record forms) and, if possible, transportation. All excavation is to be properly excavated, documented by record forms, catalogue, and photographs. Meighan will submit a report to the C. Historical Society within 30 days of conclusion of the work (Heizer 1949a:344).

The excavation began earlier than originally planned, with field operations commencing on August 13 (Neasham 1949); the excavation, however, proceeded slower than expected. On August 23, 1949, Heizer drove from Berkeley to visit the site and see how the excavation was progressing. Heizer wrote that Meighan and his team “are doing quite well, though had moved in 1 week only 300+ cubic feet [8.5 cu. m]. I advised them to dig only the top 24”-30” [60-76 cm] which is Late Horizon, and leave the compacted lower layer which is Middle, and therefore pre-1595” (Heizer 1949a:345). This reinforces the fact that the primary purpose of the excavation was to locate sixteenth-century European and Asian material remains. Slightly more than a week later, on September 2 1949, Heizer again visited the site. He reported that “[s]ince I was there on 8/23, they have dug 90’ [27 m] of the edge, and recovered a total of 18 pcs. of blue glazed china – all fragments and 3-400 Indian artifacts. They were in process of opening up a 10’ x 30’ [3 m by 9 m] area in the east center of the deposit where Beardsley had not dug” (Heizer 1949a:345).

The crew finished site investigations on September 7, 1949 (Figure 4.6; see Table 4.2) (Meighan 1950c:18). Excavations covered the western edge of the site along the bluff above the estero in 12 partial and full 10 ft. (3 m) by 10 ft. (3 m) units, and four additional 10 ft. (3 m) by

Figure 4.6. University of California excavation map of CA-MRN-232, 1949 (Meighan 1950b:Figure 1).



10 ft. (3 m) internal blocks in areas not excavated by Heizer and Beardsley in 1940-1941 (Meighan 1950b)(PAHMA Catalog). Unfortunately, Meighan's reports of total artifacts recovered in 1949 vary. In one account, he noted that excavators recovered 375 artifacts (not including burial contexts) (Meighan 1950c:17). In another account, Meighan records that 1949 investigations at CA-MRN-232 resulted in 443 "aboriginal" artifacts, 28 historic artifacts (although this figure is 78 in Meighan 1950b:19), and approximately 150 bone, shell, and soil samples (Meighan 1950a:32). The team also recovered three burials from the site during the 1949 field season—two inhumations and a cremation.

Summarizing the 1949 excavation at CA-MRN-232, Heizer noted, "[w]e have redug Estero and turned up a number of additional fragments of porcelain and a few more spikes, but no additional finds were made which might further salvage the still open question of who left these pieces in Drake's Bay" (Heizer 1949b). Like the earlier excavations, however, evidence suggested the material remains were from the 1595 *San Agustín* shipwreck, rather than from Drake's 1579 visit. After a meeting with Allen Chickering of the CHS, who was reportedly quite pleased with the results of the excavation, Heizer reported, "[t]he consensus of opinion is that Meighan has turned up more of the Cermeño evidence..." (Heizer 1949a:345).

In addition to the extensive 1949 excavations at CA-MRN-232, Meighan and his crew also investigated nearby CA-MRN-307 (Meighan 1950a, 1950b). On a visit to the project, Robert Heizer noted that, "[w]e checked a small deposit at a spring ca. 300 yds. [275 m] up the estero from Estero site, probed it a bit, but found no china. Meighan may do more testing here" (he later penciled "CA-MRN-307" in the margin of this notebook)(Heizer 1949a). As Heizer predicted, Meighan recorded CA-MRN-307 and his crew excavated four test units at the site in late-August and early-September 1949. Meighan noted that the site was a "shell and earth midden on shore of bay," and that it measured 60 ft. (18 m) by 50 ft. (15 m), and was 4 ft. (1.2 m) deep (Meighan 1949). During 1949 excavations, with the help of an army mine detector, the team found a cache of several large iron rods about 1 in. (2.5 cm) in diameter and 2½ to 4 ft. (0.76-1.2 m) long, three smaller iron spikes, and a retouched obsidian flake (Meighan 1950b:6). Researchers thought the rods and spikes might be ship's fasteners from *San Agustín* due to stratigraphic association and the similar appearance of the smaller spikes with sixteenth-century fasteners found in other Point Reyes sites (later analysis revealed the large iron rods to be nineteenth-century ship's fasteners, see Chapter Eight, although the associated smaller spikes could very well be sixteenth-century) (Meighan 1950a:29, 1950b:7). The team also recovered several fragments of the familiar sixteenth-century underglaze blue-and-white Chinese porcelain, as well as fragments of a large, brown-glazed stoneware vessel. Like the porcelain, the stoneware fragments are also sixteenth-century and Asian in origin, although they were found at a consistently deeper stratigraphic level than the Chinese porcelain (Meighan and Heizer 1952:101). In total, the four test units excavated in 1949 yielded 39 artifacts, which include at least 22 flaked stone, ground stone, worked bone, and worked antler objects, and 17 protohistoric and historic artifacts (PAHMA Catalog).

Minor field investigations at CA-MRN-232 resumed in 1950 over two weekends in April and September-October, again under Meighan's direction (Meighan 1950d). Intensive excavation during the 1950 field season focused on CA-MRN-307, so investigations at the Estero Site were limited to surface collections on the site and from the beach below. The April session resulted in recovery of a number of flaked stone, ground stone, worked shell, and historical artifacts, including one fragment of sixteenth-century Chinese porcelain (Meighan 1950d)(PAHMA Catalog). In September-October, Meighan collected five projectile point and

point fragments, and a single porcelain fragment from CA-MRN-232 (Meighan and Heizer 1952).

Following the 1950 field season at the Estero Site, investigators estimated that the combined projects in 1940-1941 and 1949-1950 resulted in approximately 80 percent of the site being excavated. Meighan (1950a:28) noted that “[f]urther work here would probably be unprofitable.” The 1949-1950 investigations added significant details regarding artifacts introduced during the sixteenth-century encounters at *tamál-húye*. After adding a number of iron spikes to the overall finds from CA-MRN-232, Meighan plotted the horizontal spike distribution from all excavations. He noted several spike concentrations, which Heizer (1941) had previously suggested may represent house sites, assuming the Tamal used recycled timbers from *San Agustín* as roof planks. Meighan cautioned, however, that extensive plowing in areas of the site may have moved artifacts, especially in the upper levels of the site. In addition, Meighan noted that a single porcelain fragment (catalog no. 1-77956) recovered from CA-MRN-232 during the 1949 field season had been intentionally retouched by pressure flaking—this was the first porcelain fragment from the Estero Site to show indigenous modification (Meighan 1950b:5). The PAHMA catalog indicates that a second sherd had been ground and polished into large disk (catalog no. 1-77957).

Field investigations at CA-MRN-307 continued for four days in April 1950, also under Meighan’s direction. During the 1950 field season, the crew excavated three contiguous 5 ft. (1.5 m) by 30 ft. (9 m) trenches (Trenches A-C), each comprised of six 5 ft. (1.5 m) by 5 ft. (1.5 m) units, for a total of 18 units. In addition to at least 53 objects of indigenous-manufacture (including flaked stone, ground stone, worked bone, and shell), the Berkeley archaeologists also recovered 11 additional fragments of sixteenth-century Chinese porcelain, and four fragments of brown-glazed stoneware from the same vessel as the previous sherds (Meighan 1950b:9).

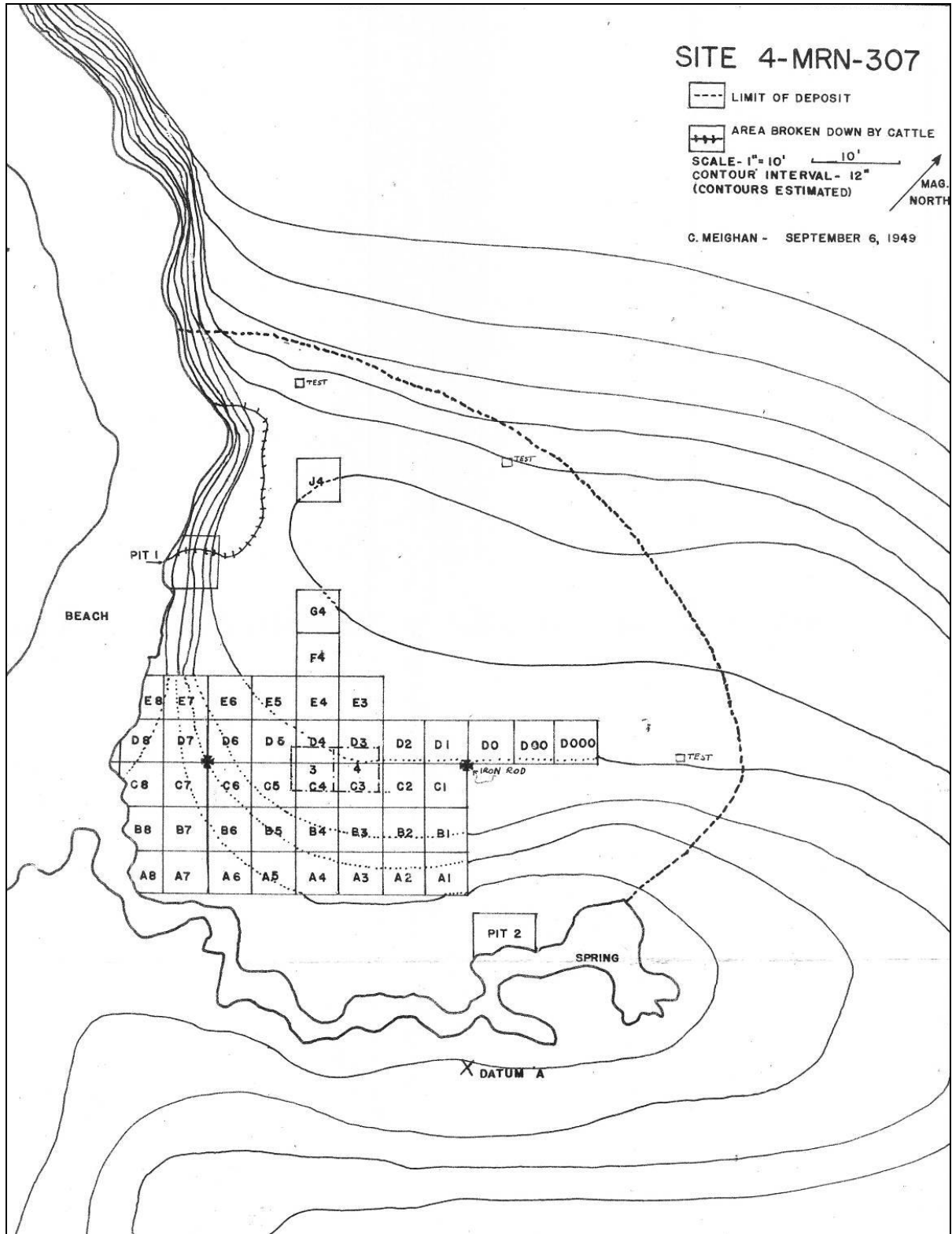
Meighan and his crew dug 28 additional 5 ft. (1.5 m) by 5 ft. (1.5 m) units in September-October 1950. Robert Heizer briefly visited the excavation during that time, and he wrote:

...[I] left Berkeley at 12:30 pm for CA-MRN-307, Drakes Bay where Meighan has a group excavating for more historic material....Arrived about 3, dug till supertime (I found 1 blue porcelain sherd) and after a cold and windy + foggy night worked till 10 next AM and returned. Aboriginal artifacts are fairly abundant (all Late Horizon?) and both the blue porcelain and glazed “sewerpipe” type of pottery jar fragments continue to show....We shall have to dig more to know whether the coarse pottery derives from Drake in 1579 (Heizer 1950).

By the end of the 1950 field season, Meighan estimated they had excavated 40% of CA-MRN-307 (Meighan 1950a:29). The Berkeley team next visited the site in April 1951, when they dug 41 new 5 ft. (1.5 m) by 5 ft. (1.5 m) units, and conducted additional work in four previously excavated units. Finally, during their last field session in September 1951, the crew excavated nine new units and re-dug one previously excavated unit. The Berkeley crew spent seven field sessions and 119 person-days excavating the site between 1949 and 1951. Artifacts from the site housed in the PAHMA collections are listed coming from 97 different units, although Meighan noted they excavated a total of 112 units, which represents 80-95% of the site (Figure 4.7; see Table 4.2) (Meighan 2002:63; Meighan and Heizer 1952:102).

Regarding site stratigraphy, excavators found the site was covered with 1 to 3 in. (2.5 to 7.6 cm) of “slope wash,” or sterile soil that covered the site in an alluvial deposit (Meighan

Figure 4.7. University of California excavation map of CA-MRN-307, 1949-1951 (Meighan 1950b).



1950d). Next, there was a 6 in. (15 cm) thick layer of soil with high concentrations of shell, followed by black midden layer with less shell. The bottom of the deposit was characterized as black, sticky clay that was as shallow as 15 in. (38 cm) on the site margins, and as deep as 40 in. (102 cm) in the center of the site. Small ash lenses were noted throughout the site.

The site yielded a variety of indigenous-manufactured material, all characteristic of the Late Period (AD 1000-1800). This result led Meighan to speculate that there was not a Middle Period occupation at CA-MRN-307, as there was at many other Point Reyes Peninsula sites, including CA-MRN-232, CA-MRN-242, and CA-MRN-271 (Meighan 1950d). Based on hearths found during excavations (three at the midden base and one 1 ft. [30 cm] below the surface), Meighan speculated the site may have contained as many as three houses, with an overall population of about 15 people (Meighan 2002:72). The small settlement may have been related to the larger village sites nearby, such as the one at CA-MRN-232 (Meighan 1966:137).

Like the other excavations at Point Reyes, evidence suggested the porcelain and spikes were material remains from the 1595 *San Agustín* shipwreck, rather than from Drake's 1579 visit (Heizer 1949a:345). One of the most notable results of the excavation at CA-MRN-307 is the observation that the brown-glazed stoneware fragments were recovered at a consistently deeper level than the Chinese porcelain fragments (Meighan and Heizer 1952:102). This observation led the team to believe they had discovered a pre-1595 strata, although they made no claims for whether this was evidence for Sir Francis Drake, or an unknown, pre-Cermeño European voyager (Meighan 1950b:9-10). Meighan's field notes also indicate that modern intrusive materials (i.e., shotgun shells, a Mason jar) were recovered from the same levels as the sixteenth-century porcelain, indicating that the stratigraphy is mixed at CA-MRN-307, as it is at most other Point Reyes sites (Meighan 1950d).

SAN FRANCISCO STATE COLLEGE, SANTA ROSA JUNIOR COLLEGE, AND DRAKE NAVIGATORS GUILD INVESTIGATIONS, 1951-1973

San Francisco State College (SFSC, now San Francisco State University), Santa Rosa Junior College (SRJC), and the DNG were each involved in archaeological investigations on the Point Reyes Peninsula from the conclusion of the University of California research program in the early-1950s, until the mid-1970s, when the NPS began actively managing cultural resources in Point Reyes National Seashore. While the most extensive excavations took place on Limantour Spit at sites CA-MRN-216 and CA-MRN-298, the institutions also conducted various other field operations at CA-MRN-232, CA-MRN-242, CA-MRN-271, and CA-MRN-307.

Following the conclusion of the 1940-1941 and 1949-1950 University of California excavations at CA-MRN-232, little systematic work took place, although a number of inadvertent discoveries were made at the site in the decades following the last formal excavation. Members of the DNG recorded a number of artifacts from the site that were collected by private individuals from 1952-1973, including nine porcelain fragments; eight obsidian projectile points, point fragments, bifaces, or biface fragments; three chert fragments; and one iron spike. These artifacts were surface collected from on or near the site, although there is no provenience information available (Anonymous 1973a; Von der Porten 1952-1973:6, 28-29). All the artifacts except a single obsidian projectile point (Catalog No. PORE 6004), remain in private collections. Because I was not able to observe any of these objects firsthand, it is unclear if the porcelain is sixteenth-century Chinese blue-and-white export porcelain or later, nineteenth-century ceramic

fragments, or if the iron spike is diagnostic. In any case, I do not include any of these artifacts in my study.

Beginning in 1966, researchers and students from SFSC made several visits to CA-MRN-242. Robert Edwards visited the site in November 1966 and collected a number of artifacts from the surface and exposed on the eroding bluff edge (Childers 1967a). These included a pestle and pestle fragment, a net weight, a charmstone, a flaked stone tool, an awl sharpening stone, and a human bone fragment (Anonymous 1966). The following spring, Barbara Childers visited the site and completed an updated site survey record, noting the site measured 130 ft. (40 m) by 50 ft. (15 m) and was 5-6 ft. (1.5-1.8 m) deep. She also observed evidence of possible looting at the site—she noted on the site record, “[o]ne pot hole and work on two faces of cliff, artifacts and disassociated burial found in pothunters back dirt” (Childers 1967b). Childers collected a number of artifacts associated with the looter’s activity, including an incised bone pendant and an abalone pendant, mortar fragments, a bone awl and other worked bone fragments, a fragment of fossilized whalebone, a pestle (mano), and a flaked stone fragment (Childers 1967a; Childers, et al. 1967). She also observed and collected exposed human remains associated with a single individual (Childers 1967a). The artifacts SFSC recovered in 1966-1967 are currently in the collection of the Point Reyes National Seashore Museum—because there is no provenience for these objects, I do not include them in my spatial analysis of the site, nor do I consider them further.

Later evidence suggests Childers’s and Edwards’s speculation that CA-MRN-242 was being actively looted was likely correct. In 1973, members of the Drake Navigators Guild recorded a number of artifacts from the site that had been collected by private individuals. Artifacts include 68 obsidian projectile points and point fragments; eight porcelain fragments; five bone awls and awl fragments; five bird bone beads or tubes; three charmstones; three net weights; and one iron spike. These artifacts were surface collected from on or near the site, and there is no provenience information (Anonymous 1973b; Von der Porten 1952-1973:29-31). All the artifacts remain in a private collection. Because I was not able to observe any of these objects firsthand, it is unclear if the porcelain is sixteenth-century Chinese blue-and-white export porcelain or later, nineteenth-century ceramic fragments or if the iron spike is diagnostic. In any case, I do not include any of these artifacts in my study.

Since the 1941 and 1945 University of California excavations at CA-MRN-271, little work has been conducted there, either, although DNG members collected four artifacts from the site between 1958-1961, including a chert biface, and three porcelain fragments identified as Ming Dynasty. These artifacts were surface collected from a washout on or near the site, and there is no specific provenience information. The DNG artifact inventory sheets indicate that two of the porcelain fragments were presented to Sir H. Garner by Tom F. King, so only one of the fragments is available for study today (Von der Porten 1951-1962:2, 13, 15). It is included in my porcelain analysis in Chapter Eight, but without location information it is not included in the GIS spatial analysis.

Similarly, little systematic work was conducted at CA-MRN-307 following Meighan’s excavation in 1951. In 1973, DNG members recorded a single charmstone (Type V, phallic, indicative of the Late Period) from the site, which had been collected by private individuals from on or near the site. There is no provenience information (Anonymous 1973c; Von der Porten 1952-1973:31). The artifact remains in a private collection, and because I was not able to observe it firsthand, I do not include it in my study, nor do I consider it further.

Adan Treganza from SFSC began to investigate sites on Limantour Spit in the late-1950s. His goal was to determine what sites were occupied by the Tamal at the time of the sixteenth century encounters with Drake and Cermeño, and to “determine the distribution of Caucasian artifacts which could be attributed to the 16th century” (Treganza 1959:1). After small-scale excavations at several sites on the Point Reyes Peninsula (including CA-MRN-308), Treganza narrowed his focus to Limantour Spit and began work at CA-MRN-298W, also known at that time as the Adams Site, and later at CA-MRN-216 (Treganza 1959:10). Like the University of California excavations before them, the majority of the work conducted by SFSC, SRJC, and the DNG at Point Reyes focused on the search for evidence of the sixteenth-century encounters in *tamál-húye*. The most extensive excavations during the late-1950s, 1960s, and early-1970s took place at CA-MRN-216 and CA-MRN-298.

The DNG’s M. P. Dillingham first recorded site CA-MRN-216 in August 1953 (Dillingham 1953). He observed that the site was semi-circular, with a 200 ft. (61 m) diameter and a depth of 22-26 in. (56-66 cm). He also observed a total of seven possible house pits, and an abundance of fish and bird bone on the surface. Dillingham and his colleagues dug two trenches at the site. The first was 8 ft. (2.4 m) long and 30 in. (76 cm) wide, and was dug to a depth of 22 in. (56 cm) through the center one of the possible house pits—they did not recover any artifacts. The second was 8 ft. (2.4 m) long and 16 in. (40 cm) wide, and dug to a depth of 24 in. (60 cm) between two possible house pits. From the second trench, Dillingham recovered an obsidian point, a worked bird bone, fire-cracked rock, and cut bone fragments. He also recovered a gray-glazed ceramic fragment from 12-in. (30 cm) deep, and two fragments of Chinese blue-and-white porcelain from 22 in. (56 cm) deep (Dillingham 1953). None of these artifacts are in the Point Reyes National Seashore Museum collection today, and their whereabouts are unknown. There is also no information on where these excavations were located within the site (Dillingham 1953). For my analysis, I do not include the reported finds because there is no information about them.

In 1960, developers’ plans to turn Limantour Spit into a housing subdivision began to come to fruition. As part of the initial surge of development, construction crews built a road along the spit, just north of the line of coastal beach dunes. Road construction had an immediate adverse effect on archaeological sites on Limantour Spit, especially CA-MRN-216, as bulldozer work and excavation of a borrow pit associated with road construction and residential development damaged the southern edge of the site (Treganza and King 1968:17). More than any single factor, the threat of destruction of the important archaeological record on Limantour Spit prompted the massive excavation efforts at CA-MRN-216 and CA-MRN-298 over the course of the next decade.

Under an NPS contract beginning in 1963, Aden Treganza of San Francisco State College (SFSC) supervised an extensive survey at Point Reyes, as well as excavations at a number of sites, including CA-MRN-216 (Moratto 1974:59). Treganza and his SFSC crew initially excavated 14 5 ft. (1.5 m) by 5 ft. (1.5 m) units near the center of CA-MRN-216 using shovel broadcast in 1964 (Moratto 1974:58, 59; Treganza 1964; Treganza and King 1968:17). The excavation yielded just 68 artifacts (see Chapter Five). Excavators recorded artifact provenience by the whole unit, although the majority of artifacts had depth recorded to the nearest inch (Treganza 1964). Fifty-five of the 68 artifacts are now in the collection of Point Reyes National Seashore; the location of the remaining 14 is unknown.

A more extensive excavation at CA-MRN-216 began in 1965, and a large portion of the site was excavated from 1965-1967 (Moratto 1974:59). With his failing health, Treganza’s

SFSC students Anthony Barnett, Thomas King, Robert Edwards, and Michael Moratto began supervising the Point Reyes investigations, although they remained under Treganza's overall direction (Moratto 1974:59). The 1965 excavation was supervised by Anthony Barnett (Treganza 1965). In preparation for 1965 excavation, researchers used a bulldozer to remove sand overburden from the site, and they delineated the site's northern and eastern boundaries by bulldozing trenches that they referred to as "power cuts." Excavation began in August 1965, and continued throughout the fall semester (Treganza and King 1968:20). Based on provenience information recorded in the artifact inventory, the team excavated a total of 31 10 ft. (3 m) by 10 ft. (3 m) units during fall 1965, and one 5 ft. (1.5 m) by 5 ft. (1.5 m) unit off the site's western edge (Treganza 1965). This includes two units that Treganza and King's (1968:21) final site map indicates as not excavated (units I-2 and J-2), however, and another unit that overlaps with Treganza's 1964 excavation (unit K-6). A total of 818 artifacts are listed in artifact catalogs for 1965 (see Chapter Five).

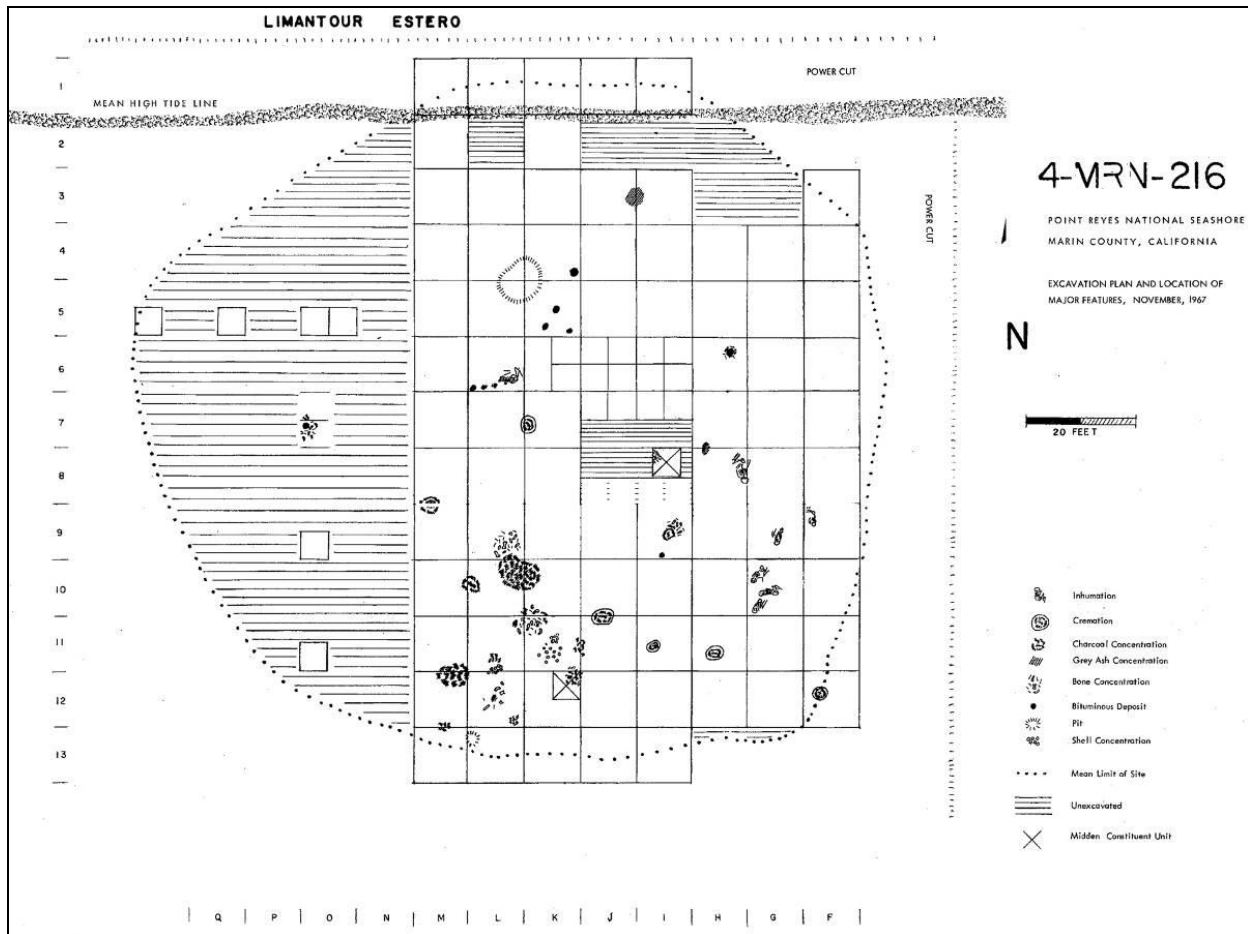
Under Barnett's direction, SFSC continued excavation at CA-MRN-216 in spring 1966, and excavated two units in fall 1966 (Treganza 1966; Treganza and King 1968:20). During the 1966 field season, investigators excavated a total of 46 10 ft. (3 m) by 10 ft. (3 m) units, although there is again a slight discrepancy between the final site map and the artifact catalog. The latter indicates excavation in five units (F1, F2, G3, H3, and H13) that appear as unexcavated portions of the site on the published site map (although only 1-7 artifacts are recorded per unit, and none deeper than 14 in. [35 cm], so excavation may have been limited)(Treganza 1966). A total of 843 artifacts were recovered during the spring and fall 1966 excavations (see Chapter Five).

The next excavations at the site took place in Spring 1967, and were directed by Rob Edwards and Tom King. This field session included excavation of a 5 ft. (1.5 m) by 5 ft. (1.5 m) unit (X-1, in the center of the site in the otherwise unexcavated Unit I-8) that was used for midden constituent analysis as part of a detailed faunal analysis of the site. The unit was excavated in 6 in. (15 cm) arbitrary levels to depth of 42 in. (1 m). Excavators used ¼ in. screens in the field, and retained everything in the screens for later laboratory analysis (Henn 1970). Artifacts recovered from this unit were cataloged along with other finds from the field season (Treganza 1967). In addition, "minor work" in the previously unexcavated western portion of the site was completed in fall 1967, using discontinuous 5 ft. (1.5 m) by 5 ft. (1.5 m) units (Treganza and King 1968:20). A total of 731 artifacts were recovered from the site during field sessions in spring and fall of 1967 (see Chapter Five).

At the conclusion of CA-MRN-216 excavations in 1967, crews from SFSC had completed 24 5 ft. (1.5 m) by 5 ft. (1.5 m) units and 77 10 ft. (3 m) by 10 ft. (3 m) units (Figure 4.8; see Table 4.2). Little additional work was conducted over the years. Artifact collectors removed several artifacts from the site, and the DNG recorded the finds in 1973. These included a projectile point (type S1b) and a point fragment (unknown type), both of which were collected from a "washout" with no location recorded—both remain in a private collection and are unavailable for study (Von der Porten 1952-1973:28).

The other site on Limantour Spit that was extensively excavated from the late-1950s to mid-1970s was CA-MRN-298, located several hundred meters to the west of CA-MRN-216. Initial work at the site began in the mid-1950s, when DNG members conducted a small text excavation at DNG-2 (CA-MRN-298W) in 1956 (Dillingham 1956; Von der Porten 1963:7). Researchers excavated a 13 ft. (4 m) by 6 ft. (1.8 m) trench to a depth of 30-54 in. (76-137 cm), and screened all material through ½ in. mesh. They recovered six fragments of sixteenth-century Chinese porcelain and two obsidian projectile points that are in the Point Reyes National

Figure 4.8. San Francisco State College excavation map of CA-MRN-216, 1964-1967 (Treganza and King 1968:21).



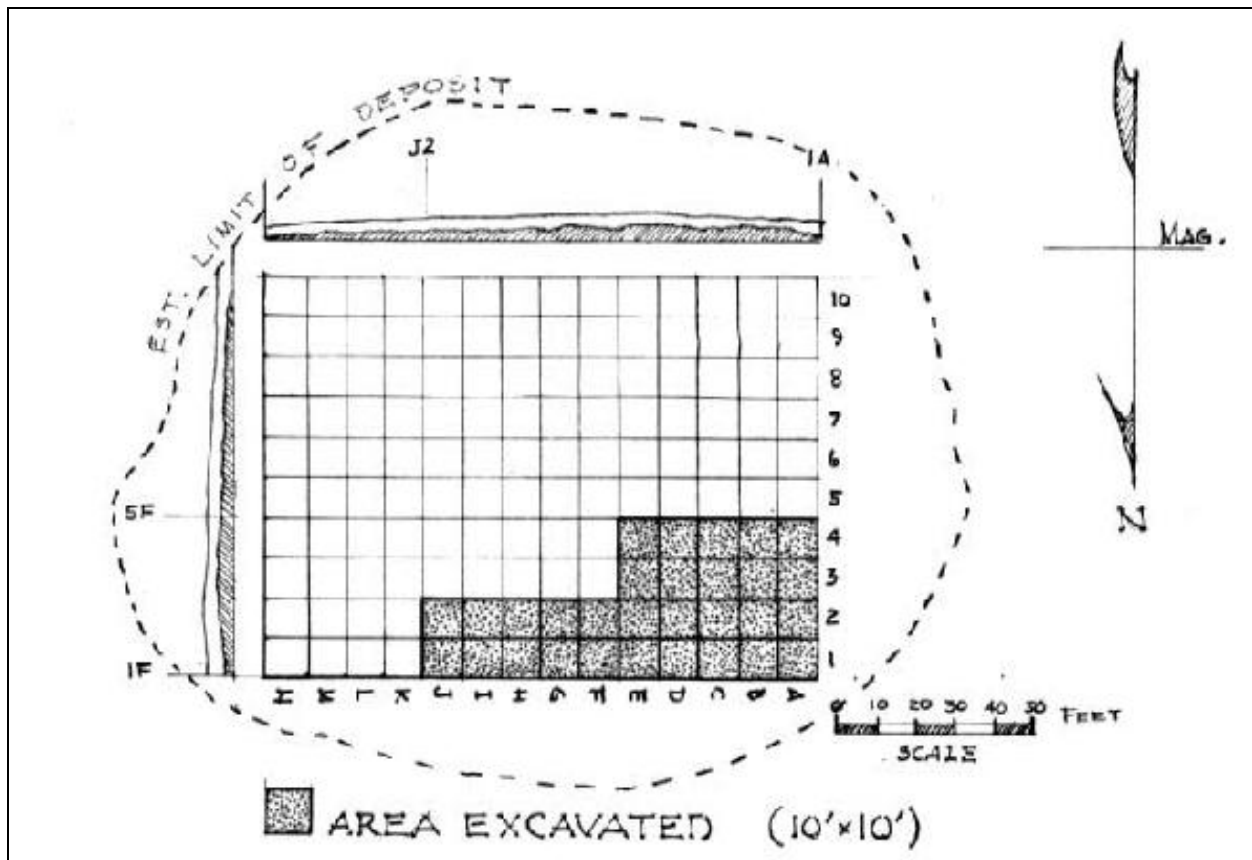
Seashore Museum collection today, and a seventh porcelain fragment and a scraper, which are not currently located in the collection and whose whereabouts are unknown. Excavators also observed an ash lens in the trench, possibly from a cooking hearth. There is no information on where these excavations were located within the site (Dillingham 1956; Von der Porten 1963:42). For my analysis, I include the eight artifacts located in the collections today, but do not include the other reported finds because there is no information about them.

SFSC's Adan Treganza began excavations at the western loci of CA-MRN-298 in late fall 1958. At that time, he found the site buried by 1-2 ft. (30-60 cm) of migrating sand, and he used a bulldozer to removed the sand overburden before beginning excavation (Treganza 1959:10). In a letter to Robert Heizer in November 1958, Treganza wrote, "[w]ork on the sandspit at Drakes Bay [i.e. Limantour Spit] may produce something this [sic] next two weekends. I was able to borrow a bulldozer and strip all the sand off the surface of one of the sites. A sample has produced some large chunks of porcelain and a remarkable amount of fish, mammal, and bird bone. I don't think I have ever encountered as much before" (Treganza 1958).

Over a five month period in 1959, Treganza excavated 30 10 ft. (3 m) by 10 ft. (3 m) units at the site (3,000 sq. ft. or 279 sq. m) using shovel broadcast, without use of screens, and digging in 12 in. arbitrary levels (Figure 4.9) (Moratto 1974:57; Treganza 1959:11; Treganza and King 1968:22). Treganza's excavation yielded more than 150 flaked stone, ground stone, worked bone, and worked shell artifacts, along with 39 sixteenth-century Chinese porcelain fragments, a single fragment of "stoneware," and a single cast-iron stove fragment—a surprisingly small number of artifacts for what later turned out to be such a rich site (there is some discrepancy between Treganza's report and the original artifact catalogs—for my analysis I rely primarily on the original records). In addition to artifactual material, as he alluded to in his letter to Heizer, Treganza was struck by the "excessive" amount of faunal remains on site (Treganza 1959:11), although he did not collect faunal remains during the excavation. In addition, Treganza excavated a single burial located below the cultural deposit, with no associated artifacts (Treganza 1959:16).

As at CA-MRN-216, preparations for the commercial development of Limantour Spit adversely effected CA-MRN-298, as road construction partially buried the southern part of CA-MRN-298W (Treganza and King 1968:20). In the process, the construction activities disturbed or destroyed the stakes and other datum information from Treganza's 1959 excavation, leading to the "loss" of its location—a problem that has persisted to the present (King and Upson 1970:126).

Figure 4.9. San Francisco State College excavation map of CA-MRN-298, 1958 (Treganza 1959:35).



In 1961, DNG member Edward Von der Porten began teaching an archaeology field class sponsored by the Community Service Program at Santa Rosa Junior College (SRJC), and in 1961-1962 Von der Porten's class began excavation at CA-MRN-298 under his direction. By agreement, the DNG became owners of all archaeological material recovered during these field sessions (Von der Porten 1963:5), although a cooperative agreement stipulated that all the "Indian artifacts" were transferred to the Treganza Museum at SFSC (Moratto 1974:58). Since then, both the DNG and Treganza Museum collections, along with copies of all original field documentation, have been transferred to Point Reyes National Seashore, where they are held in the Point Reyes National Seashore Museum and Archive. Von der Porten and his SRJC class began their excavations at the site's eastern locus, CA-MRN-298E. Their investigations began with an initial 5 ft. (1.5 m) by 5 ft. (1.5 m) test pit in May 1961, followed by excavation of another 29 5 ft. (1.5 m) by 5 ft. (1.5 m) units over nine days between September 1961 and April 1962, for a total of 30 units excavated the first season (Von der Porten 1961-1962).

During the excavation of CA-MRN-298E, Von der Porten and his crew found that the primary midden deposits were covered by approximately 8 in. (20 cm) of sand, and that there was significant mixing of material from all levels due to rodent activity. The primary midden was 2.5 ft. (76 cm) thick on average, with sterile soil below. Excavations yielded a wide variety of indigenous-manufactured artifacts, including more than 200 worked shell and worked bone objects, as well as flaked and ground stone artifacts. Among the features recorded were traces of house floors, fire lenses, pits dug into the midden base, and rock concentrations. No burials were found during the first field season. The midden was characterized by a high concentration of shell, predominantly from species found in nearby tidal flats, such as *Saxidomus nuttalli* (Washington clam), *Macoma nasuta* (Bent-nose clam), *Euspira* (formerly *Polinices*) *lewisii* (Lewis' moon snail), *Leukoma* (formerly *Protothaca*) *staminea* (Pacific Littleneck clam), *Clinocardium nuttallii* (Nuttall's Cockle), and *Tresus* (formerly *Schizothaerus*) *nuttallii* (Long-neck clam), but also including mussel shell (*Mytilus californianus* (California mussel) and *Mytilus edulis* [Bay mussel, actually *Mytilus trossulus*]) found in rocky habitats up to several miles away. The excavation also yielded a large number of mammal, bird, and fish remains. The crew found a total of 22 fragments of sixteenth-century Chinese porcelain during the first field season, as well as six fragments of terra cotta and a terra cotta handle, possibly from a single large bowl, and two additional fragments of coarse terra cotta, all dating to the sixteenth century. Finally, they recovered a number of historic-period objects, including a fragment of nineteenth-century bottle glass and five iron fragments from military activity during World War II (Von der Porten 1963:31-37)(see Chapter Five).

During DNG/SRJC excavations at CA-MRN-298E in 1961-1962, the crew also re-visited Treganza's 1959 excavation at CA-MRN-298W and screened backdirt from the previous work with ¼ in. mesh. During re-excavation of the "tip heap," investigators recovered 10 clam shell disk beads and bead blanks, two *Olivella* shell beads, a bone needle, one bird bone tube and three other cut bird bones, one piece of tar or pitch, three porcelain fragments and one porcelain bead blank (Von der Porten 1963:42-43). Re-excavation of the 1959 CA-MRN-298W backfill indicates that Treganza missed a variety of smaller artifacts during his investigation.

The DNG/SRJC excavations at CA-MRN-298E continued for the 1962-1963 field season and into Fall 1963. During the September 1962 to April 1963 field season, the DNG/SRJC team excavated an additional 19 5 ft. (1.5 m) by 5 ft. (1.5 m) at CA-MRN-298E, plus one 2.5 ft. (76 cm) by 2.5 ft. (76 cm) sub-unit, while from September to November 1963, the crew excavated eight more 5 ft. (1.5 m) by 5 ft. (1.5 m) units. The site continued to yield a wide variety of

material, both indigenously-manufactured and introduced, reinforcing the importance of CA-MRN-298 as a contact-period site. Indigenous-manufactured artifacts recovered included more than 200 worked bone, antler, and shell artifacts, 100 flaked and ground stone artifacts, and 35 fragments of asphaltum and ochre. Introduced artifacts included 30 sixteenth-century porcelain fragments and four fragments of earthenware that may also be from the *San Agustín*. Excavators also recovered several historic-period artifacts, including a single glass fragment and numerous iron fragments (see Chapter Five).

In 1963, while the DNG/SRJC excavations were underway, Treganza and SFSC entered into a contract with the National Park Service and the newly-formed Point Reyes National Seashore, which was created in 1962, for an extensive survey of the Point Reyes Peninsula that also included excavations at CA-MRN-216 and CA-MRN-298, among other sites (Moratto 1974:59). As part of this contract, over three days in January 1964 Treganza partially excavated nine 5 ft. (1.5 m) by 5 ft. (1.5 m) units at CA-MRN-298E (Moratto 1974:58; Treganza and King 1968:22). Records from this excavation are sketchy, and only 15 artifacts were recorded during this investigation—nine worked bone artifacts, three flaked stone artifacts, two fragments of sixteenth-century Chinese porcelain, and a fragment of “tar.” None were given exact provenience, but only recorded to the unit and level (Treganza 1964).

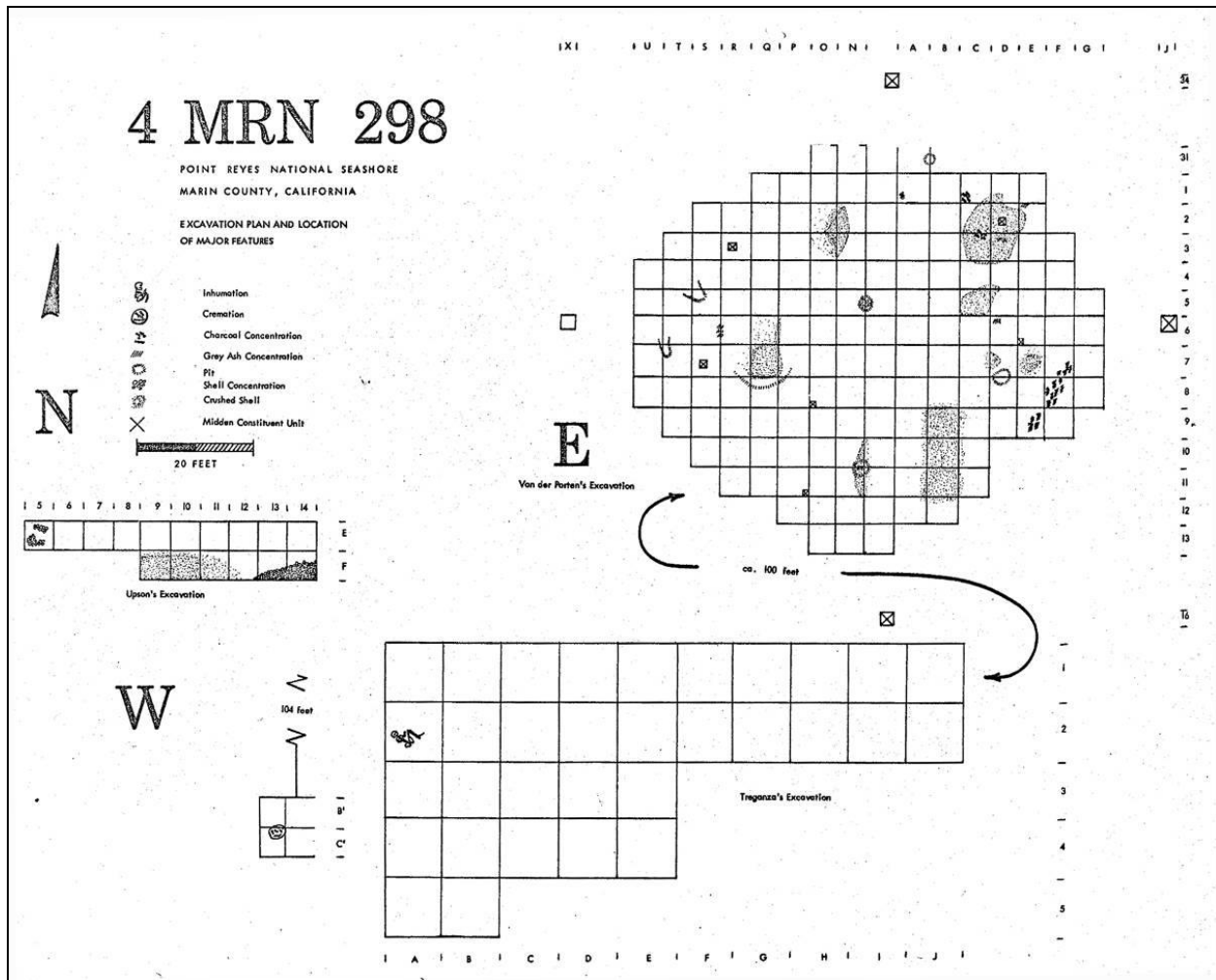
From 1965 on, investigations became a joint project of SRJC and SFSC (Treganza and King 1968:9). The SRJC excavation was put on hold in 1964, but it recommenced as a partnership with SFSC in the fall of 1965. Fieldwork on Limantour Spit during the 1965-1966 field season focused solely on CA-MRN-298E. From September 1965 to May 1966, the combined SRJC/SFSC crew excavated 99 5 ft. (1.5 m) by 5 ft. (1.5 m) units, which included re-excavating six of Treganza’s 1964 units, and four 2.5 ft. (76 cm) by 2.5 ft. (76 cm) sub-units on the margins of the site. Indigenous-manufactured artifacts recovered included 102 worked bone and antler artifacts, 386 worked shell objects, 65 mineral artifacts (asphaltum, ochre, etc.), 22 ground stone and 281 flaked stone artifacts. Introduced objects from the *San Agustín* included 67 fragments of Chinese porcelain and a single fragment of coarse earthenware. Finally, investigators recovered 39 historic-period intrusive metal objects, one glass fragment, and one fragment of refined earthenware. In addition, during the fall of 1965, investigators collected six columns samples for detailed faunal analysis. The columns were 6 in. (15 cm) square and recovered in 6 in. (15 cm) levels, and each level was screened through ¼ in. mesh. Wilson (1970) analyzed three of the six samples, and I discuss the results in Chapter Five when discussing the CA-MRN-298 faunal assemblage.

With the completion of the spring semester in 1966, the SRJC/SFSC team completed their excavations at CA-MRN-298E. The various crews working at the site had excavated 159 5 ft. (1.5 m) by 5 ft. (1.5 m) units, five 2.5 ft. (76 cm) by 2.5 ft. (76 cm) sub-units, and six 6 in. (15 cm) square column samples (Figure 4.10; see Table 4.2).

In fall 1966, investigation moved from CA-MRN-298E to the site’s western locus, CA-MRN-298W, and although the project was still under Treganza’s overall direction, Ward Upson led excavations there until 1969 as a field archaeology class under the auspices of SRJC (Moratto 1974:58; Treganza and King 1968:23; Upson 1967). The midden at CA-MRN-298W was found to be stratified into three distinct layers: an uppermost sand overburden with little cultural material; a dark midden layer bearing most of the artifactual material; and a dark sand layer with some cultural materials and features (Upson 1969:13).

During the 1966-1967 academic year (during which excavations began in February 1967), the crew excavated 16 5 ft. (1.5 m) by 5 ft. (1.5 m) units at CA-MRN-298W, focusing

Figure 4.10. San Francisco State College and Santa Rosa Junior College excavation map of CA-MRN-298, 1958-1967 (Treganza and King 1968:24).



their efforts on an area of the site to the northwest of the estimated location of Treganza's 1959 excavation. Excavation that field season yielded 180 artifacts (including a variety of flaked stone, ground stone, worked antler and bone, and worked shell artifacts such as shell beads), and the team recorded a number of features, including a thick lens of *Saxidomus nuttalli* (Washington clam) shell, patches of crushed *Mytilus edulis* [Bay mussel, actually *Mytilus trossulus*], small rock concentrations, and an apparent house floor (Upson 1967:1). Interestingly, however, significantly fewer beads and bead blanks were recovered from CA-MRN-298W as were found at CA-MRN-216 and CA-MRN-298E, including no clam shell disk bead blanks, and only *Olivella* bead blanks. In addition, a large number of "holed shells" were recovered—mollusk shells with holes chipped into them (Upson 1967:4-5). Investigators also recovered 27 fragments of sixteenth-century Chinese porcelain, including one with a unique green glaze, and six red terra cotta fragments that are also from the *San Agustín* (Upson 1967:2-3). In addition, a single cremation was discovered just south of the site boundary in February 1967, and was excavated as part of two additional units. Thirty-two fragments of incised bird-bone and three clam shell disk beads were found either in association or surrounding the cremation (Upson 1967:2). The

cremation was later reburied at Kule Loklo by members of the Federated Indians of Graton Rancheria (Anonymous 1982-2001).

Excavations at CA-MRN-298W continued during the 1967-1968 academic year, when 20 5 ft. (1.5 m) by 5 ft. (1.5 m) units were excavated, and during 1968-1969 academic year, with another 14 5 ft. (1.5 m) by 5 ft. (1.5 m) units excavated, plus two partial sub-units. After the untimely death of Treganza in fall 1968, work on CA-MRN-298 came to a halt (Péron, et al. 1973:18), and the spring 1969 excavations, taking place over two days in April, were completed to help stabilize the site for long term abandonment (Upson 1969:Addendum). During these field investigations, the site continued to yield an array of indigenously-manufactured objects, including numerous beads and bead blanks, as well as fragments of sixteenth-century porcelain and coarse earthenware. Investigators also recovered a number of intrusive iron fragments from modern military exercises (Upson 1969:3-9). Features excavated included a house floor of crushed shell and clay that measured approximately 16-17 ft. (5 m) by 12 ft. (3.7 m) in diameter. The crew also recorded a number of shell concentrations, ash lenses, and concentrations of stone and bone (Upson 1969:13-14). Three *in situ* terra cotta fragments, which had been previously reported as being found on the intact house floor, were actually not associated with the house floor, but were located below the intact house floor. Nonetheless, they represented a rare, potentially undisturbed deposit that researchers hoped might be used to estimate a sixteenth-century stratum within the site. In total, crews from SRJC and SFSC excavated 54 5 ft. (1.5 m) by 5 ft. (1.5 m) units at CA-MRN-298W from 1967 to 1969, and recovered 602 artifacts, including nearly 90 sixteenth century ceramic fragments (see Figure 4.10) (Upson 1969:17).

After the spring 1969 field season, there was a three-year hiatus before work resumed at CA-MRN-298W. Active looting was discovered at the site in 1972, and combined with weathering of exposed corners, the site was found to be suffering extensive damage. SRJC resumed excavation at the site in 1972, under the direction of René Péron and Edward Von der Porten, to protect it from further degradation and to retrieve valuable information before it was destroyed by looting (Péron, et al. 1973:15, 18). When excavations began again during the 1972-1973 academic year, 12 5 ft. (1.5 m) by 5 ft. (1.5 m) units were excavated or started (Péron, et al. 1973:19). The final field sessions at CA-MRN-298W took place during the summer and fall of 1973, when 17 additional 5 ft. (1.5 m) by 5 ft. (1.5 m) units were completed, in addition to the remaining units from the previous field sessions. The excavations recovered the usual array of flaked and ground stone, and worked bone and shell, artifacts, along with sixteenth-century porcelain and a number of intrusive historic-period objects (Von der Porten and Peron 1973:10-12). One notable feature recorded was a shell concentration that included more than 700 whole shells, mostly *Saxidomus nuttalli* (Washington clam), but also *Euspira* (formerly *Polinices*) *lewisii* (Lewis' moon snail), *Leukoma* (formerly *Protothaca*) *staminea* (Pacific Littleneck clam), *Clinocardium nuttallii* (Nuttall's Cockle), and *Tresus* (formerly *Schizothaerus*) *nuttallii* (Long-neck clam), in a 4-6 in. (10-15 cm) thick layer (Von der Porten and Peron 1973:9).

In addition to the 1956 test pit and Treganza's 1959 dig, excavations at CA-MRN-298W included all or part of 83 5 ft. (1.5 m) by 5 ft. (1.5 m) units (2,075 sq. ft. or 193 sq. m) excavated from spring 1967 to fall 1973, including the two units excavated around the isolated cremation south of the site proper (see Table 4.2). Summarizing work at CA-MRN-298 after all excavations has been completed, Moratto noted that 90% of the site had been dug, with a total of 1,359 artifacts, including 1,075 Late Period artifacts, along with 254 porcelain fragments and two iron spikes, recovered. He estimated that only 5-10% of site remained undisturbed (Moratto 1974:84, 98), although recent mapping suggests that percentage is likely much higher.

Combining the excavation at CA-MRN-298W with the volume excavated at the site's eastern loci, CA-MRN-298E, a total of 844 cu. m of material was excavated from CA-MRN-298. This makes CA-MRN-298 the most extensively-excavated site on the Point Reyes Peninsula.

NATIONAL PARK SERVICE-SPONSORED INVESTIGATIONS, 1960s-PRESENT

The conclusion of excavations at CA-MRN-298 in 1973 marked the end of major clearing excavations in what is now Point Reyes National Seashore. Beginning in the 1970s, following the passage of the National Historic Preservation Act of 1966 and the National Environmental Policy Act of 1969, the NPS began to take a more active interest in managing cultural resources (including archaeological sites) in the national seashore (Sadin 2007:301-303). As a result, archaeological research on the Point Reyes Peninsula shifted from major excavations to survey, inventory, and site preservation activities. Research sponsored by the NPS, while limited, has resulted in a number of significant finds and observations about the sites at *tamálhúye* that are relevant to my present study, which I summarize in this section.

Riley (1976) visited a number of archaeological sites during a 1976 project to document endangered sites in Point Reyes National Seashore. She made a number of important observations at sites that are the focus of my study. During her site assessment at CA-MRN-232, she noted that the site was characterized by a midden composed of “very dark gray (Munsell 10 YR 3/2), fairly well-consolidated, shell-filled loam” (Riley 1976:10). Predominant shellfish species represented during her surface observations included *Saxidomus nuttalli* (Washington clam), *Protothaca staminea* (Pacific Littleneck clam), *Clinocardium nuttallii* (Nuttall's Cockle), and *Euspira* (formerly *Polinices*) *lewisii* (Lewis' moon snail); she also observed fire-cracked rock, but dense vegetation prevented additional artifact observations, nor did she collect any artifacts (Riley 1976:10). In addition to the previous archaeological investigations at the site by University of California researchers, Riley observed that the site was actively eroding along the bluff edge on the its western face. She recommended excavating the bluff edge to mitigate the on-going impact due to erosion (Riley 1976:14-15). This was never carried out by the NPS, as it had been at CA-MRN-230.

Riley (1976:18-24) also conducted an assessment of CA-MRN-242 in 1976. During her visit, she observed obsidian and chert flaked stone debris, fire-cracked rock, mammal and fish bone, and shellfish remains, including *Saxidomus nuttalli* (Washington clam), *Tresus nutallii* (Long-neck clam), *Clinocardium nuttallii* (Nuttall's Cockle), *Protothaca staminea* (Pacific Littleneck clam), *Mytilus californianus* (California mussel), *Ostrea lurida* (Olympia oyster), and *Euspira* (formerly *Polinices*) *lewisii* (Lewis' moon snail). Riley echoed earlier concern about site erosion, noting both the bluff edge on the north and northwest site margins, and a large gully transecting the southern part of the site, were constantly sloughing cultural material. She determined that site stabilization would not be possible, and instead recommended complete excavation of the site margins—this was never undertaken.

Following Riley's observations, Ward Upson visited a number of Point Reyes sites in 1977. At CA-MRN-242, Upson (1977:16-21) reiterated Riley's recommendations about mitigating damage due to erosion, and also observed that there was no sign of recent looting at the site, as had been observed a decade earlier (see above). Upson (1977:36-42) also visited CA-MRN-307 during his 1977 assessment. During his site visit, he noted that the site was characterized by a midden composed of “dark loam containing fragments of shell,” including *Saxidomus nuttalli* (Washington clam), *Protothaca staminea* (Pacific Littleneck clam), *Mytilus*

californianus (California mussel), and *Euspira* (formerly *Polinices*) *lewisii* (Lewis' moon snail). Upson noted the major impact to the site was from Meighan's previous archaeological investigations, but he also observed that the site was slowly eroding along the beach edge on its western face, and possibly into the gully along the southern boundary (Upson 1977:38).

In 1983, Beaudry (1983:29-33) visited CA-MRN-271 during another survey of threatened sites at Point Reyes. He documented erosion impacting the site along Coast Creek, and observed a variety of shell remains, charcoal, bone, lithics, ground stone artifacts, and fire-cracked rock. He also noted bottle glass, a metal fragment, a possible Chinese porcelain sherd, as well as possible human remains eroding from the creek bank. He did not, however, collect any artifacts.

During a post-fire assessment in 1995, NPS researchers recovered a sixteenth-century blue-and-white Chinese export porcelain fragment from CA-MRN-232. It was found on the surface, the result of rodent activity. The sherd is a base fragment from a plate or dish, and the fragment is particularly interesting for two reasons: first, it can be refit to a porcelain fragment excavated by Heizer on June 20, 1940 (Hearst Museum Catalog No. 1-60315); and second, the sherd has been bifacially-worked into a semblance of a "flaked stone" tool. Although there is specific provenience for this object relative to a modern datum, it may not be possible to relate the location to artifacts excavated by the University of California team. Because the sherd location has been disturbed due to the rodent activity that brought it to the surface, the provenience is probably meaningless in terms of addressing my primary research questions, in any case. Nonetheless, I do include this fragment in my overall porcelain analysis presented in Chapter Eight.

Polansky (1998) re-recorded many archaeological sites on the Point Reyes Peninsula in 1997. For many sites, this was the first official site visit since the 1970s. At CA-MRN-232, Polansky characterized the site as a permanent residential base camp based on the high density of shell, the size (at least 3,000 sq. m), and the presence of milling equipment, faunal remains, and flaked stone artifacts and debris. She observed groundstone fragments, fire-cracked rock, and shellfish remains including *Saxidomus nuttalli* (Washington clam), *Protothaca staminea* (Pacific Littleneck clam), *Clinocardium nuttallii* (Nuttall's Cockle), *Macoma nasuta* (Bent-nose clam), and *Tresus nutallii* (Long-neck clam). Polansky did not recover any artifacts during her visit to CA-MRN-232 (1998:85-86, 144-145). Polansky also re-evaluated CA-MRN-242 in 1997, which, like CA-MRN-232, she characterized as a permanent residential base camp. In addition to noting the continuing erosion at that time, she commented on the rich assemblage of flaked stone debris, fire-cracked rock, charcoal, shellfish remains, and mammal, bird and fish bones (Polansky 1998). Polansky characterized CA-MRN-271 as a semi-permanent residential base camp, based on a moderate to high density of shell, the presence of milling equipment, in addition to both faunal remains and flaked stone artifacts, but made no further observations of note (Polansky 1998:83-85, 172-173). Polansky (1998:222-223) also re-recorded CA-MRN-307 in 1997, observing that the site was heavily vegetated and difficult to locate. She did not note any artifacts, but observed shellfish remains on the surface, including *Saxidomus nuttalli* (Washington clam), *Protothaca staminea* (Pacific Littleneck clam), *Clinocardium nuttallii* (Nuttall's Cockle), *Macoma nasuta* (Bent-nose clam), and *Tresus nutallii* (Long-neck clam). She did not note any other details about the site, but it had evidently remained undisturbed since the last site visit by Ward Upson in 1977. Polansky's 1997 project included a site visit to CA-MRN-216, as well, which she characterized as a temporary camp site. She reported that the site was stable, with no evident recent disturbances (Polansky 1998:83, 211). Finally, Polansky

characterized CA-MRN-298 as a permanent residential village site, based on the presence of shell midden, extensive faunal remains, milling equipment, lithic material, a high shell density, and the large size of the site (Polansky 1998:86). After observing a variety of ground stone artifact fragments on the surface, fire-cracked rock, dense shell remains, and bird, mammal, and fish bone, she concluded, the “[s]ite is very dense and rich and still quite intact, lots of information here” (Polansky 1998:211).

In December 2001, NPS archaeologists recovered human remains belonging to a single, adult female from CA-MRN-242 that had been reported by ranch workers as eroding from the bluff edge. No excavation took place beyond collecting exposed remains, and no artifacts were recovered (Rudo 2002). The remains were later returned to the Federated Indians of Graton Rancheria for reburial. Rudo also recommended erecting a fence to protect the site from cattle intrusion, which was contributing to continued site erosion, a recommendation echoed by Thorne and Ehrenhard (2003). A cattle exclusion fence was later completed (Mark Rudo, personal communication, 2006).

More recently, in 2002, an NPS team returned to CA-MRN-232 and CA-MRN-307 to conduct a detailed total station survey—I utilize their maps as part of my GIS analysis presented in Chapter Seven. I also visited all the sites I included in my project over the course of several years, from 2007-2009. My visit to CA-MRN-232 and CA-MRN-307 did not involve new data collection, but did result in observations that were important to my GIS site reconstructions—I describe these observations in Chapter Six. I visited CA-MRN-216, CA-MRN-242, CA-MRN-271, and CA-MRN-298 during an August 2009 GPS mapping project that helped me to locate the previous researchers excavations so that I could position the excavation units, and the artifacts and features recovered, in real-world coordinates within the GIS. I describe the results of these mapping projects in detail in Chapter Six.

During my visit to site CA-MRN-242, I noted that it looks much the same now as it must have during assessments beginning in the 1960s. There is a light scatter of shellfish remains, mammal and fish bones, flaked stone debris, and fire-cracked rock on the site surface. Active erosion continues at the site, both on the bluff edges and in the gully transecting the southern part of the site. Based on subjective comparison to earlier reports, I believe the gully is slowly becoming wider over time. Heizer and Beardsley’s site descriptions and site maps from the 1940-41 excavation indicate the area surrounding the site was used for artichoke cultivation, and that artichoke furrows 24 in. deep encroached on the eastern site margins (Beardsley 1941e, 1946a, 1954a:21). They also noted the presence of a wooden shack on the northern edge of what they described as “a gullied ditch five feet wide dug to drain a sump at its rear edge” (Beardsley 1954a:21). Riley (1976:20) noted remnants of the shack during her survey, and Upson (1977:20) indicated there was also remains of a flume leading down the gully to a pier, both likely associated with the artichoke farming. Extensive alteration and enlargement of the gully for commercial purposes began an erosion cycle that continues to the present. Detailed topographic site mapping I conducted with an NPS team in August 2009 did not reveal any obvious remnants of previous site activity, either archaeological or agricultural, nor did we observe any visible remains of the shack, flume or pier that were present in the late 1970s. We mapped the site margins and the gully in detail for the first time, however, which will allow quantified comparison to future site conditions to assess the rate of erosion.

The results of my site visits to CA-MRN-216, CA-MRN-271, and CA-MRN-298 echoed observations of previous researchers. The sites remain stable and appear to be undisturbed, despite the fact that they are near popular hiking trails and there are extensive archaeological

remains (mostly shell) visible on the site surface. There is abundant intact midden remaining at each of these sites, and the potential for future work there is high.

CONCLUSION

Despite University of California, San Francisco State College, Santa Rosa Junior College, and Drake Navigators Guild researcher's extensive excavations at CA-MRN-216, CA-MRN-232, CA-MRN-242, CA-MRN-271, CA-MRN-298, and CA-MRN-307, no detailed analysis of spatial relationships of artifacts and features from these sites has been attempted using contemporary tools such as GIS. The sites have consistently been referenced as the primary Point Reyes sites to have produced introduced material from sixteenth-century encounters in *tamál-húye*, and data from the sites present a unique opportunity to address anthropological questions about how the Tamal incorporated material culture introduced during the cross-cultural encounters into their cultural practices. My analysis of the sites focuses on analyzing the artifact collections located at the Phoebe A. Hearst Museum of Anthropology and Point Reyes National Seashore Museum (Chapters Five and Eight) and reconstructing previous researcher's excavations within a GIS framework for spatial analysis of artifact and features (Chapters Six and Seven).

CHAPTER FIVE

ANALYSIS OF ARTIFACT ASSEMBLAGES AND FEATURES FROM PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

INTRODUCTION

This chapter examines artifacts from each of the six sites excavated at *tamál-húye* during the 1940s to 1970s that form the core of my study. I discuss the assemblages as a whole to give a broad overview of the material culture from each site and to provide the overall context in which materials from *San Agustín* were recovered. When possible, I attempt to link artifact-types to general cultural practices—this will allow me to examine intra-site artifact patterning and compare introduced sixteenth-century artifacts to indigenously-manufactured objects based on particular activities, rather than using broad artifact categories (flaked stone, ground stone, etc.) as the basis for comparison.

In addition, when available, I highlight the implications for chronology in an attempt to separate different periods of site occupation. Due to stratigraphic uncertainty in most cases, this differentiation is necessary in order to distinguish which indigenously-manufactured artifacts are likely contemporary with the sixteenth-century artifacts from *San Agustín*, and which are from an earlier period of occupation and not associated. Likewise, this analysis also allows me to separate later, in most cases intrusive, Historic Period material (for my purposes, I consider sixteenth-century artifacts from the *San Agustín* to be from the Protohistoric Period, while I consider European and Euro-American artifacts dating from the time of permanent Spanish settlement in the Bay Area [circa 1770] and continuing into the twentieth century to be Historic Period). Identifying which objects from each site are likely to be contemporary is necessary for the most accurate Geographic Information System (GIS) analysis of intra-site artifact and feature patterning.

ARTIFACT ASSEMBLAGES

My analysis of artifact assemblages from CA-MRN-232, CA-MRN-242, CA-MRN-271, CA-MRN-307, CA-MRN-216, and CA-MRN-298 is based on published and unpublished data assembled by the original researchers, as well as first-hand examination of most of the artifacts. I used the original excavator's field notes, artifact catalogs, and publications, and examined most available artifacts first-hand to create a comprehensive spreadsheet of artifacts by class, and where possible, type.

Beardsley's publications (Beardsley 1947, 1954a, 1954b) and original field notes (Beardsley 1941e, 1946a, 1946c), in which he classified and briefly described many of the artifacts from CA-MRN-232, CA-MRN-242, and CA-MRN-271, provide a wealth of information about the artifact assemblages from these sites recovered during the 1940-1941 excavations. He includes detailed analyses of different artifact types, and uses site stratigraphy at CA-MRN-232 and CA-MRN-242, along with findings at other Point Reyes-area sites to determine artifacts that are diagnostic of the Middle and Late Periods. There are few available field notes from Meighan's 1949 field work at CA-MRN-232, on the other hand, so no artifact descriptions are available beyond what is included in the Phoebe A. Hearst Museum of Anthropology (PAHMA) catalog for the 1949 excavation at the site (see Meighan 1950d). For a

more detailed analysis of artifacts from CA-MRN-232, CA-MRN-242, and CA-MRN-271 recovered in 1940-1941, see Beardsley (1947; 1954a; 1954b).

Meighan (2002) provides a summary of the CA-MRN-307 artifact assemblage from the 1949-1951 excavations, and he noted that as a whole, the artifacts are “clearly of Phase 2 of the Late Central California Horizon, specifically the Estero facies of the Marin Province as defined by Beardsley (1954). There is no evidence of earlier occupation at the Stoneware Site [CA-MRN-307]” (Meighan 2002:74). But again there are few available field notes from Meighan’s field work, and no detailed descriptions of individual artifacts beyond what is included in the PAHMA catalog.

Previous researchers working at CA-MRN-216 described in a series of publications the artifacts recovered under San Francisco State College (SFSC) auspices from 1964 to 1967 (King and Upson 1970; Treganza and King 1968). These publications, along with original field notes now housed in the Point Reyes National Seashore Archives (Treganza 1964, 1965, 1966, 1967), in which they briefly described many of the artifacts from CA-MRN-216, provide detailed information about the artifact assemblage from the site.

Similarly, various Drake Navigators Guild (DNG), Santa Rosa Junior College (SRJC), and SFSC researchers who excavated at CA-MRN-298 from 1956 to 1973 also described many of the artifacts recovered from the site in a series of publications (King and Upson 1970; Péron, et al. 1973; Treganza 1959; Treganza and King 1968; Von der Porten 1963, 1965, 1968, 1970, 1972). Original field notes now housed in the Point Reyes National Seashore Archives add crucial detail (Treganza 1964; Von der Porten 1952-1973, 1961-1962). There are, however, a large number of artifacts recovered from screens or level bags during the 1972-1973 excavations that were not included in the artifact catalogs or documented in any way. These objects—which include mostly lithic debitage and fire-cracked rock, but include some formal artifacts—now reside with the rest of the collection in the Point Reyes National Seashore Museum. Because there is no provenience for any of these objects (some are located by unit, but many have no associated locations) and they remain unsorted and uncatalogued, I do not consider them further here. They remain an excellent repository of information about flaked-stone tool production at the site, however, and may be a rich source of data for future investigations.

For my purposes, I first assigned artifacts from all six sites to general artifact categories developed by Kent Lightfoot for use at Fort Ross (Lightfoot, et al. 1997; Lightfoot, et al. 1991). The broad artifact classes I include in this discussion and analysis are flaked stone, ground stone, worked bone, worked shell (including beads), worked antler, miscellaneous artifacts, sixteenth-century introduced objects, and Historic Period artifacts. I also include a discussion of burials and faunal remains, but to a more limited extent. I did not, for example, examine bulk faunal remains in detail, so offer only limited data on them. In addition, I link each artifact-type to general cultural practices, both primary and secondary (due to the potential problem of multivalence), so that I can later compare sixteenth-century introduced artifacts to indigenous-manufactured artifacts within each site based on possible function or use of the objects, rather than broad categories such as flaked stone, ground stone, etc. The latter categories, while a useful and expedient way to classify artifacts, may or may not include artifacts that were used for similar cultural practices—for example, mortars and charmstones are both categorized under “ground stone artifacts,” but likely had very different use and meaning to the Tamal people. The functional grouping I use include food processing (this includes both animal and plant processing artifacts, such as bifaces and mortars, as well as faunal bone and shell), craft production (thin-pointed and broad-pointed worked bone tools, artifacts associated with shell bead production, as

well as unfinished objects in various states of production), hunting and fishing (including projectile points and net weights), lithic production (hammerstones, worked antler and bone flakers, and lithic debitage), ornamentation (shell and ground stone beads and ornaments), and symbolic artifacts (charmstones and other objects that may have had ritual meaning). Since some artifacts may be used for more than one task, I tried to be as all inclusive as possible, so I include some objects in more than one distribution.

A number of artifacts recovered during the excavations and included in the artifact catalogs, field notes, and publications, could not be located in the repositories for this project. Because the original excavators who worked on the site over the years meticulously recorded and cataloged these finds, however, I was able to include a great number of these in my analysis. In addition, at the request of the Federated Indians of Graton Rancheria I did not examine associated funerary objects or human remains. Where documentation exists to identify these objects without first-hand observation, however, I include them here. Likewise, I include in this assemblage analysis all artifacts recovered from all projects at each of the sites, regardless of level of provenience information available. For example, my analysis includes many artifacts recovered from site surfaces with no provenience. My GIS analysis of spatial distributions presented in Chapter Seven, on the other hand, focuses solely on artifacts with specific provenience associated with them. The total number of artifacts recovered from each site that I include in this analysis is summarized in Table 4.2 and Figures 5.1-5.6. I discuss each of these categories in more detail below.

Flaked Stone Artifacts

The flaked stone artifact assemblage from each site is consistently one of the largest. Using Beardsley's field notes and publications for CA-MRN-232, CA-MRN-242, and CA-MRN-271 (Beardsley 1947, 1948, 1954a, 1954b), as well as firsthand examination of the artifacts, I divided the flaked stone artifacts into a number of categories, including projectile points and point fragments, bifaces and biface fragments, tinklers or bangles, flaked stone tool manufacturing debris (cores, flakes, and shatter), and unknown flaked stone artifacts (Figures 5.7-5.9). Likewise, for Meighan's excavation at CA-MRN-307, after examining the entire flaked stone assemblage, I divided the flaked stone artifacts into projectile points and fragments, bifaces and fragments, and flaked stone tool manufacturing debris (cores, flakes, and shatter) (Figure 5.10). For CA-MRN-216 and CA-MRN-298, I used original field notes, artifact catalogs, and publications to divide the flaked stone artifacts into categories that included projectile points and fragments, bifaces and fragments, drills, tinklers or bangles, flaked stone tool manufacturing debris (mostly cores), and unknown flaked stone artifacts. Because drills (mostly chalcedony and chert) are so prevalent in the assemblages from CA-MRN-216 and CA-MRN-298, I included them in a separate category rather than included with other bifaces (Figures 5.11 and 5.12).

Projectile Points and Point Fragments

To classify projectile points recovered from the sites, I use a standard typology employed by Heizer and Beardsley for their analyses in 1940-1941 (Beardsley 1954a). Points and point fragments from the sites are dominated by Types S1a and S1b, with much lesser numbers of Types N1, N2, and S3. These categories allow some (although limited) temporal control. In general, projectile point types N1 and N3 predominate in the Middle Period (2500 to 1000 B.P.),

Figure 5.1. Total artifacts recovered at CA-MRN-232 by artifact category, 1940-1950 (n=1,374).

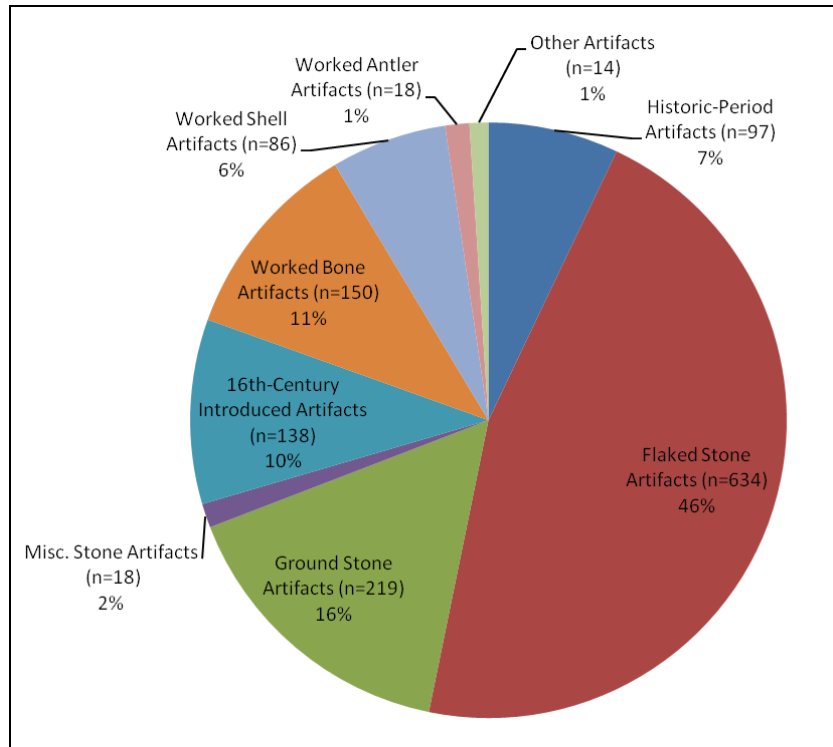


Figure 5.2. Total artifacts recovered at CA-MRN-242 by artifact category, 1940-1941 (n=1,539).

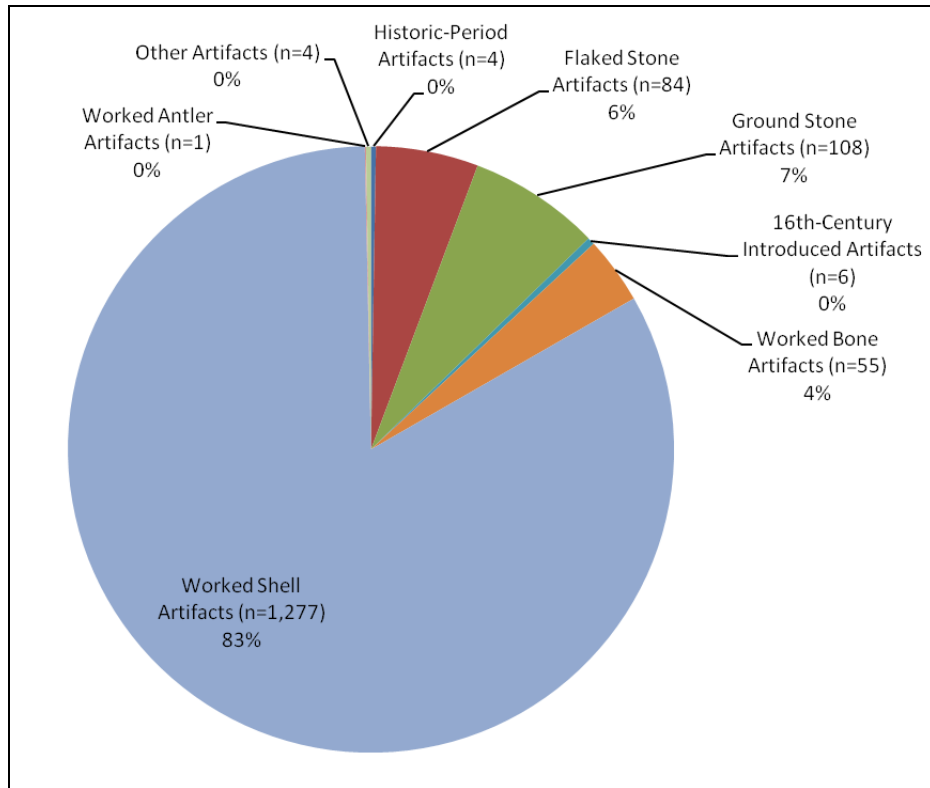


Figure 5.3. Total artifacts recovered at CA-MRN-271 by artifact category, 1941 (n=299).

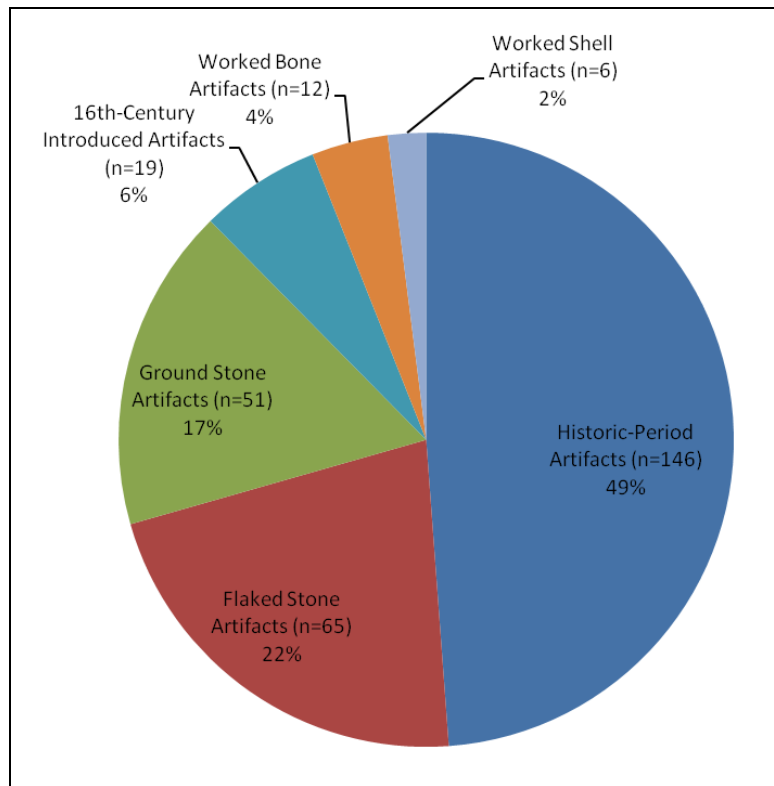


Figure 5.4. Total artifacts recovered at CA-MRN-307 by artifact category, 1949-1951 (n=561).

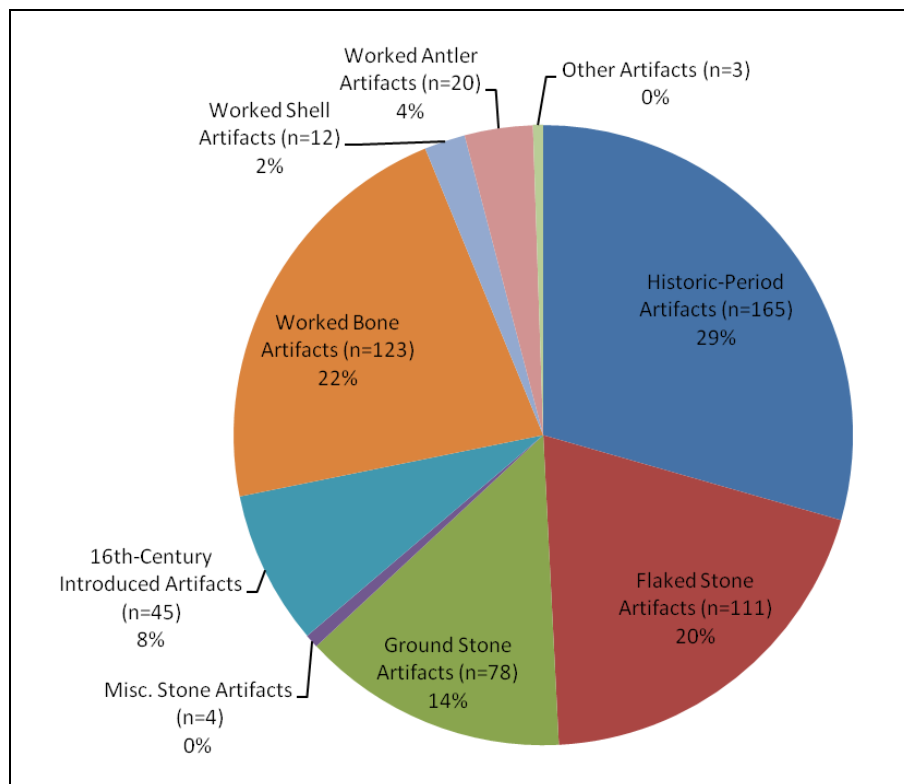


Figure 5.5. Total artifacts recovered at CA-MRN-216 by artifact category, 1964-1967 (n=2,460).

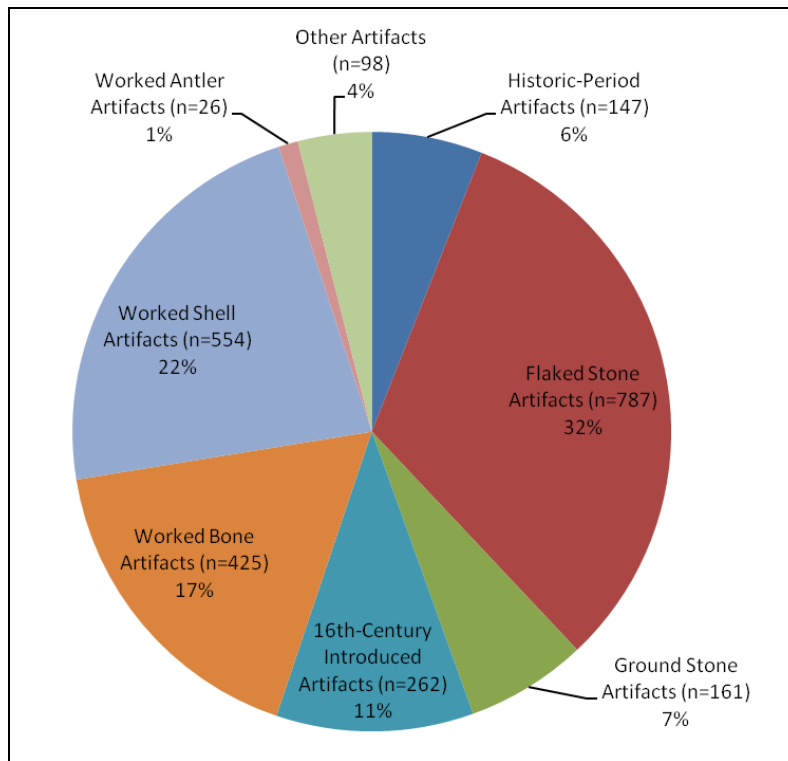


Figure 5.6. Total artifacts recovered at CA-MRN-298 by artifact category, 1956-1973 (n=2,973).

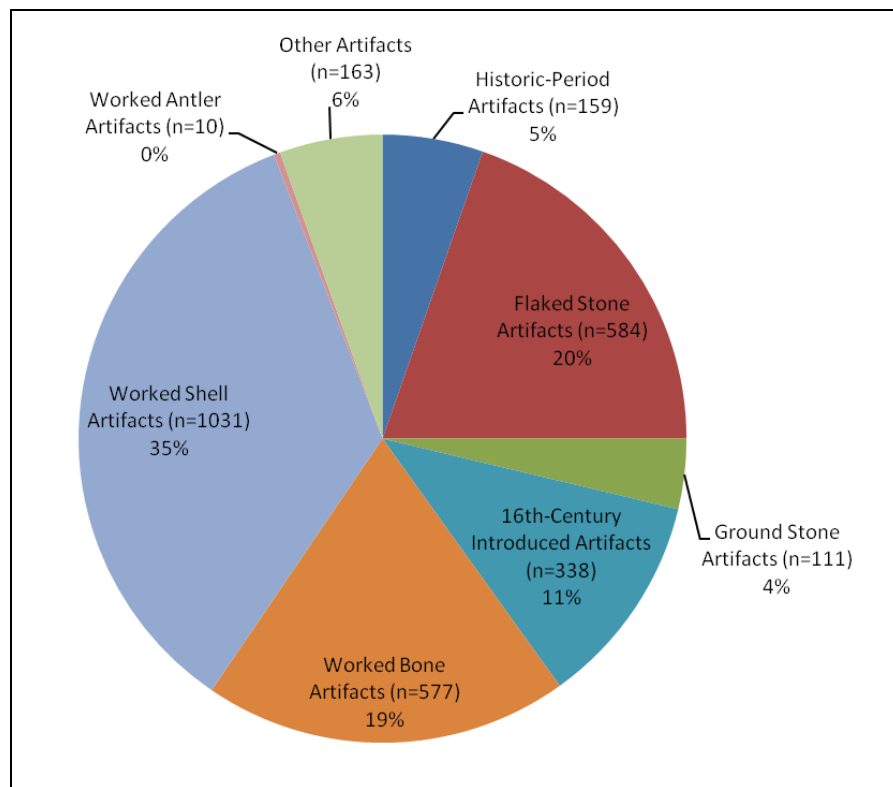


Figure 5.7. Flaked stone artifacts recovered from CA-MRN-232, 1940-1950 (n=634).

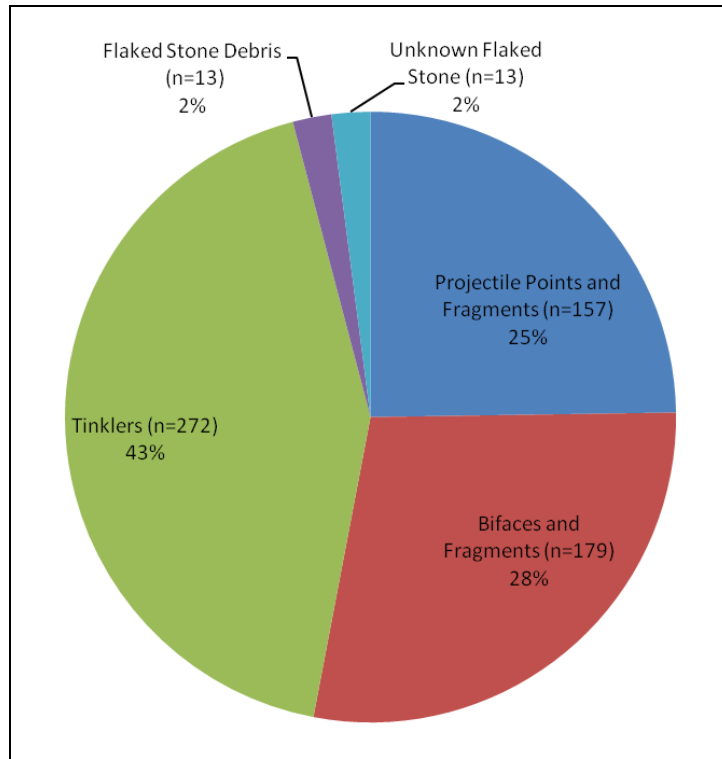


Figure 5.8. Flaked stone artifacts recovered from CA-MRN-242, 1940-1941 (n=84).

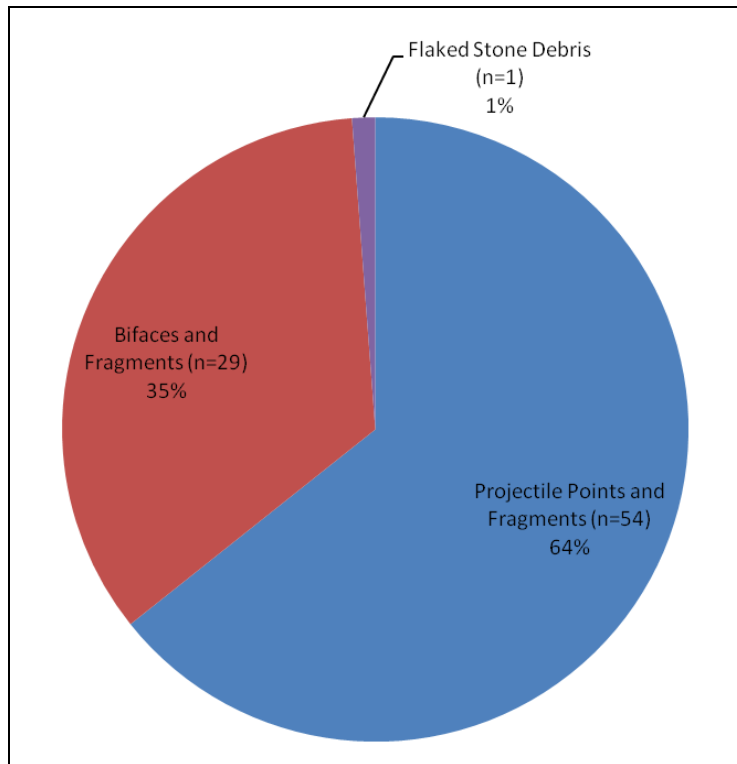


Figure 5.9. Flaked stone artifacts recovered from CA-MRN-271, 1941 (n=65).

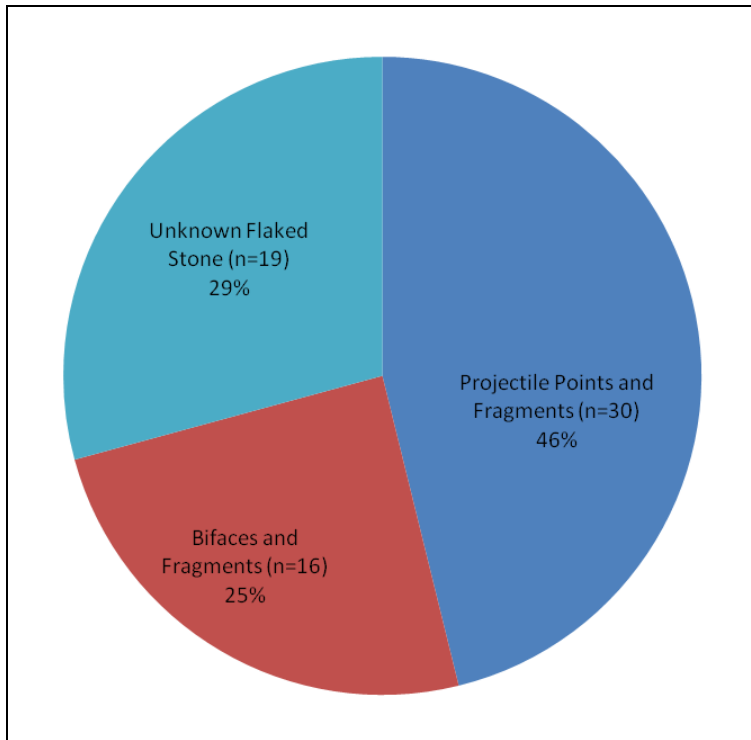


Figure 5.10. Flaked stone artifacts recovered from CA-MRN-307, 1949-1951 (n=111).

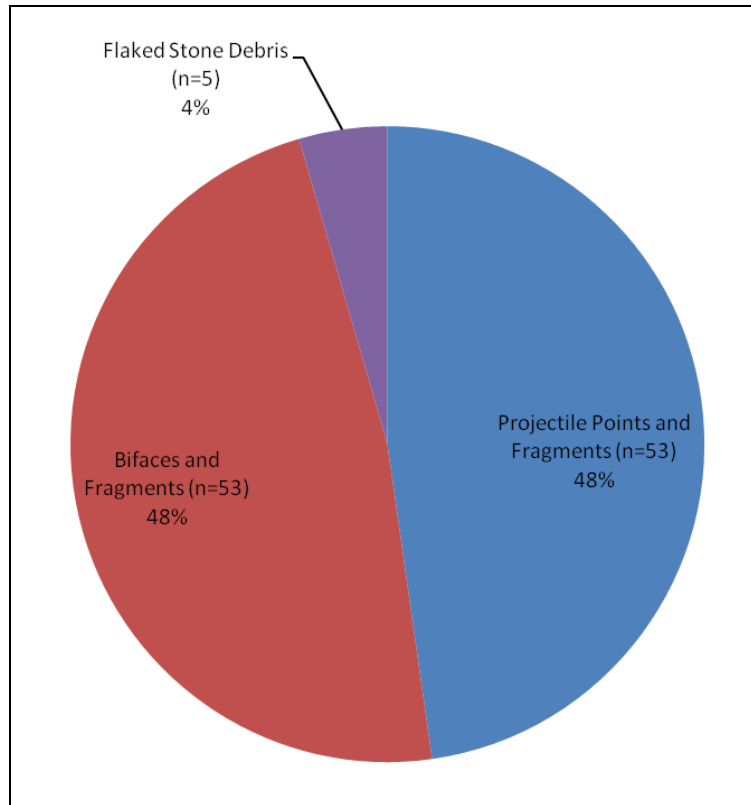


Figure 5.11. Flaked stone artifacts recovered from CA-MRN-216, 1964-1967 (n=787).

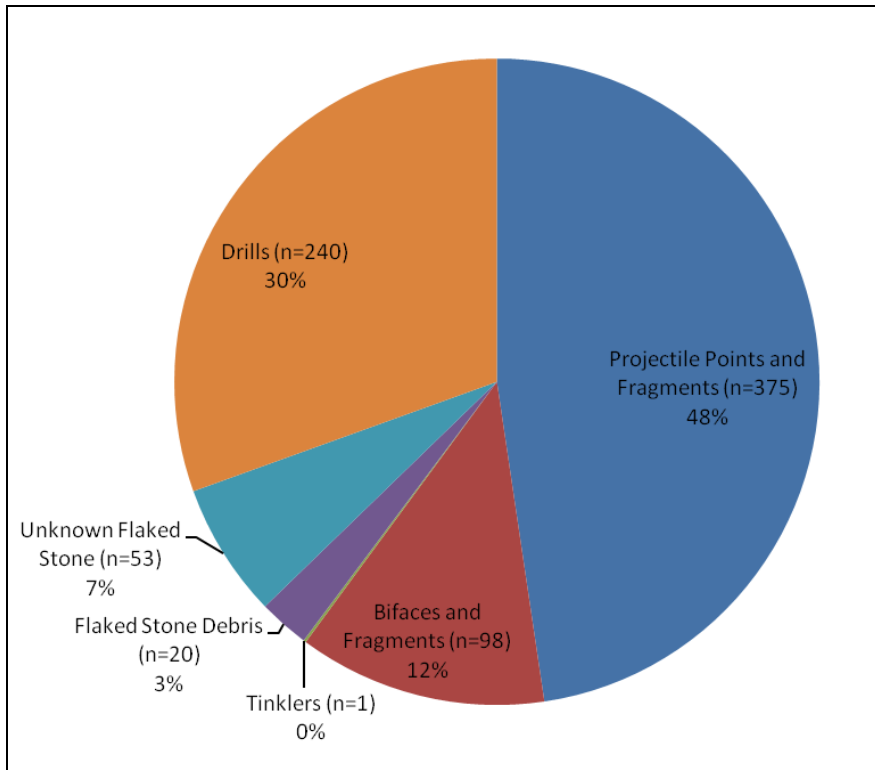
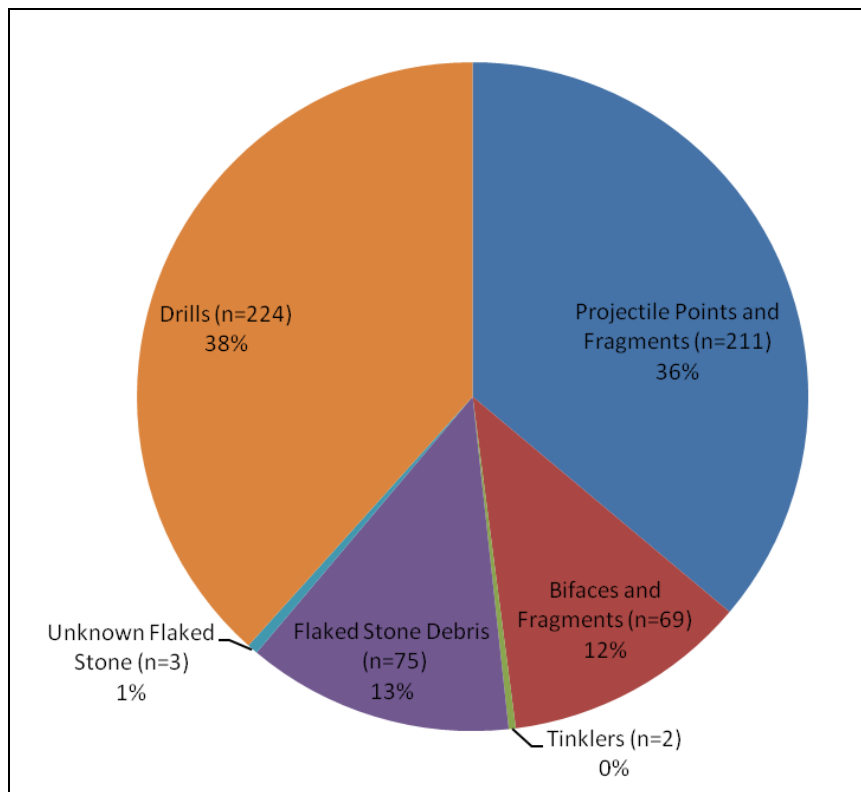


Figure 5.12. Flaked stone artifacts recovered from CA-MRN-298, 1956-1973 (n=584).



while types S1a and S1b are exclusive to the Late Period (1000 B.P. to contact)(Beardsley 1954a, 1954b). Justice (2002:265-269) classifies the points somewhat differently, including N1 and N3 points in the Houx Contracting Stem Type of the Coastal Contracting Stem Cluster, and attributing a somewhat earlier date range for them (4500 B.P. to 1500 B.P.). Likewise, Justice (2002:402-408) includes S1a and S1b points in the Rattlesnake Corner-Notched Type of the Rattlesnake Cluster, which he dates to 800 B.P. to contact. Less specifically, projectile point types N2, N4, and S3 are found in both Middle and Late Period contexts, according to Beardsley (1954a; 1954b). Justice specifies a slightly earlier date range for these points, including N2, N4, and S3 points in the Excelsior Type and Houx Contracting Stem Type, respectively, both part of the Coastal Contracting Stem Cluster, which date to the Early to Middle Periods (4500-4000 B.P. to 1500 B.P., or later)(Justice 2002:265-275).

At CA-MRN-232, a total of 157 projectile points and point fragments were excavated and collected from 1940 to 1950. Beardsley identified most of the artifacts from the 1940-1941 excavations in his field notes (Beardsley 1946a) using the standard typology employed at the time (Beardsley 1954a). The points and point fragments from CA-MRN-232 are dominated by Types S1a and S1b, with lesser numbers of Types N1, N2, and S3. Despite the differences in date ranges for particular point types by different researchers, these data suggest a strong Late Period site occupation at CA-MRN-232 with 48 of 157 artifacts (30%) having a solid Late Period connection, which I would expect since we know the site was occupied in the late-sixteenth century. The data also reinforce, however, that CA-MRN-232 was likely occupied as far back as the Middle Period, with as many as four artifacts (3%) representing the Middle Period. A total of 92 point fragments (59%), however, were too small to identify, and there are six others I could not identify with certainty. Researchers from the DNG collected an additional, single Type N2 point in 1951, bringing the total to at least 12, and as many as 16, artifacts types (8-10%) that were common in both the Middle and Late Periods, and could be representative of either time period.

Projectile points and point fragments are the largest flaked stone artifact-type from CA-MRN-242. A total of 53 obsidian points and point fragments, along with a single chert projectile point, were recovered by Heizer and Beardsley's teams in 1940-1941. Of the 54 projectile points and point fragments excavated at CA-MRN-242, Beardsley identified 31 of the artifacts in his field notes (Beardsley 1946a)—the remaining 23 artifacts (2 points and 21 fragments) remain unidentified. Like at CA-MRN-232, the points and point fragments are dominated by Types S1a and S1b, with lesser numbers of Types N2, N3, N4, S3, and one identified as either N1 or N3. These data support Beardsley's interpretation of both Middle and Late Period site occupation at CA-MRN-242, with four of 54 (7%) likely dating to the Middle Period, 10 of 54 artifacts (19%) dating to either Middle or Late Period, and another nine of 54 (17%) dating to the Late Period. I would expect a strong Late Period component, since we know the site was occupied in the late-sixteenth century.

At CA-MRN-271, Beardsley recovered a total of 30 projectile points and point fragments, including 21 obsidian projectile point fragments (32% of the flaked stone assemblage), eight complete obsidian projectile points (12% of the assemblage), and one chert projectile point (1.5%). According to Beardsley's typology, types S1a and S1b points again account for the majority of the assemblage, followed by N1 or N3 (these are difficult to distinguish, although N1 is rare so the point is likely N3), N2, and S3 points. These data suggest a strong Late Period site occupation with 15 of 30 artifacts (50%) having a solid Late Period connection, which I would expect since we know the site was occupied in the late-sixteenth

century. This also suggests the site may have been occupied as far back as the Middle Period, with two of 30 artifacts (7%) representing the Middle Period. This leaves 13 of 30 artifact types (43%) that were common in both the Middle and Late Periods, and could be representative of either time period.

Projectile points and point fragments of various raw materials comprise 48% of the flaked stone artifact assemblage from CA-MRN-307. While Meighan (2002) created his own typology to classify points from CA-MRN-307, I used Beardsley's (1954a) typology to be consistent with analysis of other sites in this study. In total, there are 53 points and point fragments recovered from the site—47 are obsidian, three are chert, and three I could not identify the raw material. In terms of point types, nine (17%) were too small or fragmentary to identify, and there are three others I could not identify with certainty. The artifacts that I could positively identify are dominated by Types S1a and S1b, with much lesser numbers of Types N2 and S3. These data strongly suggest a Late Period site occupation, which I would expect since we know the site was occupied in the late-sixteenth century. The data suggest the site may have been occupied as far back as the Middle Period, with five points and point fragments (9%) possibly representing the Middle Period (although they could also be Late Period).

Projectile points and point fragments comprise 47% of flaked stone artifacts recovered from CA-MRN-216, and are the single largest artifact class. The 375 projectile points and point fragments excavated and collected at CA-MRN-216 are dominated by obsidian Types S1a and S1b, suggesting a strong Late Period site occupation. Origer (1987) included a single obsidian projectile point from CA-MRN-216 in his obsidian hydration study (Original no. 11666). Origer described the point as an “eccentric specimen, possibly a reworked wide-stemmed projectile point” (Origer 1987:19). The SFSC team recovered the point during their 1966 field season (Treganza 1966). Origer sourced the point to the Annadel obsidian source, but reported there was no visible hydration band on the specimen (Origer 1987:126, 136).

Projectile points and point fragments comprise 36% of flaked stone artifacts recovered from CA-MRN-298. Of the 211 projectile points and point fragments excavated and collected at CA-MRN-298 from 1956 to 1973, the artifacts that I could positively identify are dominated by Types S1a and S1b (n=125), with just three Type N2 points—the remainder remain unidentified. These data also suggest a strong Late Period site occupation.

In order to investigate site occupation versus stratigraphy, I examined projectile point type versus depth of recovery for CA-MRN-232, CA-MRN-242, CA-MRN-271, and CA-MRN-307. Projectile point recovery depth data is ambiguous regarding Middle Period occupation at CA-MRN-232, although depth of recovery of specific point types at least hints at stratigraphic patterning on the site. A total of 54 temporally diagnostic points and point fragments have depth of recovery recorded. The majority of points and point fragments were recovered from 0-12 in. (0-30 cm) (28 of 54 artifacts, 52%), while 24 artifacts were specifically found deeper than 12 in. (30 cm). Unfortunately, the Type N1 and possible Types N1 or N3 points, normally found in Middle Period contexts, do not have depth of recovery recorded or were recovered from the beach below the site. Late Period points (Types S1a and S1b) were recovered from the surface to 34 in. (86 cm) deep, although the majority of points were recovered from 0-12 in. (0-30 cm). Points that are temporally diagnostic to either the Middle or Late Period (Types N2 and S3) were recovered from the surface to 48 in. (122 cm), but as many were found deeper than 25 in. (63.5 cm) as were recovered from 0-12 in. (0-30 cm). While there is clearly some intermingling of artifacts from different periods of occupation, the data support the fact that there is a distinguishable Middle Period occupation level deeper than the Late Period levels.

Projectile point recovery depth data is also ambiguous regarding Middle Period occupation at CA-MRN-242, although again depth of recovery of specific point types at least hints at stratigraphic patterning on the site. A total of 28 temporally diagnostic points and point fragments have depth of recovery recorded. Ten points and point fragments were recovered from 0-12 in. (0-30 cm)(10 of 28 artifacts, 36%), while 17 artifacts were specifically found deeper than 12 in. (30 cm). The Type N3 and possible Type N1 or N3 points, normally found in Middle Period contexts, were recovered from between 16 in. (41 cm) and 36 in. (91 cm) deep, with a mean depth of recovery of 26 in. (66 cm). Late Period points (Types S1a and S1b) were recovered from the surface to 34 in. (86 cm) deep, although the majority of points (9 of 15, 60%) were recovered from 0-12 in. (0-30 cm)—the mean depth of recovery was 12.6 in. (32 cm). Points that are temporally diagnostic to either the Middle or Late Period (Types N2, N4, and S3) were recovered from 10 in. (25 cm) to 68 in. (173 cm), with a mean depth of recovery of 27 in. (69 cm). While there is clearly some intermingling of artifacts from different periods of occupation at CA-MRN-242, as well, the data also support the fact that there is a distinguishable Middle Period occupation level deeper than the Late Period levels.

At CA-MRN-271, artifact recovery depth data also seems to support a Middle Period occupation, and gives an indication that, although not specifically discussed by Beardsley, there may be some stratigraphic patterning on the site. The majority of points and point fragments were recovered from 0-12 in. (0-30 cm)(21 of 30 artifacts, 70%), while only four artifacts were specifically found deeper than 12 in. (30 cm)(three at 12-24 in. [30-61 cm] and one at 25 in. [63.5 cm]; two artifacts have a depth provenience of 0-24 in. [0-61 cm] and three have no depth data). The two N1 or N3 points, normally found in Middle Period contexts, were found at depths of 15 in. (38 cm) and 25 in. (63.5 cm), putting them among the deepest flaked stone artifacts recovered from the site. At least one Late Period point was also found in the 12-24 in. (30-61 cm) level, so there is some intermingling of artifacts, although the depth of the Middle Period artifacts makes it likely the site actually had a Middle Period occupation, rather than the older artifacts representing curation or some other cultural practice.

Finally, at CA-MRN-307 projectile point recovery depth data is ambiguous regarding Middle Period occupation, although depth of recovery of specific point types at least hints at stratigraphic patterning on the site. A total of 38 temporally diagnostic points and point fragments have depth of recovery recorded. The majority of points and point fragments were recovered from 0-12 in. (0-30 cm)(26 of 38 artifacts, 68%), while 12 artifacts were found deeper than 12 in. (30 cm). Late Period points (Types S1a and S1b) were recovered from the surface to 36 in. (91 cm) deep, although the majority of points were recovered from 0-12 in. (0-30 cm)(25 of 35, 71%). The mean depth of recovery is 10.5 in. (27 cm) and the median depth of recovery is 9 in. (23 cm). Unfortunately, the single Type S3 and the possible Types S3 points, sometimes found in Middle Period contexts, do not have depth of recovery recorded. The other three points that are temporally diagnostic to either the Middle or Late Period (Types N2), however, were recovered from 9 in. (23 cm), 17 in. (43 cm), and 37 in. (94 cm) deep, for a mean depth of recovery of 21 in. (53 cm) and a median of 17 in. (43 cm). While this may hint at a Middle Period occupation, the number of artifacts is small so it is difficult to say.

For my GIS analysis presented in Chapter Seven, I categorize projectile points as part of a “hunting and fishing” category, assuming that the Tamal people primarily used projectile points for hunting game. I discuss this in more detail in Chapter Seven.

Biface and Biface Fragments

At CA-MRN-232, CA-MRN-242, and CA-MRN-271, Beardsley identified many of the biface and biface fragments from the 1940-1941 excavations, including such artifact types as knives, blades, scrapers (including end scrapers, side scrapers, and core scrapers), choppers, graters, and picks (Beardsley 1946a). Most biface and biface fragments from Meighan's 1949 excavation at CA-MRN-232 are rough flaked stones with rudimentary retouching, which the PAHMA catalog identifies as tools, scrapers, choppers, or "core tools." Meighan identified many of the biface and biface fragments from the 1949-1951 excavations at CA-MRN-307 as knives, scrapers (both end and side), core choppers, and drills (Meighan 2002:75). Likewise, researchers identified many of the 98 biface and biface fragments (12% of the flaked stone assemblage) from the CA-MRN-216 excavations, and 69 biface and biface fragments (12% of the flaked stone assemblage) from CA-MRN-298, as such artifact types as scrapers and blades.

For my GIS analysis presented in Chapter Seven, I categorize bifaces and biface fragments as part of a "food processing" category for a primary association, assuming that the Tamal people primarily used various bifaces for processing plants and animals for consumption. For a secondary association, I assign bifaces and biface fragments to a "craft production" category, as these tools may have been used to prepare raw materials (mostly plant and animal resources) for manufacturing various craft items.

Drills

The largest flaked stone artifact category from CA-MRN-298 is chalcedony and chert bifaces specifically identified by previous researchers as drills used in the production of shell beads. These drills comprise 38% of the overall flaked stone assemblage from both site loci, with a total of 224 recovered. There is a sharp difference in number recovered from each site loci, however, which is not reproduced by other flaked stone artifact categories that have similar percentages. Chalcedony and chert drills comprise 50% of the flaked stone assemblage from CA-MRN-298E (n=207 of 415), while they represent just 10% of the assemblage from CA-MRN-298W (n=17 of 169)(Figure 5.13). These data, combined with evidence from worked shell artifacts (see below), strongly suggest that the site's eastern loci represents a specialized activity area focused on clamshell disk bead production.

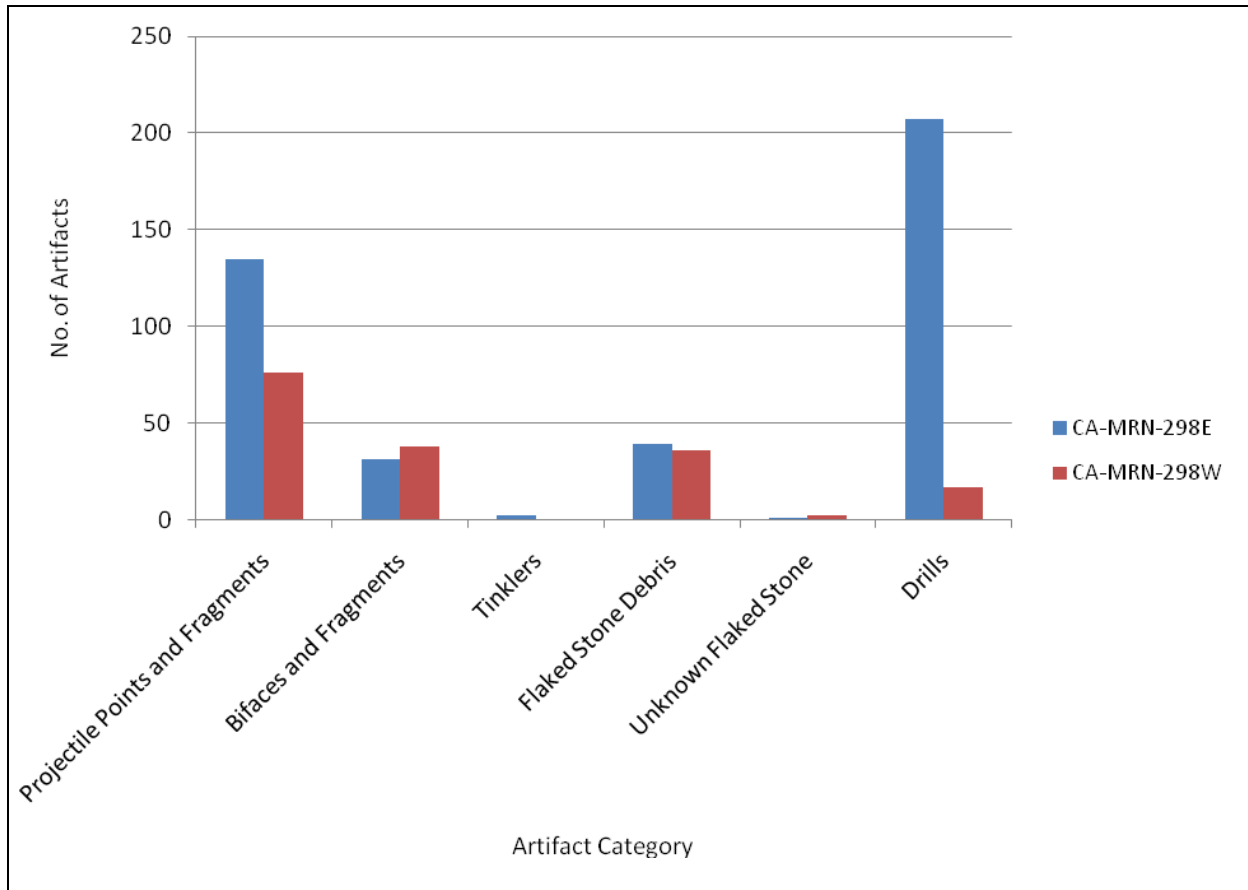
Bifaces identified as drills were also recovered from CA-MRN-216, and were the second largest flaked stone artifact category from the site. The majority of drills from CA-MRN-216 are chert and chalcedony, but a few obsidian and quartz examples were also recovered. These drills comprise 31% of the overall flaked stone assemblage from the site, with a total of 240 recovered (see Figure 5.11). Drills were not recovered from any of the other four sites.

For my GIS analysis presented in Chapter Seven, I categorize drills as part of a "craft production" category, assuming that the Tamal people primarily used flaked stone drills for manufacturing shell beads and other related objects.

Obsidian Prisms ("Tinklers" or "Bangles")

The single largest flaked stone artifact type from CA-MRN-232 is obsidian prisms, also called "tinklers" or "bangles." A total of 272 obsidian prisms were recovered, but this number is misleading because 266 of the prisms came from a single burial excavated by Heizer's team in

Figure 5.13. Flaked stone artifacts from CA-MRN-298E and CA-MRN-298W.



1940 (I did not examine these objects). The Berkeley crew excavated Burial no. 2 at a depth of 42 in. (107 cm), and recorded 266 burnt prisms consolidated near the individuals head, as though part of a headdress. This find lead Beardsley to suggest that obsidian bangles could be considered a diagnostic characteristic of the Middle Period occupation in Point Reyes (Beardsley 1954a:47). The other six prisms from CA-MRN-232 have no obvious associations and were recovered from varying depths, the deepest at 22 in. (56 cm). Investigators also recovered a single obsidian prism at CA-MRN-216, and two more at CA-MRN-298. The other three sites did not contain any prisms.

For my GIS analysis presented in Chapter Seven, I categorize obsidian prisms as part of an “ornamentation” category, assuming that the Tamal people primarily used these prisms for decorating clothing, costumes, and other ceremonial regalia for various dances and other rituals.

Manufacturing Debris (Cores, Flakes, and Shatter)

There are a small number of flaked stone artifacts representing lithic manufacturing debris, including cores, flakes, and shatter, recovered from each of the sites. The overall percentage of debitage is quite low. While this may suggest that flaked stone tool production did not take place at these sites, it is more likely a bias of the researcher’s recovery techniques,

which may not have recognized the importance of flaked stone debitage. None of these artifacts are temporally diagnostic.

For my GIS analysis presented in Chapter Seven, I categorize flaked stone debitage as part of a “lithic production” category, assuming that lithic debitage is primarily a by-product of producing flaked stone tools such as projectile points and bifaces.

Other or Unknown Flaked Stone Artifacts

Finally, there are several unknown flaked stone artifacts recovered from CA-MRN-232, CA-MRN-216, and CA-MRN-298 which have clearly been culturally modified, but that do not fit into any of the other artifact categories. None of these artifacts are temporally diagnostic. For my GIS analysis presented in Chapter Seven, I categorize these unknown objects as part of an “unknown” category, unless there is specific reason to assign them to another category.

Ground Stone Artifacts

Ground stone artifacts comprise a substantial portion of each site’s artifact assemblage. After examining previous researchers’ field notes and publications (Beardsley 1947, 1948, 1954a, 1954b), and examining the artifacts from all the sites, I divided the ground stone artifacts from all sites into discrete artifact categories. These include mortars and mortar fragments; pestles and pestle fragments; net weights or stone line sinkers; charmstones and charmstone fragments; hammerstones; food processing or craft production objects (anvil stones, grinding slabs, and milling stones); ornaments (beads, pendants, ear spools, etc.); other objects, such as pipes; and unidentified objects (Figures 5.14-5.19). A number of these artifacts are temporally diagnostic.

Mortars and Mortar Fragments

Mortar and mortar fragments, along with their associated pestles and pestle fragments, comprise the majority of ground stone artifacts at each of the six sites under study. At CA-MRN-232, a single complete ground stone mortar and multiple mortar fragments, along with complete pestles and pestle fragments, make up more than half the ground stone artifacts. Three complete ground stone mortars and multiple mortar fragments, along with eight complete pestles and numerous pestle fragments, make up one-third of the ground stone artifacts at CA-MRN-242 (36 of 108 artifacts, 33%). The ground stone mortars and pestles, and fragments of each, from CA-MRN-271, make up more than half the ground stone artifacts from the site. This includes three complete mortars (6% of the ground stone assemblage) and 15 mortar fragments (29% of ground stone). At CA-MRN-307, multiple mortar fragments, along with complete pestles and pestle fragments, make up 79% of the ground stone artifacts. A total of 44 mortar fragments were recovered from CA-MRN-307, but no complete mortars. Ground stone mortar fragments, along with complete pestles and pestle fragments, make up 45% of the ground stone artifacts at CA-MRN-216 (n=73), while at CA-MRN-298, ground stone mortar fragments, along with complete pestles and pestle fragments, make up 39% of the ground stone artifacts (n=43).

Certain types of ground stone mortars are temporally diagnostic. Type B mortars are diagnostic of the Middle Period, while type A mortars are characteristic of the Late Period. At CA-MRN-232, both mortar type A (A1a and A2a) and type B (B1) are represented at the site—

Figure 5.14. Ground stone artifacts recovered from CA-MRN-232, 1940-1950 (n=219).

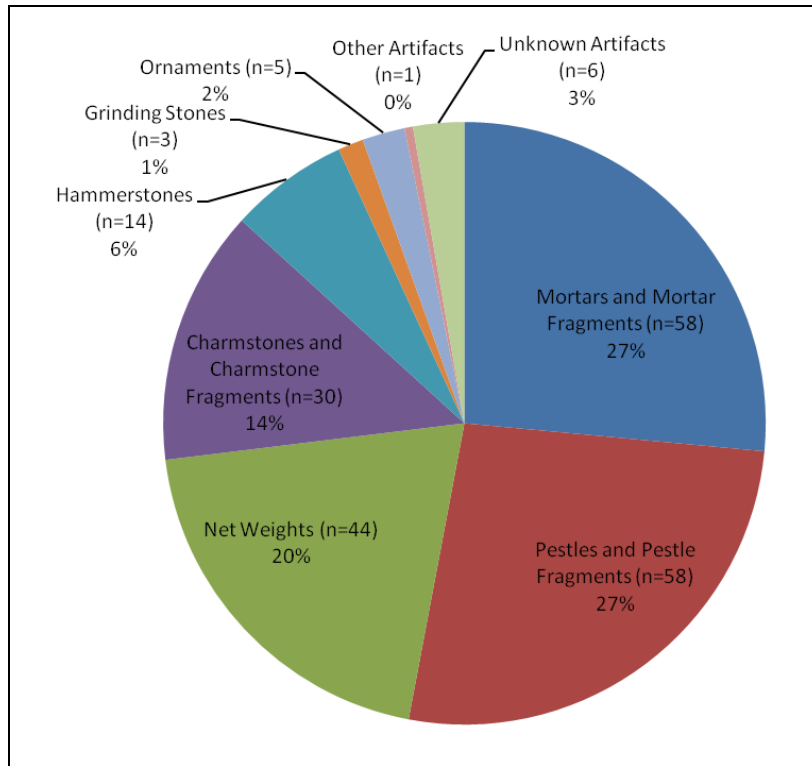


Figure 5.15. Ground stone artifacts recovered from CA-MRN-242, 1940-1941 (n=108).

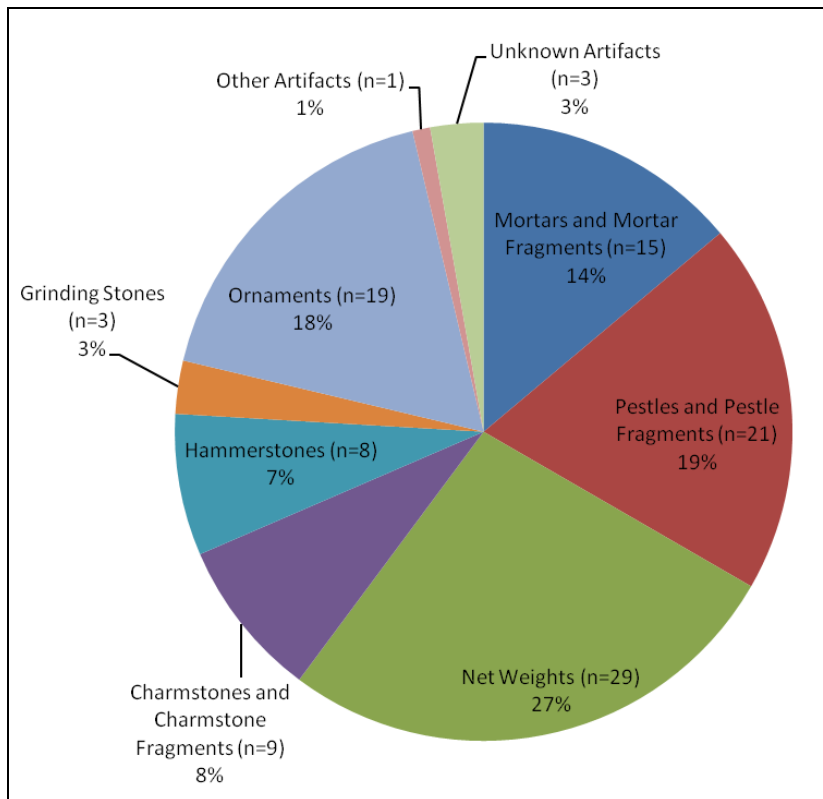


Figure 5.16. Ground stone artifacts recovered from CA-MRN-271, 1941 (n=51).

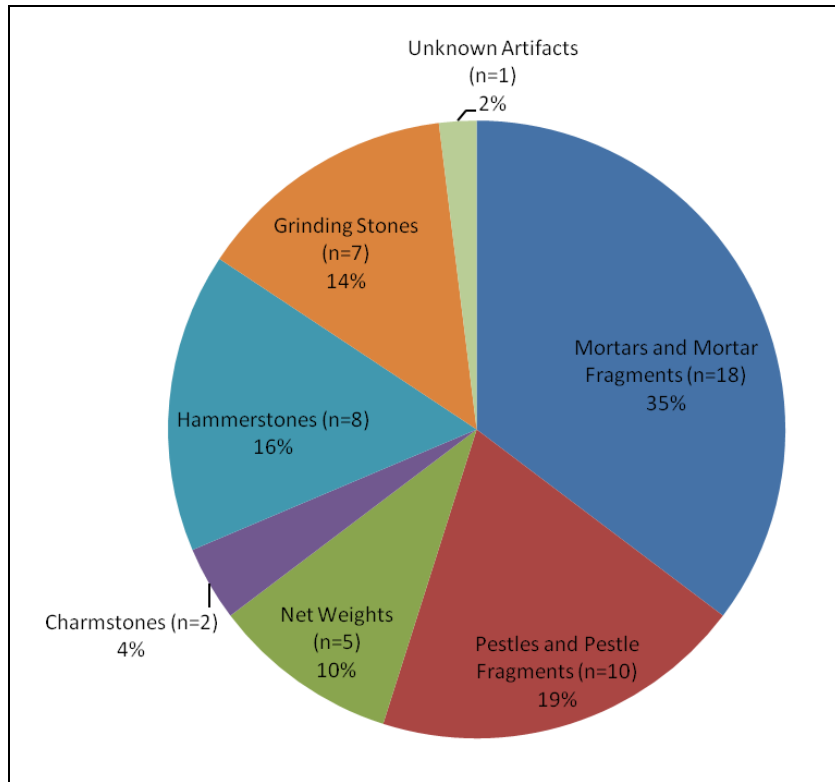


Figure 5.17. Ground stone artifacts recovered from CA-MRN-307, 1949-1951 (n=78).

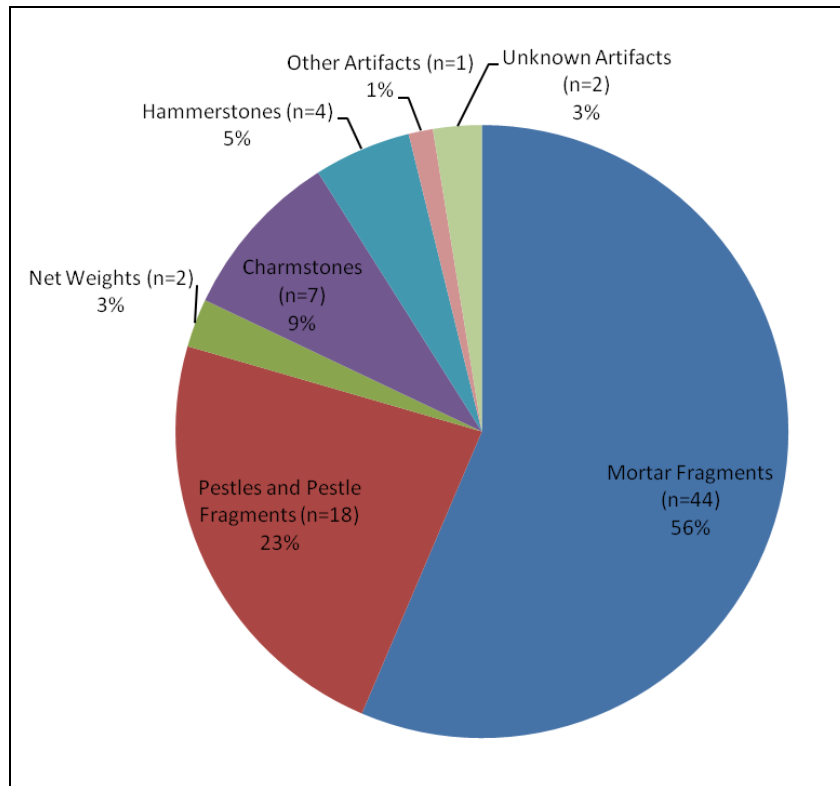


Figure 5.18. Ground stone artifacts recovered from CA-MRN-216, 1964-1967 (n=161).

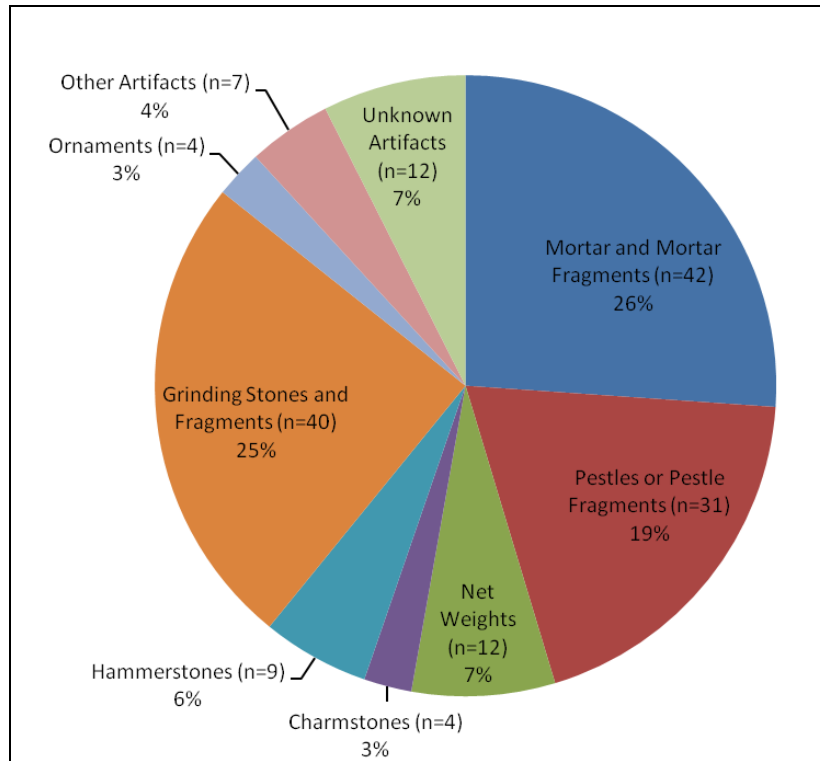
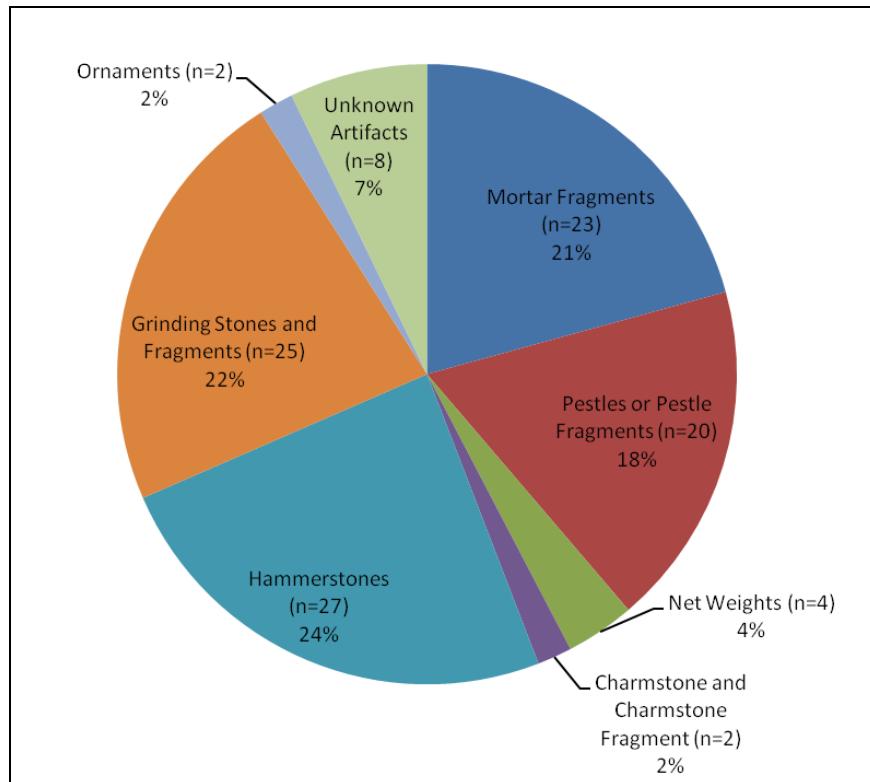


Figure 5.19. Ground stone artifacts recovered from CA-MRN-298, 1956-1973 (n=111).



there is a single complete mortar, type B1, and at least one type B1 fragment, along with an indeterminate type B mortar fragment. In addition there are fragments of type A1a, A2a, and an indeterminate type A fragment (Beardsley 1946a). In general, however, the majority of mortar fragments cannot be identified to type because they are too small or body fragments with no diagnostic features.

At CA-MRN-242, both mortar type A (A1a, A1b, and A2a) and type B (B1) are also represented at the site. There is a single complete type B1 mortar and two type B1 fragments. There are also complete type A1a and A1b mortars, as well as a fragment of type A2a and several indeterminate types (Beardsley 1946a).

All three types of mortars identified at CA-MRN-271 (representing both complete and partial examples) are characteristic of the Late Period only (types A1a, A2a, and A2b). Similarly, at CA-MRN-307 a single undifferentiated mortar Type A, characteristic of the Late Period, is represented by three fragments mended into a single rim fragment. In general, however, the majority of mortar fragments from CA-MRN-307, as well as all of the mortar fragments from CA-MRN-216 and CA-MRN-298, cannot be identified to type because they are too small or body fragments that exhibit no diagnostic features.

For my GIS analysis presented in Chapter Seven, I categorize mortars and mortar fragments as part of a “food processing” category, assuming that the Tamal people primarily used ground stone mortars for processing various plant remains for consumption.

Pestle and Pestle Fragments

At CA-MRN-232, complete pestles and pestle fragments, along with a single complete ground stone mortar and multiple mortar fragments, make up more than half the ground stone artifacts. Similarly, at CA-MRN-242, eight complete pestles and numerous pestle fragments, along with three complete ground stone mortars and multiple mortar fragments, make up one-third of the ground stone artifacts (36 of 108 artifacts, 33%). At CA-MRN-271, ground stone mortars and pestles, and fragments of each, make up more than half the ground stone artifacts—this includes two complete pestles (4% of the ground stone assemblage) and eight pestle fragments (15% of the assemblage). At CA-MRN-307, complete pestles and pestle fragments, along with multiple mortar fragments, make up 79% of the ground stone artifacts. The assemblage includes three complete pestles and 15 pestle fragments. Complete pestles and pestle fragments, along with ground stone mortar fragments, make up 45% of the ground stone artifacts at CA-MRN-216 (n=73), while they make up 39% of the ground stone artifacts at CA-MRN-298 (n=43).

A number of pestle types are temporally diagnostic (Beardsley 1946a, 1947). Ten pestle or pestle fragments from CA-MRN-232 and three pestle or pestle fragments from CA-MRN-242 are type IIB1, which is diagnostic of the Late Period, while the other pestle and pestle fragments from the sites either represent types found in both Middle and Late Period contexts (types I [A or B], IIA1, IIB2, IIB3, and III), or were too fragmentary to positively identify (Beardsley 1946a, 1947). One of the pestle types represented at the CA-MRN-271 (type IIB1) is also diagnostic of the Late Period, while the other types (IB, IIA, IIB2, IIB3, and III) are all found in both Middle and Late Period contexts. The pestles at CA-MRN-307 include as many as eleven Beardsley Type IIB1 pestle or pestle fragments, while possibly three other pestle and pestle fragments represented types found in both Middle and Late Period contexts (Types I and IIA)(Beardsley 1946a, 1947); the remainder were too fragmentary to positively identify. Likewise, the pestles

and pestle fragments from CA-MRN-216 and CA-MRN-298 or either not temporally diagnostic or are too fragmentary to identify.

For my GIS analysis presented in Chapter Seven, I categorize pestles and pestle fragments as part of a “food processing” category, assuming that the Tamal people primarily used ground stone pestles for processing various plant remains for consumption.

Charmstones and Charmstone Fragments

Charmstones or charmstone fragments were found at all sites, and certain types are temporally diagnostic. At least seven distinct charmstone types were recovered from CA-MRN-232, although none are temporally diagnostic because all are found in both Middle and Late Period contexts. Similarly, at least six distinct charmstone types were recovered from CA-MRN-242 (Types I, IIA, IIB1, III, IVc, and V), but only one (Type V) is temporally diagnostic—the others are all found in both Middle and Late Period contexts. The single diagnostic charmstone type (phallic, Type V) is indicative of the Late Period. At CA-MRN-271, the single charmstone type found on the site (type IA) is found in both Middle and Late Period contexts. Seven charmstones were recovered from CA-MRN-307 (Types IIA, IIB1, IIB2, IV, V), all of which are occasionally found in both Middle and Late Period contexts, although the Type V is exclusive to the Late Period. None of the charmstones or charmstone fragments recovered from CA-MRN-216 or CA-MRN-298 were temporally diagnostic.

For my GIS analysis presented in Chapter Seven, I categorize charmstones and fragments as part of a “symbolic” category, assuming that the Tamal people primarily used charmstones as symbolic objects such as totems or charms.

Net Weights

Stone net weights, or line sinkers, were also found at all six sites. Net weights, however, are not temporally diagnostic, and were recovered from both Middle and Late Period contexts at Point Reyes.

For my GIS analysis presented in Chapter Seven, I categorize net weights as part of a “hunting and fishing” category, assuming that the Tamal people primarily used net weights during fishing activities to procure fish for consumption.

Hammerstones

Hammerstones were recovered from all sites, and at CA-MRN-298 they comprise 24% of the assemblage (n=27). Like net weights, hammerstones are not temporally diagnostic, and are found in both Middle and Late Period contexts at Point Reyes.

For my GIS analysis presented in Chapter Seven, I categorize hammerstones as part of a “lithic production” category, assuming that the Tamal people primarily used hammerstones during production of flaked stone tools.

Food Processing or Craft Production Objects

Anvil stones (also called acorn anvils), grinding slabs, and milling stones—possibly used for either food processing or craft production—were found at all sites except CA-MRN-307.

Small grinding stones, abraders or polishing stones, along with fragments of larger slab milling stones, possibly associated with bead production, comprise 25% of the ground stone artifact assemblage at CA-MRN-216 (n=40), and 22% at CA-MRN-298 (n=25). Anvil stones, grinding stones, and milling stones are not temporally diagnostic, and are found in both Middle and Late Period contexts at Point Reyes.

For my GIS analysis presented in Chapter Seven, I categorize these objects as part of a “food processing” category for a primary association, assuming that the Tamal people primarily used various anvil stones and grinding slabs for processing plants. For a secondary association, I assign them to a “craft production” category, as many of these objects may have been used for manufacturing various craft items, such as abraders and polishing stones used during shell bead production.

Ornaments

Ornaments, including ground stone beads (steatite and magnesite), steatite pendants, and a sandstone ear spool or ear plug were found at CA-MRN-232, CA-MRN-242, CA-MRN-216, and CA-MRN-298. The sandstone ear spool or ear plug found at CA-MRN-232 is characteristic of the Middle Period, while the magnesite beads (four from CA-MRN-216, two from CA-MRN-232, and one from CA-MRN-298), steatite disk beads (from CA-MRN-232, CA-MRN-242, and CA-MRN-298), and steatite pendant (found at CA-MRN-232) are all diagnostic of the Late Period (Beardsley 1946a, 1947).

For my GIS analysis presented in Chapter Seven, I categorize various ground stone ornaments as part of an “ornamentation” category, assuming that the Tamal people primarily used these objects for decorating clothing, costumes, and other ceremonial regalia for various dances and other rituals.

Other Ground Stone Objects

Objects classified as “other” are mostly steatite pipe fragments, single examples of which were recovered from CA-MRN-232, CA-MRN-242, CA-MRN-307, although four steatite pipe fragments (3% of the assemblage) were recovered from CA-MRN-216. Steatite pipes and pipe fragments represent an artifact type found in both Middle and Late Period contexts (Beardsley 1946a, 1947). Unique objects from CA-MRN-242, a sandstone spheroid and a sandstone or siltstone whetstone or “cupped stone,” are not temporally diagnostic.

For my GIS analysis presented in Chapter Seven, I categorize “other” objects as part of several different categories. For example, steatite pipe fragments I assign to a “symbolic” category, assuming that pipes were primarily used during various rituals and ceremonies. Other objects may be assigned to a number of different categories as needed, or to a general “unknown” category.

Unidentified Ground Stone Objects

A small number of ground stone artifacts from each site remain unidentified, and do not contribute to the discussion about site chronology. I assign these objects to a general “unknown” category for my GIS analysis presented in Chapter Seven.

Taken together, it appears that diagnostic artifacts in the ground stone artifact assemblages of CA-MRN-232 and CA-MRN-242 support an occupation spanning both Middle and Late Periods, while the ground stone artifact assemblage from CA-MRN-271, CA-MRN-307, CA-MRN-216, and CA-MRN-298 support a focus on Late Period site occupation. In addition, artifact depth data for temporally-diagnostic ground stone artifacts supports some stratigraphic differentiation of CA-MRN-232 and CA-MRN-242 based on age. The artifacts associated with the Middle Period (ear spool or plug, and Type B mortar and mortar fragment) were recovered consistently deeper (33-35 in. [84-89 cm]) than artifacts associated with the Late Period (pestles and pestle fragments, Type A mortar fragments, stone beads, and steatite pendant)(0-24 in. [0-61 cm]) at CA-MRN-232. Similarly, artifacts associated with the Middle Period at CA-MRN-242 (Type B1 mortar and mortar fragments) were recovered consistently deeper (18-76 in. [46-193 cm], with a mean depth of recovery of 44 in. [112 cm]) than artifacts associated with the Late Period (Type IIB1 pestle and pestle fragments, Type A mortars and mortar fragments, Type V charmstone, and steatite beads)(10-27 in. [25-67 cm], with a mean depth of recovery of 21 in. [52 cm]). As discussed by Beardsley (1954a:25-26), there is a zone of intermixture at both sites CA-MRN-232 and CA-MRN-242 that spans a stratigraphic break at 22 in. (56 cm) to 24 in. (61 cm) depth. The zone of intermixture is from 11 in. (28 cm) to 40 in. (102 cm) at each site, in which artifacts from both Middle and Late Period are intermixed, while generally above and below that zone the Middle and Late Period artifacts are stratigraphically segregated. While there is clearly some intermingling of artifacts from different periods of occupation, the ground stone artifact data support a distinguishable Middle Period occupation level deeper than the Late Period levels.

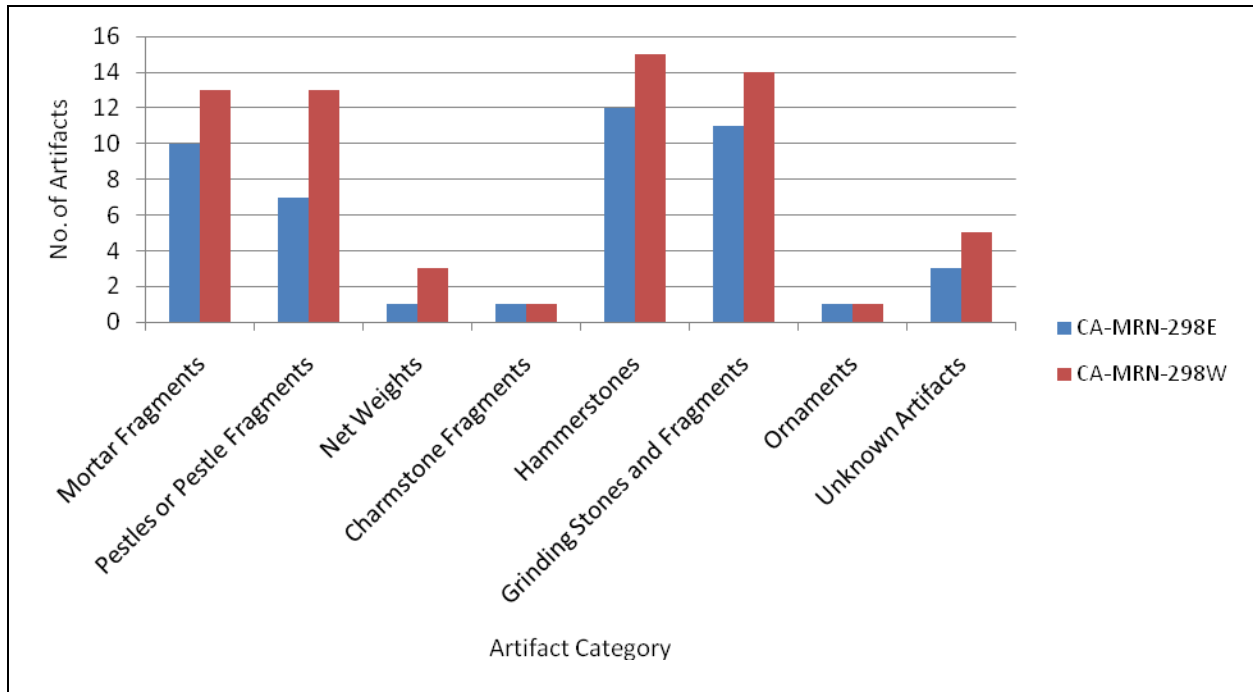
At CA-MRN-271, artifact depth data for ground stone artifacts is ambiguous. The majority of artifacts were recovered from the 12-24 in. (30-61 cm) level (26 objects, 51% of the ground stone assemblage), while 25% or 13 objects were found in the upper level, from 0-12 in. (0-30 cm). Five ground stone artifacts were documented in the 24-36 in. (61-91 cm) level (10%) and three artifacts found in the 36-48 in. (91-122 cm) level (6%). Four artifacts in the ground stone assemblage (8%) had no depth provenience recorded. The eight ground stone artifacts that are temporally diagnostic to the Late Period roughly follow this same distribution, with two found at 0-12 in. (0-30 cm) (25%), five recovered from 12-24 in. (30-61 cm) (63%), none found from 24-36 in. (61-91 cm), and one recovered from a depth of 39 in. (99 cm)(12%). This indicates Late Period ground stone artifacts were recovered from nearly all levels of the site, and ground stone cannot be used as a reliable stratigraphic marker at CA-MRN-271.

Artifact depth data for the few temporally diagnostic ground stone artifacts found in both Middle and Late Period contexts from CA-MRN-307 does not strongly suggest Middle Period occupation based on stratigraphic data alone—all are found in similar depth ranges as exclusively Late Period artifacts. Taken together, it appears that diagnostic artifacts in the ground stone artifact assemblage from CA-MRN-307 support a Late Period occupation, but do not entirely rule out Middle Period occupation.

At CA-MRN-216, the paucity of ground stone artifacts, especially those related to plant processing, indicate the focus of the site was not producing food—although some plant processing likely took place. This supports an interpretation of a specialized site function, such as a bead production site.

Finally, although more ground stone artifacts were recovered from CA-MRN-298W than from CA-MRN-298E, the ratio of number of objects in each artifact category does not vary significantly (Figure 5.20). This indicates that there is no discernable difference in activities

Figure 5.20. Ground stone artifacts from CA-MRN-298E and CA-MRN-298W.



taking place between the two site loci (like evidenced above with the flaked stone assemblage). The larger number of ground stone artifacts from CA-MRN-298W most likely reflects the greater area excavated there over CA-MRN-298E—approximately 5,100 sq. ft. (474 sq. m) was excavated at CA-MRN-298W between 1956 and 1973, while slightly more than 4,000 sq. ft. (372 sq. m) were excavated at CA-MRN-298E between 1961 and 1966. Overall, the paucity of ground stone artifacts, especially those related to plant processing, indicates the focus of the site was not producing food, which also supports an interpretation of a specialized site function.

Worked Bone Artifacts

I divided the worked bone artifact assemblage into a number of categories of artifacts, including thin-pointed artifacts (mostly mammal-bone awl and awl fragments), bird bone beads or tubes (some of which are intricately incised), broad-pointed artifacts (including awls and wedges), other worked bone objects, and unidentified cut or worked bone fragments (Figures 5.21-5.26). For the objects recovered from CA-MRN-232, CA-MRN-242, and CA-MRN-271, Beardsley classifies these artifacts in more detail than I do for my purposes here (Beardsley 1946a, 1947, 1954a). Meighan (2002) classifies these artifacts from CA-MRN-307, and the worked bone objects from CA-MRN-216 and CA-MRN-298 are described in detail by Treganza and King (1968) and King and Upson (1970).

Thin-Pointed Worked Bone Artifacts

Thin-pointed worked bone artifacts, mostly mammal-bone awl and awl fragments, are the most ubiquitous worked bone objects and are found at all the Point Reyes sites except CA-MRN-

Figure 5.21. Worked bone artifacts recovered from CA-MRN-232, 1940-1950 (n=150).

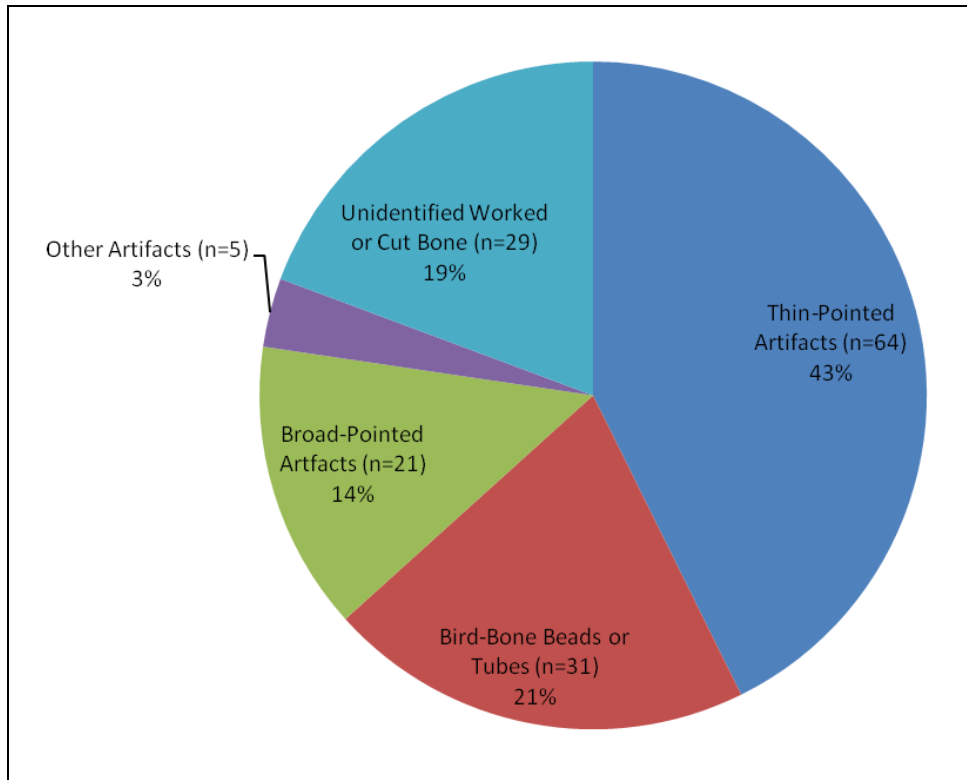


Figure 5.22. Worked bone artifacts recovered from CA-MRN-242, 1940-1941 (n=55).

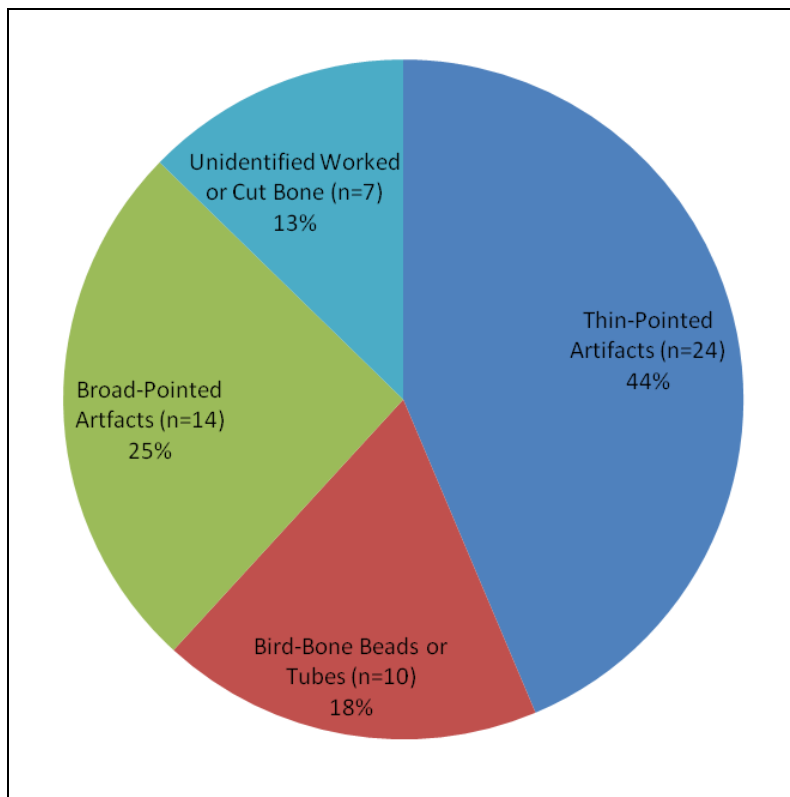


Figure 5.23. Worked bone artifacts recovered from CA-MRN-271, 1941 (n=12).

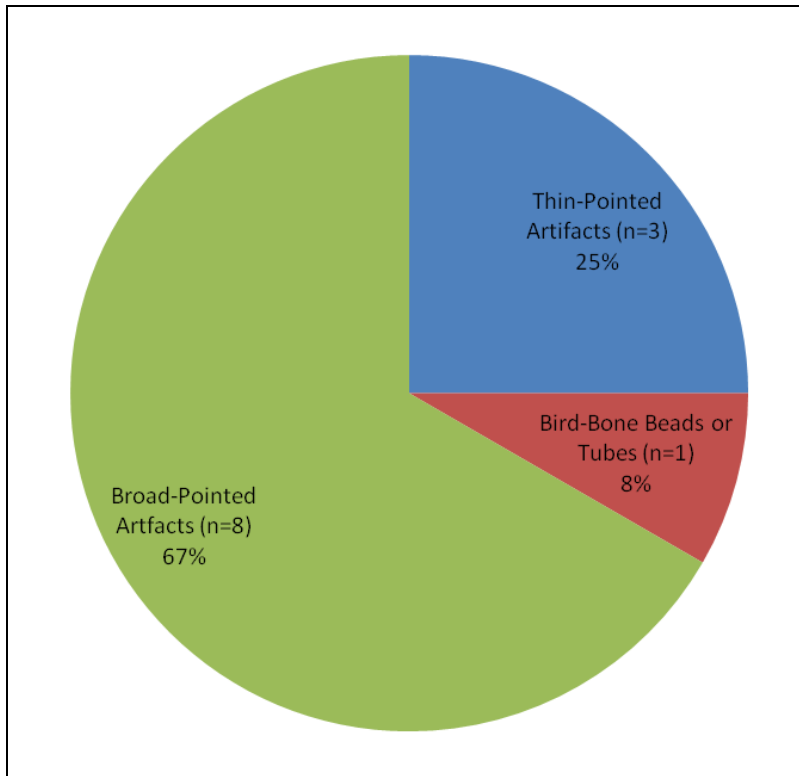


Figure 5.24. Worked bone artifacts recovered from CA-MRN-307, 1949-1951 (n=123).

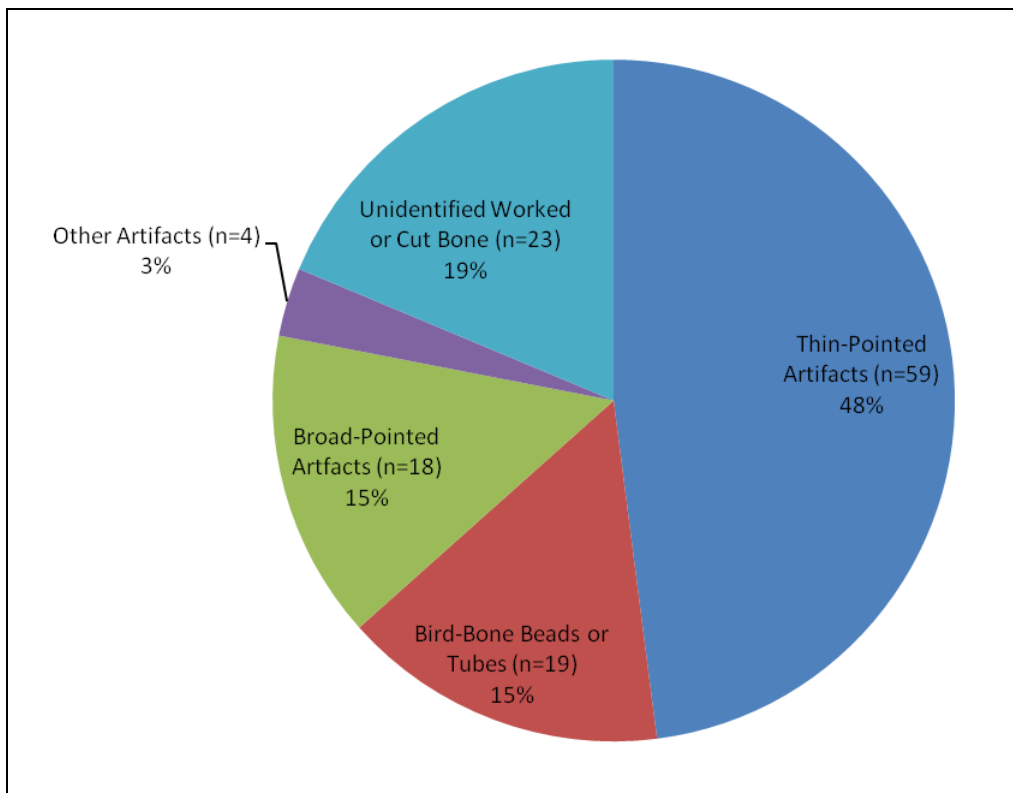


Figure 5.25. Worked bone artifacts recovered from CA-MRN-216, 1964-1967 (n=425).

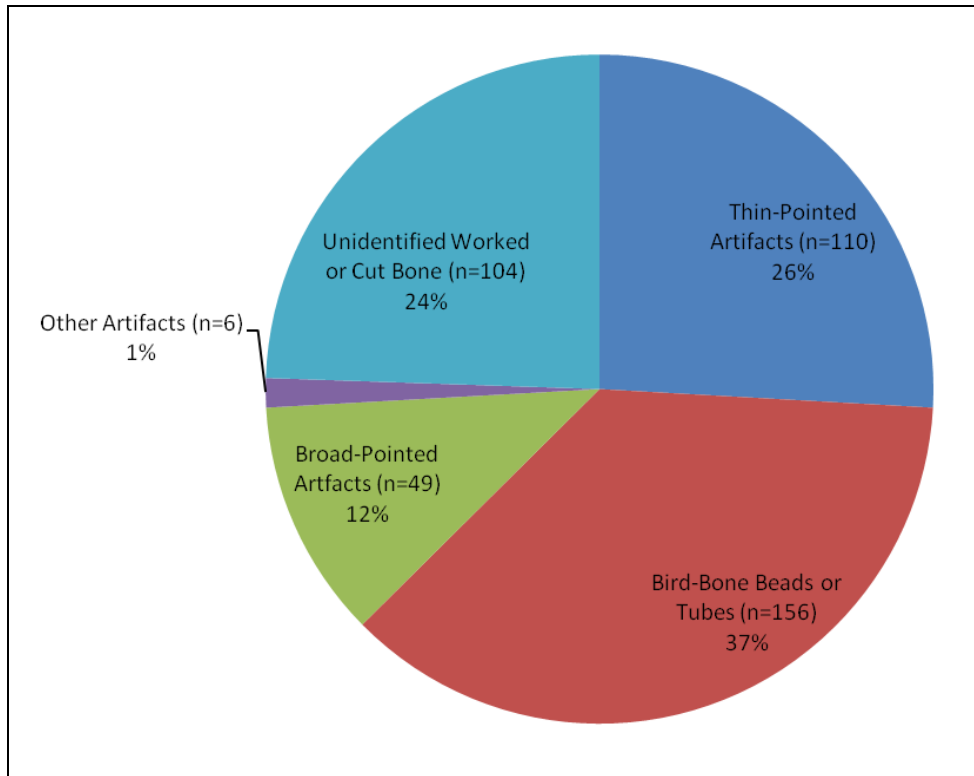
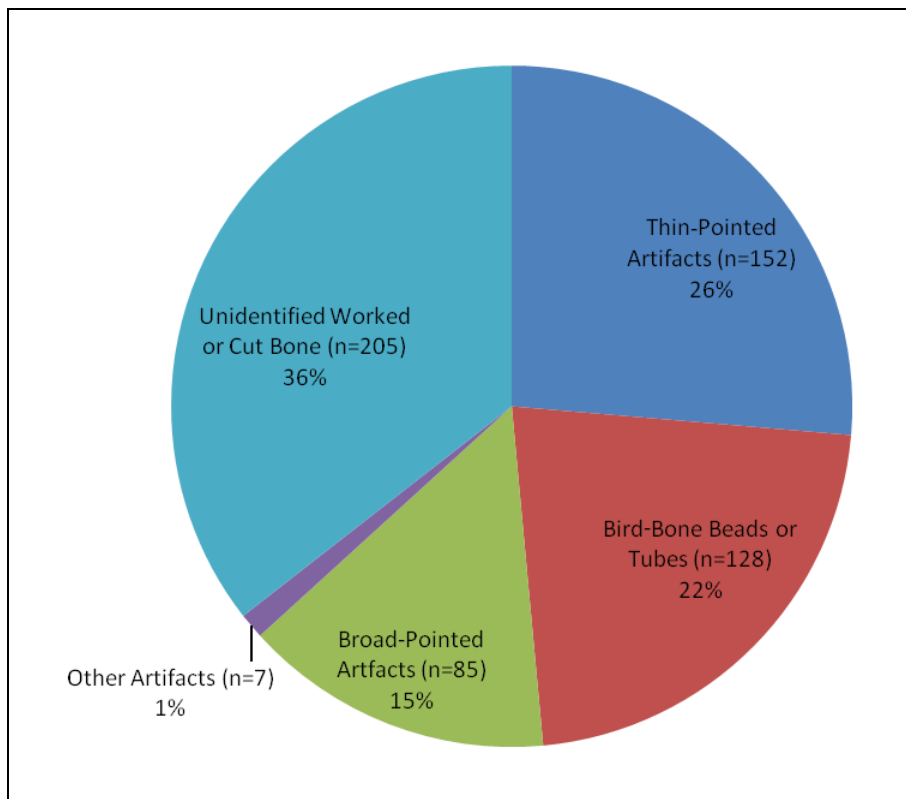


Figure 5.26. Worked bone artifacts recovered from CA-MRN-298, 1956-1973 (n=577).



271. Thin-pointed artifacts from CA-MRN-298 also include several objects identified by previous researchers as “hairpins” (King and Upson 1970; Treganza and King 1968).

For my GIS analysis presented in Chapter Seven, I categorize thin-pointed worked bone artifacts as part of a “craft production” category, assuming that bone awls and other objects were commonly used by the Tamal for manufacturing baskets, clothing, and other items.

Broad-Pointed Worked Bone Artifacts

Broad-pointed worked bone artifacts were also numerous at each site. This category includes objects such as wedges, often made from whale or other large mammal bones, and broad-pointed awls. At CA-MRN-271, Beardsley recovered six of the seven bone awl fragments from the site, observing in his field notes that “all pointed bones have heavy points – no fine awl points (ergo no basketry there?). Are roughly made, majority are fragmentary...” (Beardsley 1946a). Treganza recovered the seventh bone awl fragment, which he noted was the “common K type” (Beardsley 1946a).

For my GIS analysis presented in Chapter Seven, I also categorize broad-pointed worked bone objects as part of a “craft production” category. Broad-pointed awls may have been used in a similar way as thin-pointed awls in the production of various craft items, and wedges were likely used for splitting wood and other similar activities.

Bird Bone Beads or Tubes

Bird bone beads, also called bird bone tubes, were found at all six Point Reyes sites under discussion here. Many have some basic incising on them, while a few are intricately incised with complex geometric patterns. For my GIS analysis presented in Chapter Seven, I categorize bird bone beads or tubes as part of an “ornamentation” category, assuming these objects were used to decorate clothing, costumes, baskets, and other objects for use in ceremonial or ritual contexts.

Other Worked Bone Artifacts

Several sites had worked bone objects that did not fit in any of the previous artifact categories, and so were placed in a general “other” category. At CA-MRN-232, the other worked bone artifacts include fragments of a whalebone slab, a worked penis bone, and a forked bone artifact that Beardsley described as a “head scratcher” (Beardsley 1946a). CA-MRN-271 had two split bone fleshers and one bone flaker. Beardsley identified the single, possible bone flaker from CA-MRN-271 because he observed the pointed end was unpolished (as opposed to the possible bone awl fragments). Other worked bone artifacts from CA-MRN-307 included several serrated bone objects, as well as bird bone whistles, which were also found at CA-MRN-298.

For my GIS analysis presented in Chapter Seven, I categorize other worked bone objects in various categories, when possible. For example, bird bone whistles I assign to a “symbolic” category, assuming that whistles were primarily used during various dances and other ceremonies. Other objects may be assigned to various other categories as needed, or to a general “unknown” category.

Unidentified Cut or Worked Bone Fragments

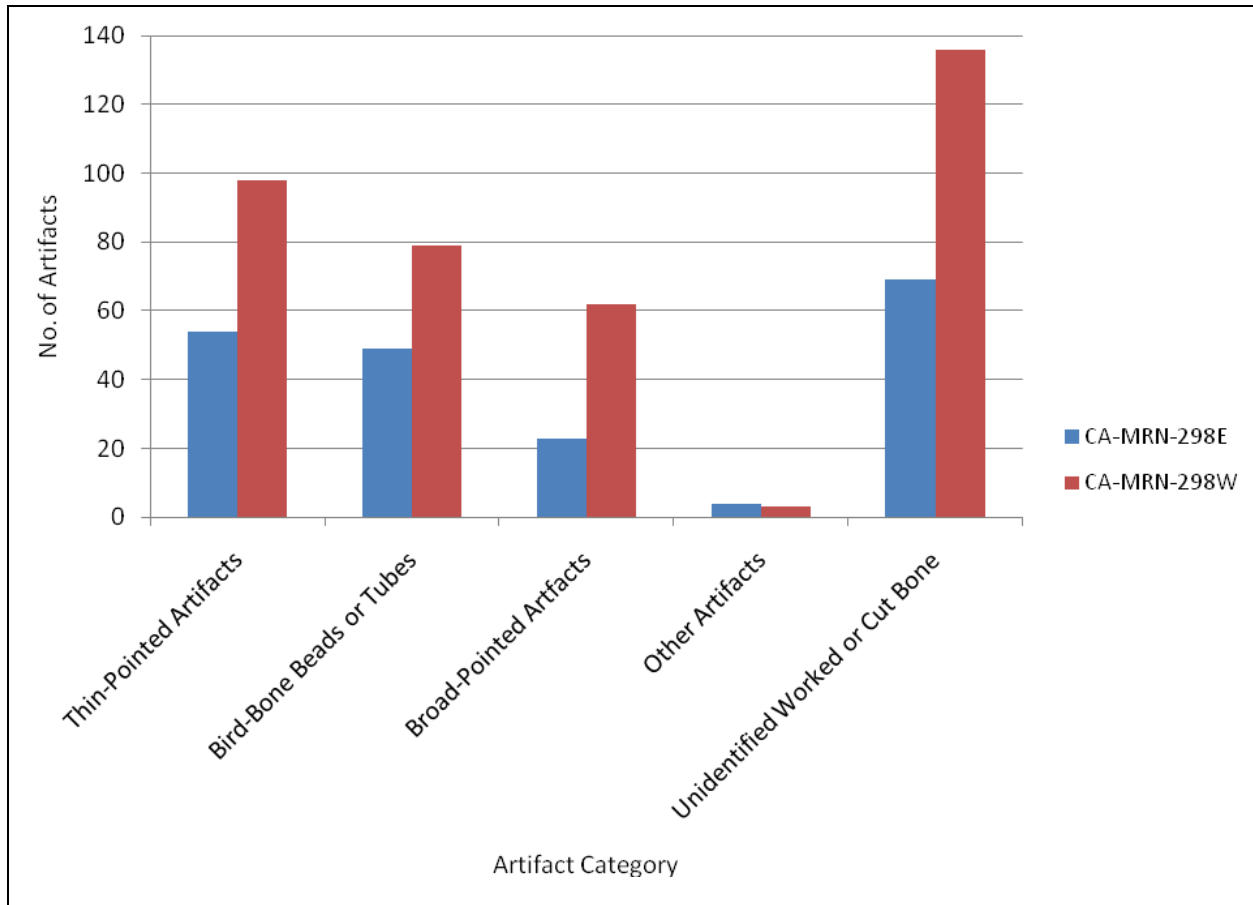
Five of the six sites contained a number of cut or worked bone fragments, both mammal and bird, that could not be specifically identified. Many of these were manufacturing by-products from producing other worked bone artifacts, such as bird bone beads. For my GIS analysis, many of these objects are assigned to an “unknown” category. Some, however, I do place in various other categories. For example, cut bird bone that is likely the discarded portion of a long-bone with the joint left-over from manufacturing bird bone beads or tubes, I place in a “craft production” category, since it is related to bird bone bead production.

Most of the worked bone assemblage is not temporally diagnostic, but a few of the objects predominate in one period or the other. Beardsley noted that he recovered forked head-scratchers, like the one from CA-MRN-232, solely from Middle Period contexts at CA-MRN-266 (Beardsley 1947), although he recovered the one example at CA-MRN-232 from the “zone of intermixture” at 22 in. (56 cm) depth. The two split bone fleshers found on CA-MRN-271 (one by Beardsley in 1941 and the other by Treganza in 1945) are the only possibly temporally diagnostic worked bone artifacts from that site, and may represent Middle Period contexts (Beardsley 1946a). Artifact depths recorded by Beardsley and Treganza may support an early date for the split bone fleshers, and therefore a Middle Period component at CA-MRN-271. The majority of worked bone artifacts were recovered from the 0-24 in. (0-61 cm) levels. The two split bone fleshers were recovered from depths of 25 in. (63.5 cm) and 33 in. (84 cm)—only one other worked bone artifact was recovered from a greater depth, one of the awl fragments was found at a depth of 48 in. (122 cm). This is another clue there may be some stratigraphic integrity at the site, even though Beardsley did not record any obvious stratigraphic breaks.

On the other hand, Beardsley found that whalebone wedges (many of the broad-pointed artifacts from all sites are whalebone wedges) are often recovered from Late Period contexts, as are finely-incised bird bone beads (one of the bird bone beads or tubes from CA-MRN-232 has intricate fine-lined incising, as does one of the bird bone beads from CA-MRN-298, while many of the beads from CA-MRN-216 also have some form of incising). At CA-MRN-232 and CA-MRN-242, all of the Late Period artifacts were recovered from either above the stratigraphic break (22 in. [56 cm] at CA-MRN-232 or 24 in. [61 cm] at CA-MRN-242), or in the zones of intermixture. The worked bone assemblage, therefore, supports both a Middle and Late Period occupation at CA-MRN-232 and CA-MRN-242, but solely Late Period occupations at CA-MRN-216 and CA-MRN-298.

At CA-MRN-298, it was found that nearly twice as many worked bone artifacts were recovered from CA-MRN-298W as from CA-MRN-298E, but the ratio of number of objects in each artifact category does not vary significantly (Figure 5.27). This indicates that there is no discernable difference in activities taking place between the two site loci (similar to that observed for the flaked stone assemblage). The larger number of worked bone artifacts from CA-MRN-298W most likely reflects the greater area excavated there over CA-MRN-298E—approximately 5,100 sq. ft. (474 sq. m) was excavated at CA-MRN-298W between 1956 and 1973, while slightly more than 4,000 sq. ft. (372 sq. m) were excavated at CA-MRN-298E between 1961 and 1966.

Figure 5.27. Worked bone artifacts from CA-MRN-298E and CA-MRN-298W.



Worked Shell Artifacts

The numbers of artifacts made from worked shell varied considerably at each site (see Figures 5.1-5.6). At CA-MRN-232, many of the worked shell artifacts were recovered from burial contexts, and I did not examine those objects firsthand. Two PAHMA catalog numbers indicate multiple beads from burials, but do not give a specific number, the reason that I indicate there are at least 86 worked shell artifacts. At CA-MRN-242, artifacts made from worked shell, also primarily shell beads, make up an overwhelming 84% of the overall artifact assemblage (1,277 of 1,539 artifacts). The majority of the worked shell artifacts were recovered in large lots from burial contexts (1,116 of 1,277, 87%), and I did not examine those objects firsthand.

Using Beardsley's field notes and publications (Beardsley 1947, 1948, 1954a, 1954b), Meighans's (2002) publication, the PAHMA artifact catalog, the SFSC, SRJC, and DNG artifact catalogs, Limantour Spit site publications (King and Upson 1970; Treganza and King 1968), as well as first-hand examination of the available artifacts, I divided the worked shell artifacts into a number of categories, including beads (clamshell disk beads and *Olivella* beads) and bead blanks, pendants and pendant blanks, clamshell tubes (made from the hinge), and other worked shell objects (Figures 5.28-5.33).

Figure 5.28. Worked shell artifacts recovered from CA-MRN-232, 1940-1950 (n=86).

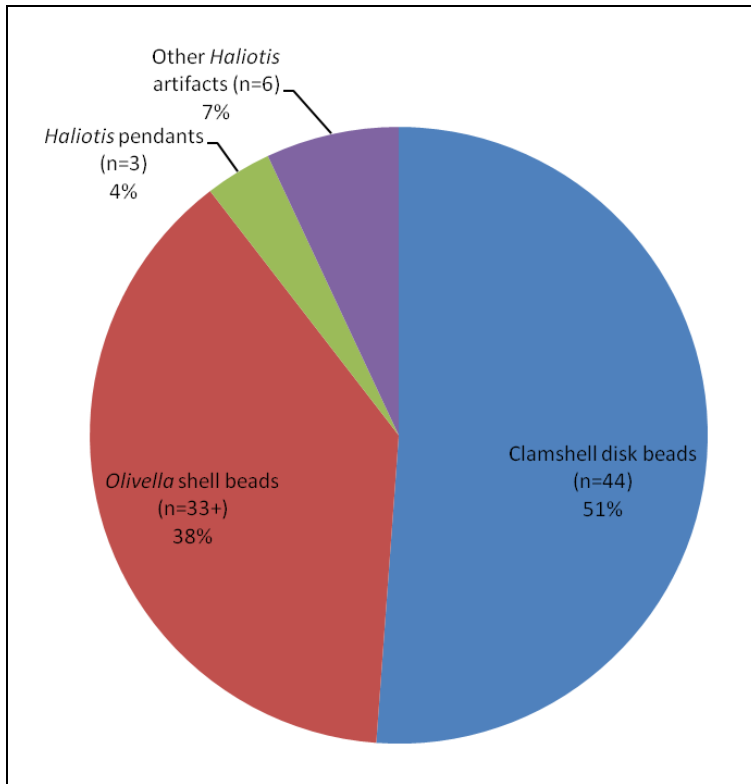


Figure 5.29. Worked shell artifacts recovered from CA-MRN-242, 1940-1941 (n=1,277).

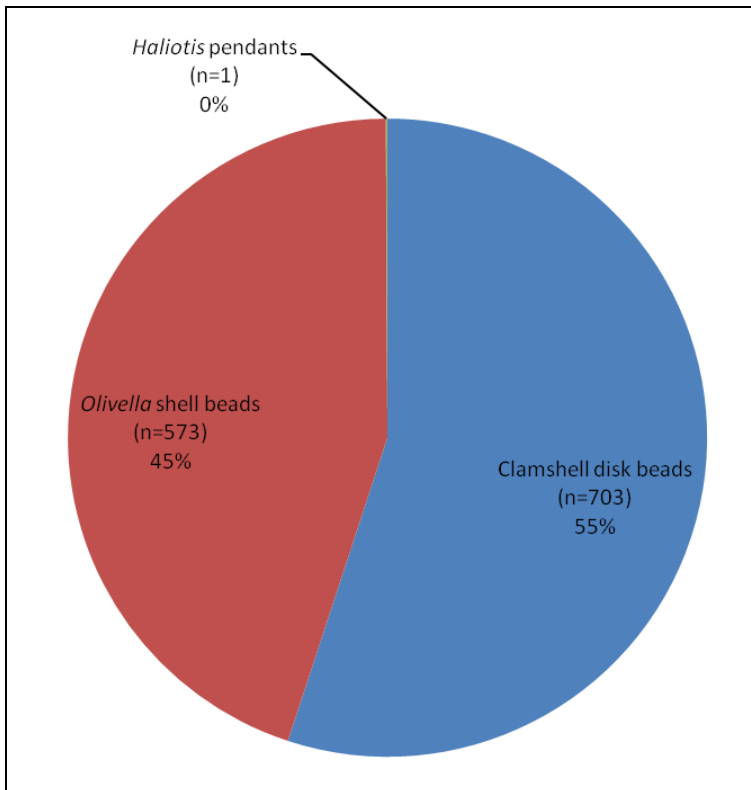


Figure 5.30. Worked shell artifacts recovered from CA-MRN-271, 1941 (n=6).

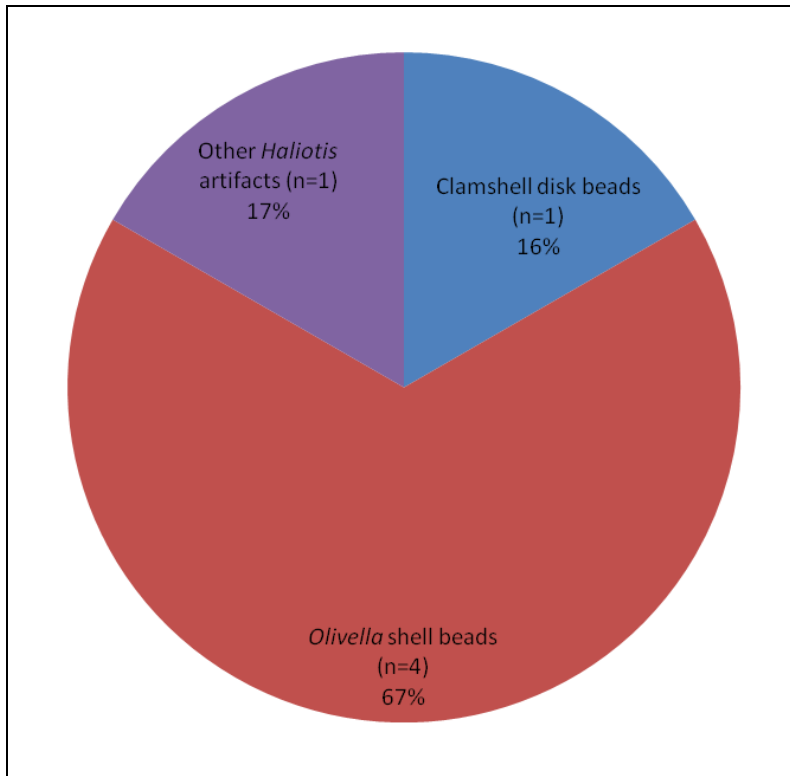


Figure 5.31. Worked shell artifacts recovered from CA-MRN-307, 1949-1951 (n=12).

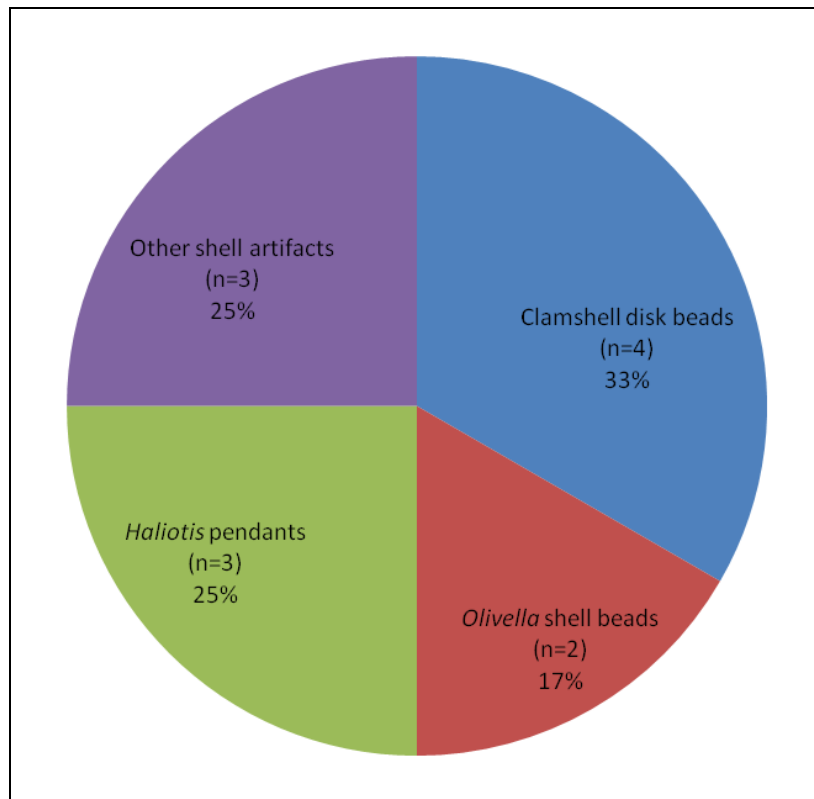


Figure 5.32. Worked bone artifacts recovered from CA-MRN-216, 1964-1967 (n=554).

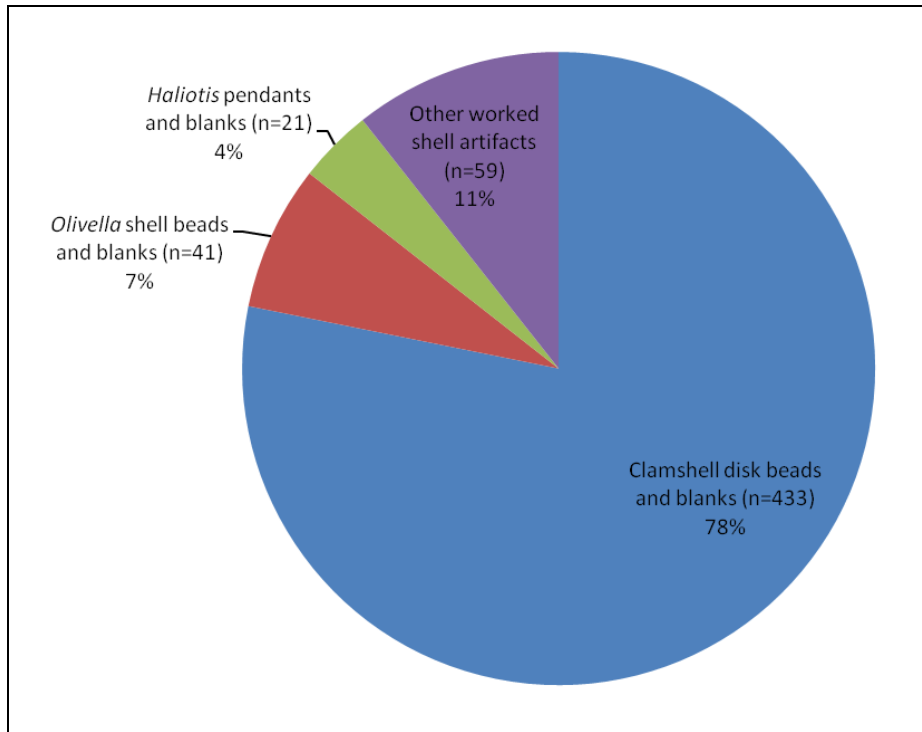
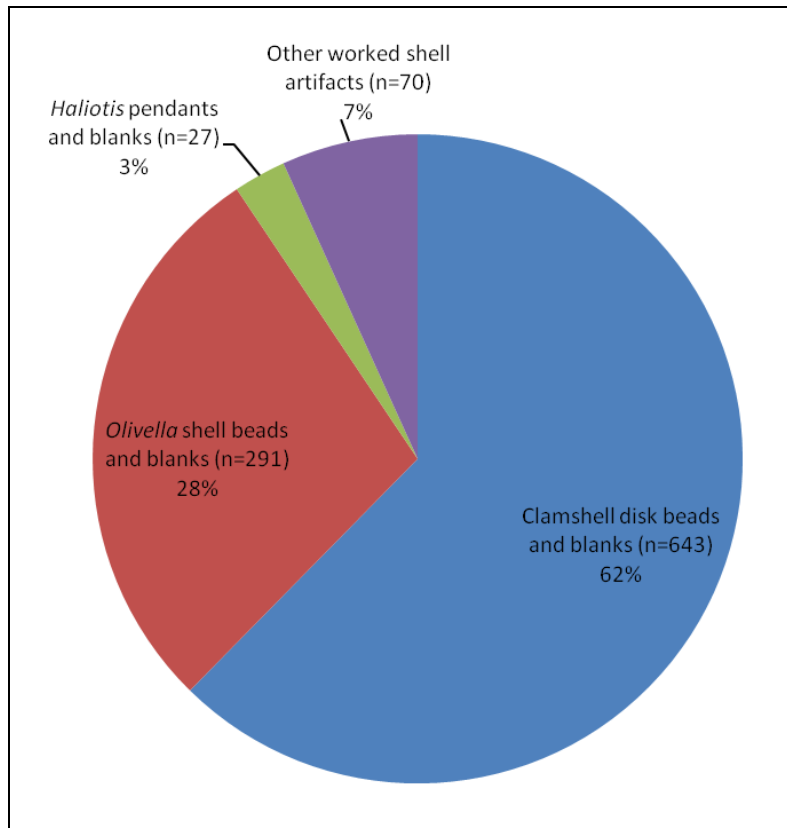


Figure 5.33. Worked shell artifacts recovered from CA-MRN-298, 1956-1973 (n=1,031).



Clamshell Disk Beads and Blanks

The largest category of worked shell artifacts from all sites except CA-MRN-271 is clamshell (*Saxidomus nuttalli*) disk beads (just one clamshell disk bead was recovered from CA-MRN-271). At CA-MRN-232, they comprise 51% of the worked shell artifacts (44 of 86+ artifacts)—29 clamshell disk beads come from burials excavated by Beardsley in 1941. At CA-MRN-242, clamshell disk beads comprise 55% of worked shell artifacts (703 of 1,277 artifacts), and all but two clamshell disk beads come from five burials (four cremations and one inhumation) excavated by Heizer and Beardsley in 1940-1941, including 455 beads from one inhumation and 180 beads from one cremation. Clamshell disk beads make up 33% of the small worked shell assemblage at CA-MRN-307 (four of 12 artifacts). On the other hand, clamshell disk beads (n=349) and bead blanks (n=84) dominate the large worked shell assemblage from CA-MRN-216 (433 of 554 artifacts, 78%). Likewise, the large number of disk beads (n=340) and bead blanks (n=303) from CA-MRN-298 together comprise 62% of the worked shell artifacts (643 of 1,031 artifacts) from the site. Interestingly, also abundant on CA-MRN-298 are whole, worked clamshells—42 of these are whole shells with rough holes punched in them (likely to extract the raw material for the beads), while the remaining seven are whole clamshells with edges ground or worked.

Saxidomus nuttalli clamshell disk beads are temporally diagnostic, and are a hallmark of Late Period Phase 2. According to shell bead dating Scheme D, Late Period Phase 2 begins A.D. 1500-1550 (Hughes and Milliken 2007:267; Milliken, et al. 2007:117); Groza (2002) indicates Late Period Phase 2 begins A.D. 1510.

Olivella Shell Beads and Blanks

At least 33 *Olivella biplicata* beads were recovered at CA-MRN-232—at least 29 of those come from burial contexts, which I did not examine. An additional *Olivella* bead could not be located in the PAHMA collection, so I was able to examine just three of the *Olivella* beads from CA-MRN-232. These included two Type A1b and one Type A1c spire-removed beads (using the typology by Bennyhoff and Hughes 1987). Beardsley identified many of the beads from the 1940-1941 excavations in his field notes using the Bulletin 2 (Lillard, et al. 1939) and Gifford (1947) typologies (Beardsley 1946a), however, so I was able to identify the remaining beads using Bennyhoff and Hughes's concordance of shell bead typologies (Bennyhoff and Hughes 1987:85). This indicates that 17 beads from CA-MRN-232 are Type H1, H2, or H3; seven are E1, E2, or E3; and three are either E2 or E3.

Many types of *Olivella* shell beads are temporally sensitive and offer clues to site occupation, as well, although the majority of beads from Point Reyes are not diagnostic. The Type A1b and A1c spire-removed beads, the largest category of *Olivella* bead recovered from the six sites, are not temporally diagnostic. Bennyhoff and Hughes (1987:118) report Type A1c as the most numerous *Olivella* bead type recovered in Central California from both Middle Period and Protohistoric contexts, while the Type A1b have no temporal significance—they can occur in any period. The Type E1-3 *Olivella* beads, on the other hand, are diagnostic of Late Period Phase 2 leading into the Historic Period (Bennyhoff and Hughes 1987:127-129). Similarly, the Type H1-3 *Olivella* beads are hallmarks of the Mission and post-Mission Periods (Bennyhoff and Hughes 1987:135).

At CA-MRN-242, in addition to large numbers of clamshell disk beads, 573 *Olivella* beads (likely *Olivella biblicata*) were also recovered, although all but seven of the *Olivella* beads come from burial contexts (five inhumations and three cremations), including lots of 245 and 210 beads from two separate inhumations. Like at CA-MRN-232, Beardsley identified the beads from the CA-MRN-242 excavations in his field notes using earlier typologies (Beardsley 1946a), which I converted to Bennyhoff and Hughes's 1987 typology using their concordance of shell bead types (Bennyhoff and Hughes 1987:85). Beardsley noted at least six separate types of *Olivella* beads represented at the site, including types dominant in both Middle and Late Period contexts. The Type B1 *Olivella* bead is a marker type for Late Period, Phase 1, while Type B2 occurred in both the Early Period and Late Period, Phase 1 (Bennyhoff and Hughes 1987:121). Both Types F3a and G3 are marker types for the Middle Period (Bennyhoff and Hughes 1987:131-132). Finally, Types K1 is a marker type for the Late Period, Phase 1 (Bennyhoff and Hughes 1987:137, 140).

Beardsley also recovered four *Olivella biplicata* beads from CA-MRN-271, including three Type A1c spire-removed beads and one Type G3 ring bead (using the typology by Bennyhoff and Hughes 1987). As noted above, the spire-removed bead is not diagnostic, but the Type G3 ring bead, on the other hand, which is most common in the Marin district of Central California, is a marker type for the early phase of the Middle Period (Bennyhoff and Hughes 1987:132), which dates to approximately 2200 to 1600 BP (Milliken, et al. 2007:104).

At CA-MRN-307, just two *Olivella biplicata* beads were recovered by Meighan. The *Olivella* beads include a Type A1a spire-removed bead and a Type E3b disk bead (using the typology by Bennyhoff and Hughes 1987). Like the other Type A1 beads noted above, the Type A1a is not diagnostic and can occur in all time periods. The Type E3b *Olivella* bead, however, is a Historic Period marker type (Bennyhoff and Hughes 1987:129).

Olivella shell beads and bead blanks (n=41) are the second most abundant worked shell artifact-type from CA-MRN-216, together comprising 7% of the assemblage, while at nearby CA-MRN-298, *Olivella* shell beads (n=129) and bead blanks (n=162) comprise 28% of the assemblage. The *Olivella* beads include at least 35 Type A1 simple spire-lopped beads (using the typology by Bennyhoff and Hughes 1987), one Type A4 punched spire-lopped bead, and at least 68 cup-, saddle-, and disk-shaped beads. Type A4 spire-removed beads are also not temporally diagnostic—Bennyhoff and Hughes (1987:117-119) report they have no or uncertain temporal significance.

Haliotis Pendants, Pendant Blanks, and Other *Haliotis* Artifacts

In addition to the clamshell disk beads and *Olivella* beads, the remaining worked shell artifacts from CA-MRN-232 are *Haliotis rufescens* (Red Abalone), including at least three pendants. All but one of the rest are cut fragments of *Haliotis* shell that may have been intended as raw material for pendants or other ornaments. The last *Haliotis* fragment from CA-MRN-232 is a smooth, waterworn piece about 1.8 in. (4.6 cm) in diameter that does not appear to be raw material, but instead may have been a keepsake used as a charm or similar object (see Chapter Nine).

Heizer and Beardsley recovered a single *Haliotis* pendant from CA-MRN-242, which Beardsley identified as Type A using Lillard et al.'s (1939) Bulletin 2 typology. Likewise a single roughly-chipped fragment of *Haliotis rufescens* (Red Abalone) measuring 4.5 in. (11 cm) by 1.5 in. (4 cm) was recovered from CA-MRN-271. This may have been a blank formed in

preparation for making a *Haliotis* ornament or bead. The worked shell assemblage at CA-MRN-307 also includes a single *Haliotis* pendant (possibly Type B1) and two cut fragments of *Haliotis* shell that may have been intended as raw material for pendants or other ornaments.

Haliotis artifacts are more abundant at CA-MRN-216 and CA-MRN-298. At CA-MRN-216, nine pendants, twelve pendant blanks, and nine cut fragments of *Haliotis* shell that may have been intended as raw material for pendants or other ornaments were recovered. Similarly, at CA-MRN-298, ten pendants, seventeen pendant blanks, seven cut fragments of *Haliotis* shell, and one *Haliotis* bead blank were recovered.

Clamshell Tubes

Clamshell tubes, made from the hinge section of the clamshell and likely raw material for tubular beads, were recovered from CA-MRN-307, CA-MRN-216, and CA-MRN-298. The assemblage at CA-MRN-307 includes two clamshell cylinders, while there are twelve clamshell tubes and tube blanks from CA-MRN-216, and seven clamshell tubes from CA-MRN-298. Clamshell tubular beads are characteristic of the Late Period (Beardsley 1946a).

Other Worked Shell Objects

The PAHMA catalog for CA-MRN-307 lists a whole, unmodified *Clinocardium nutallii* shell as “polished shell art” and a “cardium container,” although I believe this is instead a faunal remain. At CA-MRN-216, there are thirteen fragments of unidentified worked clamshell (2% of the worked shell assemblage), while the remainder of the assemblage includes unidentified fragments of worked *Mytilus*, several unidentified bead and bead blanks (n=17), and three unknown worked shell fragments. At CA-MRN-298, a single *Mytilus* bead, and several unidentified bead and bead blanks (n=5) were recovered.

The shell beads have a number of implications regarding chronology at the various sites. For example, at CA-MRN-232, while I was not able to examine the Type E and H beads first hand, if Beardsley’s identification is correct, then that is strong evidence that CA-MRN-232 was occupied at least into the beginning of the Spanish colonial period. There is a complicating factor to this conclusion, however—at least 20 of the Late and Historic Period *Olivella* beads were associated with the same burial (no. 2) recovered from 42 in. (107 cm) depth that yielded the 266 obsidian prisms discussed above, which Beardsley argued is a hallmark of the Middle Period based on the burial’s position below the whole shell layer. These data suggest it is possible either Beardsley misidentified the shell beads, or Bennyhoff and Hughes’s concordance of shell bead typologies is incorrect (Bennyhoff and Hughes 1987:85).

Unfortunately, the 68 shell beads from CA-MRN-232 with recorded depths do not offer any clues to site stratigraphy that could further differentiate occupation levels. Clamshell disk beads and *Olivella* beads associated with Late or Historic Periods (different than those associated with Burial no. 2 discussed above) were recovered at all levels, including the deepest levels of the site. Similarly, the recorded depths for the worked shell artifacts at CA-MRN-271 also do not offer any clues to site stratigraphy—five of the six artifacts, including both the Middle Period Type G3 *Olivella* shell bead and the Late Period clamshell disk bead, were recovered from 0-12 in. (0-30 cm)(the sixth bead did not have recovery depth noted). The clamshell disk bead is consistent with a Late Period occupation that is reinforced by the presence of sixteenth-century introduced artifacts, while the Type G3 *Olivella* bead could represent a Middle Period-artifact

that was brought to the upper level of the site by rodent activity or other site disturbance. Alternatively, it could be a curated artifact that was passed down to Late Period occupants of the site by their Middle Period ancestors.

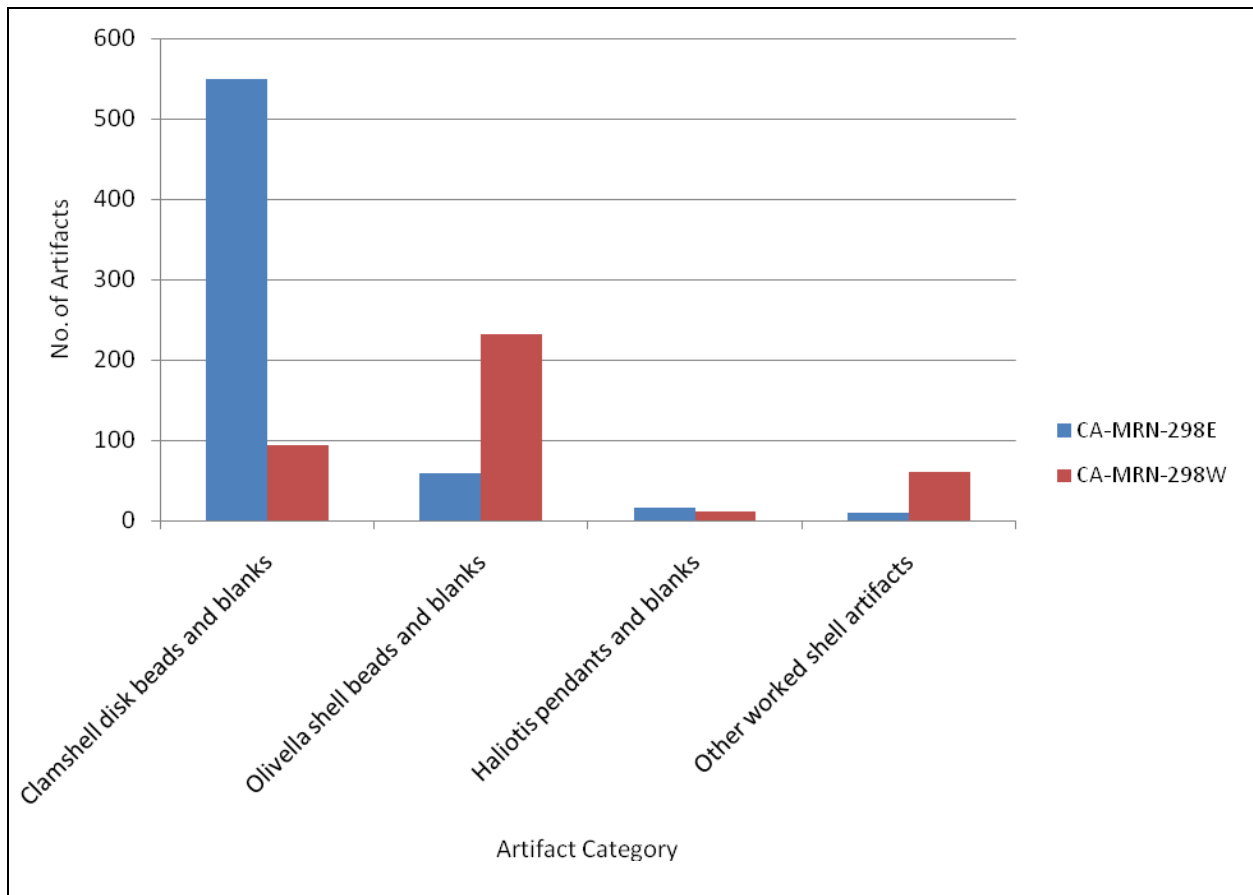
The Type E3b *Olivella* bead recovered at CA-MRN-307 is a Historic Period marker type (Bennyhoff and Hughes 1987:129), which is perhaps evidence that CA-MRN-307 was occupied at least into the beginning of the Spanish colonial period, like nearby CA-MRN-232. Otherwise, the recorded depths of the six diagnostic shell beads at CA-MRN-307 do not offer any clues to site stratigraphy, and none of the shell beads suggest Middle Period occupation. Clamshell disk beads and *Olivella* beads associated with Late or Historic Periods were recovered at all levels, including the deepest levels of the site. The *Olivella* assemblage at CA-MRN-216 supports a Late Period site occupation—there are no bead types that suggest earlier occupation. Likewise, the *Haliotis* assemblage also supports a Late Period occupation. The *Olivella* assemblage at CA-MRN-298 also supports a Late Period site occupation, as does the *Haliotis* assemblage.

There is an unusual lack of shell beads in the CA-MRN-232, CA-MRN-271, and CA-MRN-307 artifact assemblages. The most likely explanation for such a paucity of shell beads is due to recovery techniques the excavators used. Since Beardsley and his crew likely only screened a portion of the site deposit through ½ in., even when they did use screens it is possible that many shell beads were missed (see Chapter Six for a more detailed discussion of recovery techniques). Meighan (2002:78), however, suggests the “paucity of such items in a near-total excavation of the site [CA-MRN-307] is a reflection of the small population and relative poverty of the inhabitants of the site.” He also suggests that the lack of clamshell disk beads indicates that bead manufacture did not occur at the site (Meighan 2002:72). It is also possible, however, that since Meighan and his crew only screened a portion of the site deposit, shell beads may have been missed at CA-MRN-307, as well.

Finally, the worked shell assemblage from CA-MRN-298 offers an interesting clue to cultural practices prevalent at the site. Spatially, there is a sharp dichotomy between the worked shell assemblages at the two site loci at CA-MRN-298 (Figure 5.34). Most prominently, clamshell disk beads and bead blanks comprise 87% (n=550) of worked shell assemblage from CA-MRN-298E, but they make up just 24% (n=93) of the assemblage from CA-MRN-298W. Interestingly, however, worked clamshells with holes punched in them, which may have been discarded after creating bead blanks, were only found on CA-MRN-298W, and are totally absent from CA-MRN-298E. At the same time, *Olivella* beads (n=70) and bead blanks (n=162) comprise 59% of the CA-MRN-298W worked shell assemblage, but *Olivella* beads (n=59) make up just 9% of the assemblage from CA-MRN-298E, and *Olivella* bead blanks are entirely absent from the eastern site locus. The remaining worked shell artifact types are relatively evenly distributed between the two site loci. Overall, the spatial distribution of worked shell, combined with the flaked stone distribution (specifically flaked stone drills) discussed above, strongly suggests that CA-MRN-298E was a center of *Saxidomus* shell bead production, while CA-MRN-298W was a locus for production of *Olivella* beads.

For my GIS analysis presented in Chapter Seven, I categorize all final worked shell artifacts as part of an “ornamentation” category, assuming that the Tamal people primarily used shell beads, pendants, and other artifacts to decorate clothing, baskets, as regalia for costumes and other items, and possibly for use during dances and other ceremonial practices. Bead and pendant blanks, however, along with other unfinished shell objects, I categorize as part of the “craft production” category because they are still part of the production process and not yet finished ornaments that would be in active use.

Figure 5.34. Worked shell artifacts from CA-MRN-298E and CA-MRN-298W.



Worked Antler Artifacts

Worked antler artifacts comprise a relatively small percentage of the artifact assemblages from each of the six sites examined here. Using Beardsley’s field notes and publications (Beardsley 1947, 1948, 1954a, 1954b), Meighans’s (2002) publication, the PAHMA artifact catalog, the SFSC, SRJC, and DNG artifact catalogs, Limantour Spit site publications (King and Upson 1970; Treganza and King 1968), as well as first-hand examination of the artifacts, I divided the worked antler artifacts into antler tine flakers; broad-point tools, such as wedges; and unidentified antler objects.

Antler Tine Flakers

There are nine antler tine flakers in the CA-MRN-232 and CA-MRN-216 assemblages, seven from CA-MRN-307, four from CA-MRN-298, and a single fragment of antler tine flaker from CA-MRN-242. For my GIS analysis presented in Chapter Seven, I categorize all antler tine flakers as part of a “lithic production” category, assuming that the Tamal people primarily used antler tine flakers for pressure flaking during flaked stone tool manufacturing.

Broad-Point Antler Artifacts

There are 12 broad-point antler artifacts, mostly wedges, from CA-MRN-216, nine broad-point antler artifacts from the CA-MRN-232 and CA-MRN-307 assemblages, and six broad-point antler artifacts in the CA-MRN-298 assemblage. For the GIS analysis, I categorize broad-point antler artifacts as part of a “craft production” category, assuming that the Tamal people primarily used them during manufacturing of various craft items made from animal and plant.

Unidentified Antler Artifacts

There are five unknown worked antler fragments from the CA-MRN-216 assemblage. These I categorize as “unknown” for the GIS analysis. None of the worked antler artifacts are temporally diagnostic, and site stratigraphy does not help differentiate the objects. At CA-MRN-232, worked antler artifacts were recovered from the site as shallow as the 6-12 in. (15-30 cm) level, and as deep as 36 in. (91 cm), at CA-MRN-307, they were recovered from the site as shallow as 2 in. (5 cm), and as deep as 41 in. (104 cm), at CA-MRN-216 they were found from 2 in. (5 cm) deep to 33 in. (84 cm), and at CA-MRN-298 worked antler artifacts were recovered from the site as shallow as 16 in. (41 cm) and as deep as 41 in. (104 cm). The depth of recovery for the flaker fragment was not recorded at CA-MRN-242.

Miscellaneous Artifacts

There are a number of miscellaneous artifacts from each of the sites that cannot be categorized in standard artifact categories. The miscellaneous artifacts from these sites include lithic artifacts, clay artifacts, asphaltum, pigment fragments, and other miscellaneous artifacts. Using the original researcher’s field notes, artifact catalogs, and publications, along with firsthand artifact examination, I briefly discuss each of the artifacts here. Although none of the artifacts are temporally diagnostic, some of them are very interesting, especially with regard to hypotheses I am testing in this dissertation. These artifacts of special interest will be singled out for spatial analysis in Chapter Seven.

Lithic Artifacts

At CA-MRN-232, miscellaneous artifacts include 18 lithic artifacts that are neither obviously flaked nor ground, but are modified in some way. This includes a single bag of 13 artifacts with no provenience recovered by Beardsley in 1941. None of these artifacts appears remarkable. Meighan recovered two quartz crystal fragments from CA-MRN-232, one recovered during the 1949 excavation and the other recovered from the beach in 1950. Both are “battered” but not obviously retouched. Meighan also recovered what he described as a “problematical stone object” from the excavation in 1949 (PAHMA Catalog Card No. 1-78010). This artifact is semi-cylindrical and possibly burned, but does not resemble a recognizable charmstone (although it may have functioned in a similar manner). Another “problematical stone object” resembles a hammerstone, but was not burned (PAHMA Catalog Card No. 1-78201). Finally, Heizer and Beardsley recovered a “thumb-sized” stone fragment associated with Cremation no. 1 in 1940.

At CA-MRN-242, Heizer and Beardsley recovered two unmodified quartz crystals. Both were excavated from the site itself, indicating they were intentionally brought to the site by the Tamal inhabitants. While they may represent simple “keepsakes,” as Beardsley suggested of one of the crystals (Beardsley 1946a), it is also possible they functioned as charms, similar to charmstones. Meighan recovered four miscellaneous lithic artifacts from CA-MRN-307, including a smooth fragment of sandstone with a groove worn in one side, possibly for use as a whetstone; an unidentified stone with a red ochre smear; a small piece of pumice (or possibly baked clay) shaped like a 1 in. (2.5 cm)-diameter ball; and a smooth, unmodified stone that bears a passing resemblance to a charmstone. At CA-MRN-216, miscellaneous lithics included three unmodified crystals, while at CA-MRN-298, they include four pieces of mica.

For my GIS analysis, I categorize some of the miscellaneous lithic artifacts, for example the quartz crystals, as “symbolic” because they do not appear to have had another specific function, while the others I label as “unknown.”

Clay Artifacts

Heizer and Beardsley excavated four fragments of baked clay from CA-MRN-232 in 1940, which Beardsley describes as having “impressions of tule and grass preserved on one side or two sides, as though had chinked up holes between thatching elements in dwelling” (Beardsley 1946a). Meighan also excavated two baked clay fragments from CA-MRN-232 in 1949—one is not recognizable, while the other has rows of impressed dots on one side. At CA-MRN-216, researchers recovered a total of seven baked clay objects. None of the other sites had any baked clay in their assemblages. With the exception of the four fragments from CA-MRN-232 with tule and grass impressions, I label the clay objects as “symbolic” for my GIS analysis presented in Chapter Seven.

Asphaltum

Fragments of asphaltum were recovered from four of the six sites under study here. This material is likely from naturally occurring seeps in the area. Four fragments of asphaltum were recovered from CA-MRN-232, while CA-MRN-307 had a single fragment of asphaltum, as well as a piece of wood or bone with asphaltum adhering to it. Asphaltum was much more prevalent at the Limantour Spit sites than at the other sites: 42 pieces of asphaltum and at least two shells filled with asphaltum were recovered from CA-MRN-216, while 124 pieces of asphaltum and one piece of “bitumen” (likely the same material) were found at CA-MRN-298. For my GIS analysis, I label the asphaltum under the “craft production” category, assuming the material was used during the manufacture of various craft objects.

Pigment

Pigment fragments, in one form or another, were also recovered from four of the six *tamál-húye* sites. Two fragments of hematite, a reddish mineral used for pigments, were recovered from CA-MRN-232, while from CA-MRN-307, a single fragment of red ochre was recovered. Again, pigment fragments were more numerous at the Limantour Spit sites. From CA-MRN-216, 12 fragments of ochre (both red and yellow) and 12 fragments of other minerals, possibly used as pigments, were recovered. At CA-MRN-298, a total of 33 fragments of ochre

and one artifact labeled “pigment,” possibly hematite, were recovered. I label the pigment fragments as “symbolic” for my GIS analysis, since it is often found in burial contexts.

Other Miscellaneous Artifacts

Two of the more interesting artifacts from CA-MRN-232 include a chunk of fossilized whalebone and a large fossilized shark tooth. Both were excavated from the site itself, not recovered from the beach, indicating they were intentional brought to the site by the Tamal inhabitants. Two more fossilized shark teeth were recovered from CA-MRN-242. At CA-MRN-216, researchers recovered four fragments of fossil whalebone and a single “pseudomorph,” a chalcedony bivalve fossil. While these objects may represent simple “curios,” it is also possible they functioned as charms, similar to charmstones. I will include these artifacts in my spatial analysis of the site to see if any patterns emerge. In addition, there were 15 miscellaneous ethnobotanical remains and three unidentified artifacts also recovered from CA-MRN-216. I categorize the fossilized remains as “symbolic” for my GIS analysis, while the remainder of the “other” objects are categorized as “unknown.”

Sixteenth-Century Introduced Artifacts

There were a number of introduced sixteenth-century artifacts recovered from each of the sites that may be attributed to *San Agustín*, including Chinese blue-and-white export porcelain fragments from the Ming Dynasty, sixteenth-century earthenware and stoneware sherds, and iron fasteners from the galleon’s hull. I discuss these artifacts in detail in Chapter Eight as part of a detailed analysis of the porcelain, iron fasteners, and other introduced objects found in *tamá-l-húye*. The total numbers of sixteenth-century introduced artifacts from each site are shown in Figures 5.1-5.6.

Examining depth of recovery of sixteenth-century introduced artifacts from CA-MRN-232 to evaluate site stratigraphy, the introduced objects are analogous to other Late Period, Phase 2 artifacts, such as clamshell disk beads. The majority of porcelain fragments and iron fasteners with depth recorded were recovered from 0-12 in. (0-30 cm)(60 of 113 fragments, 53%). Another 45 (40%) were found in the 12-24 in. (30-61 cm) level, seven (6%) from the 24-36 in. (61-91 cm) level, and just one deeper than 36 in. (91 cm). This gives a mean depth of recovery of 13 in. (33 cm) and a median of 11 in. (28 cm). While sixteenth-century introduced artifacts were recovered from nearly all levels of the excavation, the focus was clearly in the upper levels, above the stratigraphic break separating Middle Period from Late Period artifacts. The six sixteenth-century introduced artifacts recovered from CA-MRN-242 and CA-MRN-271 show a similar pattern.

The sixteenth-century introduced artifacts at CA-MRN-307 also tended to be recovered from the upper levels of the site. Although the artifacts were recovered from all levels within the site, the four iron spikes with depth data recorded had a mean depth of recovery of 16 in. and a median of 18 in. (one was found in the 0-12 in. [0-30 cm] level and the other three in the 12-24 in. [30-61 cm] level). Porcelain had a 7 in. mean depth of recovery and 7 in. median depth of recovery (20 fragments recovered from 0-12 in. [0-30 cm], one fragment from 12-24 in. [30-61 cm], and one fragment from 24-36 in. [61-91 cm]). The majority of stoneware fragments, on the other hand, were recovered from the deeper strata of the site: the mean depth of recovery was 21 in. (53 cm) and the median was 19 in. (48 cm)(one fragment was recovered from 0-12 in. [0-30

cm], eleven fragments from 12-24 in. [30-61 cm], and four fragments from 24-36 in. [61-91 cm]). These data suggest there is internal stratification evident within the sixteenth-century artifact assemblage at CA-MRN-307. The stoneware fragments occur consistently deeper than the porcelain or iron fasteners, at the lowest levels of the site. It is also spatially separated from the rest of the assemblage (Meighan 2002:73). Meighan speculated this stratification may represent two separate depositional events (Meighan 1950b, 2002:73; Meighan and Heizer 1952), although I would not rule out natural site formation processes being responsible for the observed pattern.

At CA-MRN-216, a total of 132 sherds of sixteenth-century porcelain and earthenware were recovered from the 0-12 in. (0-30 cm) level, 79 from the 12-24 in. (30-61 cm) level, and 23 from 25-65 in. (63.5-165 cm) deep. This results in a mean depth of recovery of 13 in. (33 cm) and a median of 10.5 in. (27 cm). The remainder of the sherds did not have depth data associated with them. In this case, like the other sites, there is a clear tendency for sixteenth-century sherds to occur in the upper levels of the site.

At CA-MRN-298, however, a different trend is evident. At that site, combining data from both loci, a total of 105 sherds of sixteenth-century porcelain and earthenware were recovered from the 0-12 in. (0-30 cm) level, 111 from the 12-24 in. (30-61 cm) level, 90 between 25-62 in. (63.5-157 cm) in depth, while the remainder of the sherds did not have depth data associated with them. This results in a mean depth of recovery of 20 in. (51 cm) and a median of 18 in. (46 cm). In the case of CA-MRN-298, the trend is for more sixteenth-century artifacts to occur deeper in the site. This may reflect an occupation that focused more on the latter Late Period, towards the sixteenth-century, while CA-MRN-216 may have had a longer occupation. On the other hand, because of the severe disturbances at both sites in modern times, this trend may be an artifact of more recent site formation processes.

Historic Period Artifacts

The CA-MRN-232 and CA-MRN-242 assemblages have relatively few Historic Period artifacts (see Figures 5.1 and 5.2). In contrast, Historic Period artifacts are the largest class of artifacts recovered at CA-MRN-271 by Beardsley and his crew, and they also make up a substantial percentage of the CA-MRN-307 assemblage (see Figures 5.3 and 5.4). The Limantour Spit sites have relatively few Historic Period artifacts. For the purposes of my analysis, I divided the Historic Period material into four different categories, including metal, glass, ceramics, and other artifacts (Figures 5.35-5.39). I discuss each in more detail below.

Metal

The majority of the Historic Period artifacts from CA-MRN-232 (67 objects, or 69% of the assemblage) are metal objects, while at CA-MRN-242, all four Historic Period artifacts are metal. At CA-MRN-271, 10% of the Historic Period artifacts (15 objects) are metal objects. The majority of the Historic Period artifacts from CA-MRN-307 (99 objects, or 61% of the assemblage), CA-MRN-216 (122 objects, or 83% of the Historic Period assemblage), and CA-MRN-298 (131 objects, or 85% of the Historic Period assemblage) are metal objects. At CA-MRN-307, these objects are mostly unidentified iron fragments, along with iron nails and spikes (including seven large iron rods originally thought to be sixteenth-century, but later confirmed as modern). The archaeological record on Limantour Spit is known to be contaminated by a variety

Figure 5.35. Historic Period artifacts recovered from CA-MRN-232, 1940-1950 (n=97).

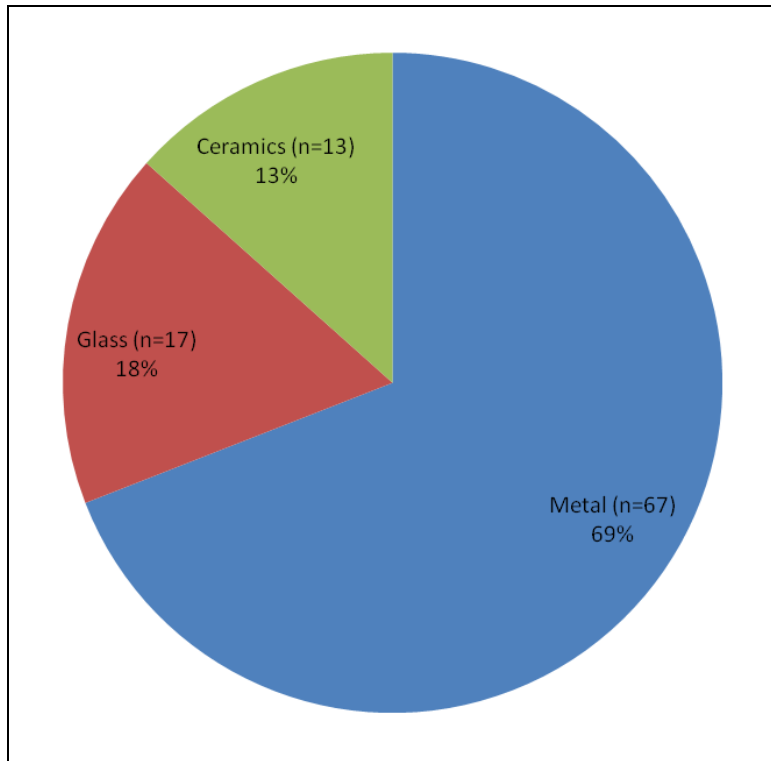


Figure 5.36. Historic Period artifacts recovered from CA-MRN-271, 1941 (n=146).

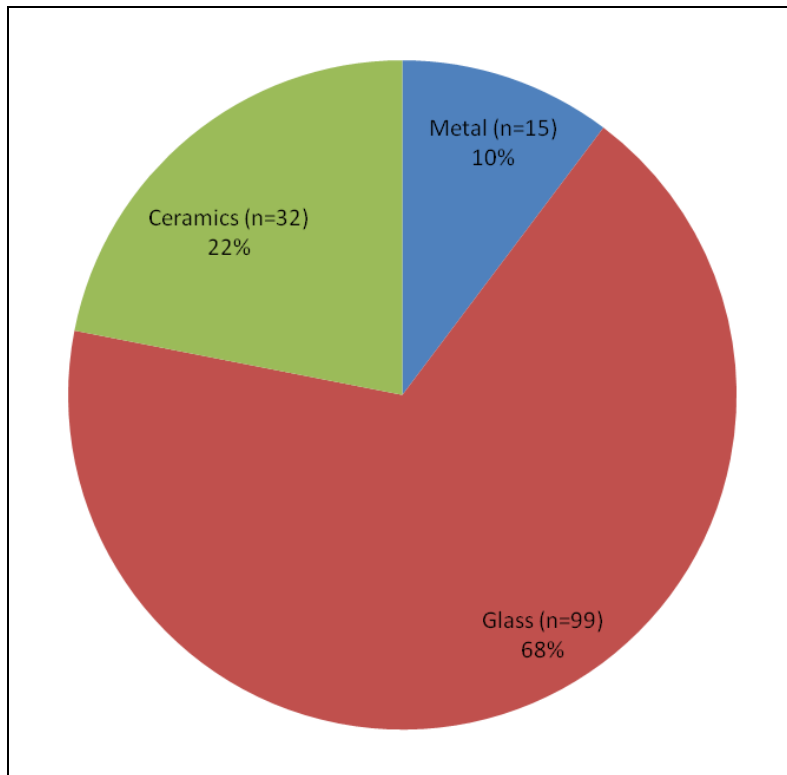


Figure 5.37. Historic Period artifacts recovered from CA-MRN-307, 1949-1951 (n=165).

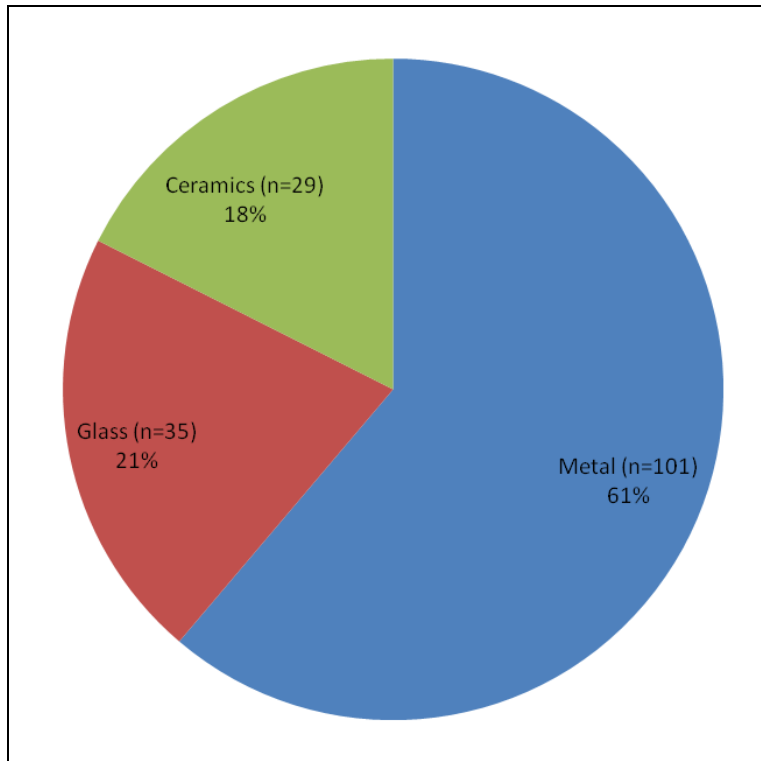


Figure 5.38. Historic Period artifacts recovered from CA-MRN-216, 1964-1967 (n=147).

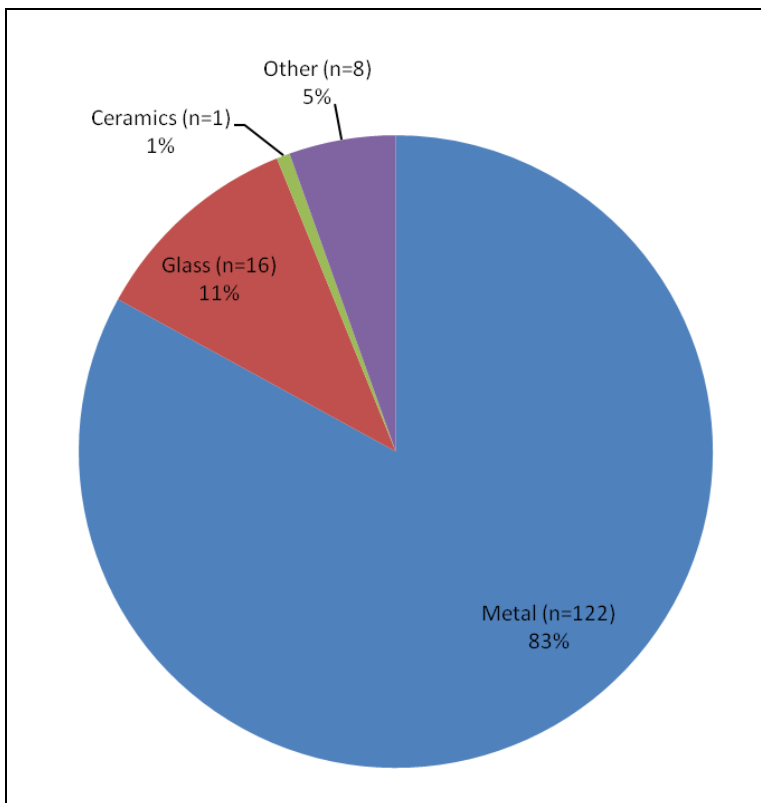
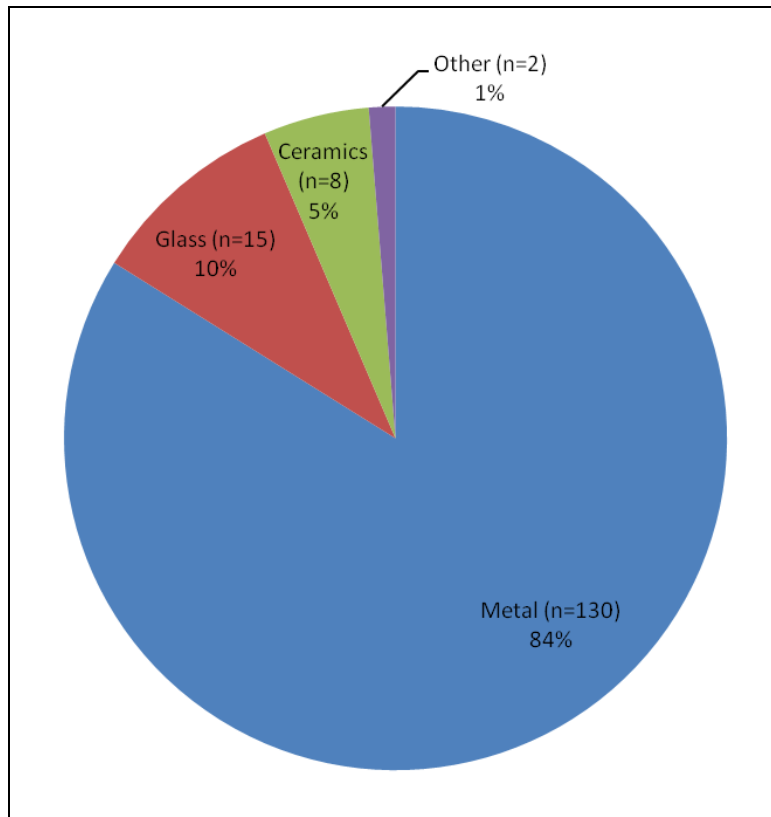


Figure 5.39. Historic Period artifacts recovered from CA-MRN-298, 1956-1973 (n=155).



of ferrous bomb fragments from military practice runs during World War Two, and most of the Historic Period objects at CA-MRN-216 and CA-MRN-298 are unidentified metal objects that are likely intrusive. This material was excavated from all levels at each site during field operations, including from seemingly undisturbed deposits (Treganza and King 1968:25). Interestingly, three unidentified copper or cupric (brass or bronze) fragments at CA-MRN-216 were associated with burials—possibly evidence for late-eighteenth or early-nineteenth century indigenous occupation (Treganza and King 1968:65-67).

Glass

At CA-MRN-232, there were 16 fragments of green and clear glass vessels, primarily bottles, and a single glass button fragment recovered, for a total of 17 glass fragments (19% of the assemblage). No glass was recovered from CA-MRN-242. The majority of the Historic Period artifacts from CA-MRN-271 (99 objects or 68% of the assemblage) are fragments of brown, green, and clear glass vessels, primarily bottles and jars. At CA-MRN-307, 35 glass fragments from various vessels, primarily bottles, were recovered (21% of the assemblage). At CA-MRN-216, there are 14 entries for glass vessel fragments recorded in the original artifact catalog that represent more than 50 individual shards, likely dating to the nineteenth or twentieth centuries. Of particular note, it appears that at least one of the nineteenth-century glass fragments has been flaked, possibly indicating Tamal occupation into the nineteenth century (Treganza and King 1968:69). There are also two glass bead entries from CA-MRN-216,

representing more than 100 fused glass trade beads recovered from Burial no. 12, which also most likely date to the Historic Period (see discussion of burials below)(Treganza and King 1968:67-68). There were 14 fragments of green and clear glass vessels, primarily bottles (9% of the assemblage), and a single glass bead (1%) recovered from CA-MRN-298.

Ceramics

Researchers recovered 13 Historic Period ceramic fragments from CA-MRN-232 (13% of the assemblage), including fragments of white-bodied, refined earthenwares (whiteware and ironstone) or possibly porcelain or another highly-vitrified ceramic, such as hotel ware; several fragments of dark-brown glazed, coarse earthenware; and three fragments of transfer-printed porcelain—there are also two ceramic fragments that could not be located in the PAHMA collection. At CA-MRN-271, Beardsley recovered 32 ceramic fragments (22% of the assemblage), primarily white-bodied, refined earthenwares (whiteware and ironstone) and possible porcelain or other highly vitrified ceramic, such as hotel ware, representing a number of vessel types (cups, plates, and bowls). Meighan excavated a total of 28 ceramic fragments from CA-MRN-307 (17% of the assemblage), including 12 fragments of white-bodied, refined earthenwares (whiteware or ironstone); ten fragments of porcelain; and six ceramic fragments that could not be located in the PAHMA collection and remain unidentified. The ten porcelain fragments are all from the same delicate, white bowl, with delicate hand-painted lines and dots along the rim. The Historic Period assemblage at CA-MRN-307 also includes a clay pipe stem fragment. At CA-MRN-216, an intact Japanese porcelain cup dating from the late-eighteenth century was found associated with Burial no. 12 (Treganza and King 1968:64), but no other Historic Period ceramics were identified. Finally, at CA-MRN-298 researchers recovered eight ceramic fragments (5% of the assemblage), including fragments of white-bodied, refined earthenwares (whiteware and ironstone) or possibly porcelain or another highly-vitrified ceramic, such as hotel ware. Seven of the ceramic fragments are from a single vessel. Heizer and Beardsley did not recover any Historic Period ceramics from CA-MRN-242.

Other Historic Period Artifacts

A number of “other” Historic Period artifacts were recovered by various researchers on Limantour Spit. At CA-MRN-216, five fragments of wax are likely associated with the World War Two practice rounds, which were sealed with wax, as is a single fragment of wax from CA-MRN-298 (Treganza and King 1968:67). Also at CA-MRN-216, two fragments of burned cloth are associated with Burial no. 5—the dating on the cloth is unclear, but they are likely from the twentieth century and therefore intrusive (Treganza and King 1968:67). A single cloth fragment was also recovered from CA-MRN-298, which is also likely intrusive. There was also a single knife handle, made of green-stained ivory and dating to the late-eighteenth or early-nineteenth century, recovered from CA-MRN-216 (Treganza and King 1968:66).

Few of the Historic Period artifacts from any of the sites can be precisely dated, and most have a wide-range of production dates, but the majority date from the late-nineteenth to mid-twentieth century. There are exceptions, such as the transfer-printed porcelain from CA-MRN-232 and the porcelain vessel from CA-MRN-307, and glass trade beads and a porcelain cup from CA-MRN-216. The transfer-printed porcelain from CA-MRN-232 could date from as early as the mid- to late-eighteenth century, but could also be nineteenth century. The porcelain from

CA-MRN-307 could date from as early as the mid- to late-eighteenth century, but could also be from the nineteenth century. The porcelain cup at CA-MRN-216 is late-eighteenth century, while the trade beads are likely early-mid nineteenth century.

Regarding recovery of Historic Period artifacts from CA-MRN-232, only seven of the 97 artifacts came from the site itself—the remaining 90 artifacts were collected from the beach below the site (although eight glass fragments have no location recorded). The artifacts recovered from the site include two glass fragments, two shotgun cartridge shells, a coarse earthenware fragment, a square nail, and an iron spike. Given the well-documented ranching and farming activities adjacent to (and possibly on) the site in the late-nineteenth and early-twentieth centuries, it is likely most of these artifacts are related to those activities, rather than Tamal site occupation. The latter, however, cannot be ruled out, as Tamal groups may have occupied some previous habitation sites beginning after secularization of the Spanish missions in the 1830s and lasting until the late-nineteenth century (Beardsley 1954a:18-19; Schneider 2009). A single green glass bottle base fragment is noted in the PAHMA catalog as “retouched,” but because it was found on the beach below the site, it is questionable whether it is actually retouched. Nonetheless, it remains a possibility and would constitute strong evidence that the site was occupied by California Indians in the Historic Period.

In general, the artifacts from the beach below CA-MRN-232 have questionable attribution to the site. While abundant material has eroded from the site onto the beach below, and continues to do so today, there is also the possibility that intrusive Historic Period material may have been introduced from elsewhere. Both iron and cupreous fasteners may have been embedded in timbers that could have washed ashore. In addition, historical maps and documents indicate the presence of a wharf or dock adjacent to CA-MRN-232 from at least 1860 (piling remnants are still extent in the water), and material found on the beach could be related to the deterioration of the wharf or the activities associated with its presence.

Similarly, during his 1934 survey of Point Reyes, Bryant wrote that the surface of CA-MRN-271 was well-picked over and that a picnic site was located on the mound (Bryant 1934a, 1934b). Since the majority of Historic Period artifacts (91%) are related to food or beverage storage and/or consumption, it is likely most of the late-nineteenth and early-twentieth century artifacts are related to picnics and the other recreational activities of the ranching family that owned the land at that time, rather than Tamal site occupation.

Likewise, given the well-documented ranching and farming activities adjacent to (and possibly on) CA-MRN-307 in the late-nineteenth and early-twentieth centuries, it is likely most of the Historic Period artifacts are related to those activities, rather than Tamal site occupation. The latter, however, cannot be ruled out. This is contrary to Meighan’s (2002:68) suggestion that sixteenth-century porcelain fragments found near the site’s surface means that the site was abandoned by the year 1600, although nearly all the porcelain-bearing sites at Point Reyes have had sixteenth-century material recovered from the surface due to rodent activity. I would suggest the Tamal people likely inhabited the sites at Point Reyes in the late-eighteenth century before Spanish proselytizing efforts reached their traditional territory (Milliken 1995:176). In addition, Coast Miwok-speaking groups may have occupied some previous habitation sites as places of refuge during the Spanish Mission Period or beginning after secularization of the Spanish missions in the 1830s and lasting until the late-nineteenth century (Beardsley 1954a:18-19; Schneider 2009). The possible eighteenth-century porcelain vessel recovered from CA-MRN-307, along with a possible Historic Period *Olivella* shell bead, supports this possibility.

Finally, given the well-documented ranching and farming activities near CA-MRN-216 and CA-MRN-298 on the mainland in the late-nineteenth and early-twentieth centuries, it is likely most of the Historic Period artifacts are related to those activities, or to mid-twentieth century military activities, rather than Tamal site occupation into the late-nineteenth century. The latter, however, is likely for the late-eighteenth and early-nineteenth century material, and even the later material association with indigenous occupation cannot be ruled out.

BURIALS

Burials were excavated at each of the sites in this study, including both inhumations and cremations. There was a great range of variability in terms of material culture associated with the burials. At the request of the Federated Indians of Graton Rancheria, I did not examine human remains that are still in the collection at the PAHMA, nor did I examine associated funerary objects (although I did include them in the present analysis based on documentation from the original excavations). In general, introduced sixteenth-century artifacts were not recovered from burials in any quantity, and the few examples that were found with burials may have been only inadvertently associated. In this section, I briefly review the burials from each of the sites under study here.

University of California researchers excavated a total of 16 human burials from CA-MRN-232 between 1940 and 1949. Heizer and Beardsley excavated ten inhumations and three cremations in 1940-1941, while Meighan excavated two inhumations and a single cremation during the 1949 fieldwork. Based on the depth of deposit, whether the burial was located below the whole shell layer, the quality of the midden from which the burial was recovered, and the presence of temporally diagnostic artifacts, Beardsley and Meighan attributed the burials to either the Middle or Late Periods (Beardsley 1946c). Five of the inhumations were attributed to the Middle Period, while seven inhumations and all four cremations were assigned to the Late Period.

Middle Period burials at CA-MRN-232 were found from 25 to 42 in. (63.5 to 107 cm) deep, within a heavy midden matrix mixed with clay from the base of the site. All burials were adult individuals, and were buried in either a loose or tight flex, on either the right or left side. Two of the individuals had their heads oriented to the west, two to the southwest, and one to the south. One of the burials had numerous artifacts in association, including 266 obsidian prisms (discussed above), eight *Olivella* shell beads, a charmstone fragment, and red ochre. A second Middle Period burial had a single *Haliotis* ornament associated with it. The other three burials did not have any associated artifacts.

The Late Period burials at CA-MRN-232 varied in depth from 11 to 30 in. (28 to 76 cm) deep. They represent five adults and one infant, and all except the infant were buried in a tight flex. Burials varied from right side, left side, and back. Two of the individuals had their head oriented to the northwest, one to the west, two to the south, and one to the east. All Late Period burials were recovered from a matrix of loose, ashy black midden mixed with shell. None of the adult burials had associated artifacts, although the infant was buried with *Saxidomus* clamshell disk beads, a pestle, and possibly a small iron fastener possibly from *San Agustín*—although Beardsley speculated the association may have been accidental and due to bioturbation (Beardsley 1946c).

The four cremations from CA-MRN-232, all attributed to the Late Period, were recovered from 23 to 32 in. (58 to 81 cm) deep, and all were embedded in the same loose, ashy black

midden matrix mixed with shell as the Late Period inhumations. Three of the four cremations had associated artifacts, while the fourth (excavated by Meighan in 1949) did not. Artifacts included an obsidian point fragment, *Saxidomus* clamshell disk beads, and unmodified stones or pebbles.

It is unknown why the Late Period is characterized by two primary burial modes (inhumations and cremations) seemingly taking place at the same time and at the same sites. Nor is it understood why cremations consistently tend to have more and varied artifacts associated with them, although it may imply status differentiation (Treganza and King 1968:39). Nearly all the burials are oriented between the south and northwest, a tendency that Beardsley (1954a:28) notes is common in coastal sites. This westerly orientation may be related to the ethnographic belief among Coast Miwok-speaking groups and Southern Pomo peoples that Point Reyes was the stepping off point for the land of the dead in the west, across the ocean (see Chapter Three for more detail on this notion)(Beardsley 1954a:28; Heizer 1947:277). Treganza and King (1968:39) found a similar variation of burial orientation between northwest and south at CA-MRN-216 and CA-MRN-298 (both sites are located within sight of CA-MRN-232, just to the southeast across the Estero de Limantour on Limantour Spit). They suggest that the confusing orientation of the coast in Drakes Bay, with the beach actually south-facing rather than west-facing, may account for the variation in burial orientation.

Heizer and Beardsley excavated a total of 33 human burials from CA-MRN-242 in 1940-1941, including twelve inhumations and four cremations in 1940, and fourteen inhumations and three cremations in 1941. Again based on factors such as depth of deposit, whether the burial was located below the whole shell layer, the quality of the midden from which the burial was recovered, and the presence of temporally diagnostic artifacts, Beardsley attributed the burials to either the Middle or Late Periods (Beardsley 1946c). He attributed seven inhumations to the Middle Period, and nineteen inhumations and all seven cremations to the Late Period.

Middle Period burials at CA-MRN-242 were found from 23 to 33 in. (58 to 84 cm) deep, within a heavy midden matrix mixed with clay from the base of the site. All burials were adult or adolescent individuals, and were buried in either a loose or tight flex, on the left side (except for one individual who was facedown). Two of the individuals had their heads oriented to the northwest, and one each to the east, northeast, and southeast. Four of the burials had associated funerary objects: one had an obsidian point and bone awl, another had 63 Type G3 *Olivella* shell beads, a third had a pestle fragment, and the last had 210 Type F3a *Olivella* shell beads and an obsidian point fragment. The remaining three Middle Period burials did not have any associated artifacts.

The Late Period burials at CA-MRN-242 varied in depth from 9 to 36 in. (23 to 91 cm) deep. They represent adults, adolescents, and one infant, and all except the infant were buried in a loose or tight flex, on the right or left side. Most individual's had their heads oriented to the northwest, southwest, or west, although two were oriented northeast, one to the east, and one to the south. All Late Period burials were recovered from a matrix of loose, ashy black midden mixed with shell. Twelve of the 18 of the adult burials had associated artifacts, along with the single infant, who was buried with ten *Olivella* Type A, B1, or B2 beads. Adult associated funerary objects included obsidian points and point fragments, bone tools and beads, *Saxidomus* clamshell disk beads, *Olivella* beads (Type K1), a charmstone (Type III), net weights, and pestles and pestle fragments. One burial had a small iron spike possibly from *San Agustín* in association, although again Beardsley noted the association may have been accidental and due to rodent disturbance (Beardsley 1946c).

The seven cremations from CA-MRN-242, all attributed to the Late Period, were recovered from 10 to 30 in. (25 to 76 cm) deep, and all except one were embedded in the same loose, ashy black midden matrix mixed with shell as the Late Period inhumations—the last was in the heavy midden matrix found in lower levels of the site. All seven of the cremations had associated funerary objects, including obsidian point or point fragments, bifaces, bone tools and beads, *Saxidomus* clamshell disk beads, *Olivella* beads (Types E1-3 and K1), a steatite bead, charmstones (Type IIA and V), mortars and mortar fragments, a pestle, a fossilized shark tooth, an abalone pendant or fragment, and a quartz crystal. None of the cremations had introduced sixteenth-century artifacts associated with them.

Beardsley excavated a single burial at CA-MRN-271, in the northern part of the site at a depth of 15 in. (38 cm). The adult male individual was tightly flexed and was buried with his head oriented towards the northwest, a burial mode found in both Middle and Late Period contexts. A single fragment of Historic Period ceramic was found at the same depth in possible association, although Beardsley noted the association was likely accidental (Beardsley 1941a). I agree this is most likely the case since the ceramic fragment is not contemporaneous with Tamal occupation of the site, but is more likely from later picnicking or other recreational activities.

Meighan and his crew excavated a single burial from CA-MRN-307 in April 1951. Little information is available about the burial, other than it consisted of one adult female interred in a flexed position, in very poor condition, with no associated funerary objects (Meighan 2002:73). A single porcelain fragment was located 6 in. (15 cm) below the burial, which could indicate that Tamal individuals occupied the site for a time after the sixteenth-century encounters at *tamál-húye*.

SFSC researchers recovered seven inhumations and five cremations at CA-MRN-216 (Treganza and King 1968:31-35). The inhumations were all flexed and positioned on either their left or right sides, and were oriented south, southwest, and west. Five of the inhumations had associated funerary objects, including flaked stone artifacts, worked shell artifacts, faunal remains, and pigment. One individual had a corner-notched obsidian point embedded in the proximal end of the left tibia (Treganza and King 1968:32). The five cremations had much more extensive artifactual remains associated with them than the inhumations—this is summarized by Treganza and King (1968:33-35). Of particular note, two of the cremations had Historic Period artifacts in association—one had a copper fragment and a carbonized textile fragment, while the other (Burial no. 12) had an intact eighteenth-century Japanese porcelain cup, copper fragments, and glass trade beads. Other burials from the region that contain glass trade beads all date to the mid-nineteenth century (Beardsley 1954a:43), and this one likely does as well. Interestingly, however, Burial no. 12 also had two fragments of sixteenth-century Chinese porcelain likely from the *San Agustín* in association. This is the only burial from any of the sites that has introduced sixteenth-century material in direct (intentional) association, although the other associated objects suggests the burial itself is much later than the sixteenth-century encounters at *tamál-húye*.

Finally, Treganza excavated a single inhumation from CA-MRN-298 (from the western locus, CA-MRN-298W) in 1959. Little information is available about the burial, other than it contained a single adult male in a “good state of preservation” interred flexed on its right side in sterile deposits below the midden. No associated funerary objects were found with the burial (Treganza 1959:16; Treganza and King 1968:32). In addition, a single cremation was excavated from the site in February 1967, again from CA-MRN-298W. The cremation was found in a compact, charcoal-filled pit measuring about 36 in. (91 cm) across and 19 in. (48 cm) deep. A

number of artifacts were found in the vicinity of the cremation, including three clamshell disk beads and 32 ornately incised bird-bone tube fragments, possibly representing at least two separate artifacts. Size of the pit and human cranium fragments suggests the cremated individual was a youth (Treganza and King 1968:35-37). No burials were encountered while excavating CA-MRN-298E.

SITE FEATURES

An examination of site features as they relate to the artifact assemblages, especially introduced sixteenth-century artifacts from *San Agustín*, is a key component of my intra-site spatial analysis of the six sites that form the core of this study. A number of features were recorded during excavations at each site, but in general, features at the Limantour Spit sites excavated during the 1960s (CA-MRN-216 and CA-MRN-298) are much better documented than features from the sites investigated earlier by University of California researchers. This likely reflects a shift in archaeological practice between the 1940s and the 1960s, with more emphasis on developing artifact typologies for chronological purposes during the earlier work and a shift to greater focus on cultural behavior during the 1960s, as well as the greater areal excavations that took place later.

Other than burials, the primary features documented by Heizer and Beardsley during their 1940-1941 excavations at CA-MRN-232 and CA-MRN-242 were “whole-shell layers” within a distinct lower stratigraphic level (Level I), which likely represents a Middle Period (2500 to 1000 B.P.) occupation layer. The whole-shell layer is “made up of whole or very nearly whole clam shells thickly bedded together in a hard soil matrix” (Beardsley 1954a:22). The whole-shell layer appears to “cap” the lower level at each site, which is characterized by a relatively sterile soil horizon. At CA-MRN-232, the whole-shell layer is approximately 18 in. (45 cm) thick at the bluff edge that forms the western edge of the site, and it thins as it moves inland. The CA-MRN-242 whole-shell layer is about 6 in. (30 cm) thick at its thickest point. These features are much earlier, and therefore completely unrelated, to the encounters at *tamál-húye*.

Other features recorded at CA-MRN-232 and CA-MRN-242 included hearths, beds of burned shell or “basin-shaped structures of baked earth” used for steaming, but specific locations were not recorded (Beardsley 1954a:30). Likewise, Meighan observed four hearth features at CA-MRN-307, accumulations of burned stones 15-28 in. (38-71 cm) in diameter, but locations within the site were not among the published or unpublished site documents I examined. Three of the hearths were observed near bottom of midden between 29-39 in. (74-99 cm) in depth, while the fourth was 12 in. (30 cm) deep (Meighan 2002:72).

No evidence of floors or other features that would suggest structures were recorded at any of the sites excavated by University of California researchers, although a slight clustering of sixteenth-century iron fasteners (probably once embedded in ship’s planks) in two areas at CA-MRN-232, each 20-25 ft. (6-8 m) in diameter may suggest that structures were once present in those areas (Beardsley 1954a:56). Beardsley also recorded two caches of *in situ*, broken mortars at CA-MRN-271, one of which was adjacent to the single burial excavated from the site. Neither had other artifacts associated with them (Beardsley 1941e, 1946a, 1946c), although the location of one of them was recorded and I include it in my GIS analysis presented in Chapter Seven.

Researchers excavating the sites on Limantour Spit recorded a greater variety of features at those sites than at the mainland sites (see Figures 4.8 and 4.10). Investigators from SFSC, SRJC, and DNG recorded locations and dimensions of these features, and I include them in the

GIS analysis presented in Chapter Seven. Features include a number of discrete, well-defined hearths associated with fire-cracked rock and burned bones at CA-MRN-216, and several less well-organized and defined hearths at CA-MRN-298 (Treganza and King 1968:26). Researchers also recorded a large hearth feature at CA-MRN-216, which consisted of a charcoal lens and fire-cracked rock associated with burned and unburned mammal, bird, and fish bones. Also associated with this feature were several concentrations of asphaltum, including a *Protothaeca staminea* shell filled with asphaltum (Treganza and King 1968:28-29).

Possible evidence of structures was located at both sites. SFSC investigators observed two shallow depressions thought to be possible housepits at CA-MRN-216 at the beginning of investigations. Excavation of one revealed no features associated with a structure, while the other had a poorly-defined, crushed-shell floor and a central hearth (Treganza and King 1968:26). Several possible crushed, compacted shell floors were also identified at CA-MRN-298E, but only one could be traced beyond a single unit to define a possible structure that was 10-12 ft. (3.0-3.7 m) in diameter. An additional packed clay and crushed shell floor was identified at CA-MRN-298W (Treganza and King 1968:26).

Numerous pit features were recorded at the sites. Two were uncovered at CA-MRN-216, one large and deep, with a variety of associated artifacts, including a chalcedony bivalve fossil (which looks similar to a *Protothaeca staminea* [Pacific Littleneck clam]); the other filled with fire-cracked rocks, including broken mortar fragments, indicating it was likely used for cooking. Four pits were recorded at CA-MRN-298E, clustered at the eastern edge of the site, ranging in size from 12-36 in. (30-91 cm). Two contained ash lenses, while a third included a cluster of complete *Saxidomus* valves covering an assortment of mammal bone fragments. Researchers also recorded three “dugouts,” or shallow pits, at CA-MRN-298E, near western edge of site (Treganza and King 1968:27-28).

Investigators recorded several large shell lenses, primarily *Saxidomus*, at CA-MRN-216, as well as a number of bone concentrations associated with hearth remains. At CA-MRN-298, an 8 in. (20 cm)-thick *Saxidomus* lens was recorded at CA-MRN-298W, adjacent to and at the same level as the possible house floor. In addition, another crushed shell lens, a *Mytilus californiacus* shell concentration, and a cache of *Haliotis rufescens* valves were also recorded at CA-MRN-298W. There were also several concentrations of hydrocarbon found at CA-MRN-216, a cluster of 88 clamshell disk beads approximately 10 in. (25 cm) from Burial 11, and a cluster of chert primary cores also recorded at the site (Treganza and King 1968:27-30).

Finally, although there were a large number of artifacts associated with clamshell disk bead manufacture recovered throughout the site, in general, there were several distinct features at CA-MRN-216 that researchers characterized as “bead workshops” – concentrations of associated *Saxidomus* shell fragments, grinding stones, beads, and flaked stone drills. In addition, another “workshop” feature was recorded at the western edge of CA-MRN-298E, which also included a dense concentration of clamshell disk beads, blanks, and flaked stone drills (Treganza and King 1968:29).

FAUNAL SHELL AND BONE

Recovery of faunal material varied considerably between sites, and published data from the faunal remains are few. In addition, few of the faunal remains have specific provenience associated with them, so I generally do not include them in my GIS analysis presented in Chapter Seven. Detailed analysis of faunal remains from the sites is beyond the scope of my project, but

I briefly summarize the data available in this section without undertaking a detailed examination of all faunal remains.

Researchers recovered more than 3,750 faunal specimens from CA-MRN-232 from 1940 to 1950, including shellfish remains and mammal, bird, and fish bones. There has been limited identification conducted on faunal bone and shell recovered from CA-MRN-232—most of the catalog numbers are simply recorded as unmodified animal bone. Similarly, Heizer and Beardsly recovered more than 690 faunal specimens from CA-MRN-242 in 1940-1941, which are cataloged in nearly 30 separate catalog numbers in the PAHMA. Faunal material from CA-MRN-232 and CA-MRN-242 generally lacks good provenience—none of the specimens have specific provenience recorded, although most are located by unit and 6 in. (15 cm) depth level. At CA-MRN-271, locations of none of the shell specimens were recorded, and only 30 of 219 animal bone specimens were given any locational data (12 bird bones have point provenience recorded, and 16 mammal bones and two mammal teeth were recorded to the nearest section).

At least 4,340 faunal specimens were recovered from CA-MRN-307, which are cataloged in nearly 550 separate catalog records in the PAHMA. Most of the catalog numbers are simply listed as unmodified animal bone, provenienced by unit and 12 in. (30 cm) depth level. Meighan (2002) summarized faunal analyses from the site, reporting that excavators recovered a wide variety of shellfish, and more than 500 bird bones, 192 mammal bones, and 66 fish bones from the site—he notes, however, that the majority of the faunal bone assemblage is too small to identify. By number, bird bones comprise 79.4% of the vertebrate assemblage, mammal bones comprise 18.6%, and fish comprise just 1.8%. Although Meighan acknowledged that number of preserved bones does not directly equate to meat weight, his analysis suggests that villagers relied heavily on bird resources (Meighan 2002:69).

Faunal remains are not included in the artifact catalogs from CA-MRN-216 and CA-MRN-298, and there has been limited data published from the sites. Henn (1970) reported that shellfish remains dominate the faunal assemblage at CA-MRN-216, with mammal, bird, and fish representing just 4% of the faunal remains. Similarly, at CA-MRN-298, Wilson (1970) summarized results from an examination of shellfish remains, but stated only that mammal, bird, and fish remains constituted less than 5% of the total faunal assemblage.

Shellfish Remains

The PAHMA artifact catalog lists just 78 shell samples from CA-MRN-232, 39 shell samples from CA-MRN-242, and four bulk shell samples from CA-MRN-271 (Table 5.1). These samples are only a small fraction of shellfish remains on the sites—shell remains litter the sites to the present, but a detailed analysis of prehistoric subsistence has not been conducted at any of these sites.

Meighan reported that overall at CA-MRN-307, shellfish species such as *Saxidomus nuttalli* (Washington clam) and unspecified *Cancer* sp. (crab), found in the local estuarine setting and easily collected from broad mudflats surrounding the site, predominate the CA-MRN-307 assemblage. He speculated that shellfish may account for not more than 25% of food consumed by Tamal villagers at the site (Meighan 2002:69). The PAHMA artifact catalog lists just 35 shell samples from CA-MRN-307 (see Table 5.1). In addition to shellfish remains recovered during Meighan's excavations, Greengo (1951) sampled CA-MRN-307 in 1950 as part of a larger study of molluscan species found in California shell middens—he found a number of additional species represented (see Table 5.1)(Greengo 1951:29). Greengo commented that the high

Table 5.1. Shellfish species identified at each site.

	CA-MRN- 232	CA-MRN- 242	CA-MRN- 271	CA-MRN- 307	CA-MRN- 216	CA-MRN- 298
<i>Saxidomus nuttalli</i> (Washington clam)	X	X	X	X	X	X
<i>Tresus nuttallii</i> (formerly <i>Schizothaerus nuttallii</i> , Long-neck clam)	X	X	X	X	X	X
<i>Cryptochiton stelleri</i> (Giant chiton or Gumboot)	X	X	X		X	X
<i>Thais canaliculata</i> (Channeled dogwinkle)	X	X	X			
<i>Thais</i> sp. (unidentified dogwinkle)				X		
<i>Olivella biplicata</i> (Purple olive snail)	X		X	X		
<i>Mytilus edulis</i> (actually likely <i>Mytilus trossulus</i> , Bay mussel)	X	X		X		
<i>Mytilus californianus</i> (California mussel)	X			X		X
<i>Mytilus</i> sp. (unidentified mussel)					X	
<i>Cinocardium nuttallii</i> (Nuttall's cockle)	X	X		X	X	X
<i>Macoma nasuta</i> (Bent-nose clam)	X	X		X	X	X
<i>Macoma secta</i> (Sand clam)					X	X
<i>Protothaca staminea</i> (Pacific littleneck clam)	X	X		X	X	X
<i>Nassarius fossatus</i> (Channeled basket or dog whelk)	X	X				
<i>Euspira</i> (formerly <i>Polinices</i>) <i>lewisii</i> (Lewis' moon snail)	X	X		X	X	X
<i>Haliotis rufescens</i> (Red abalone)		X				
<i>Haliotis</i> sp. (unidentified abalone)					X	
<i>Ostrea lurida</i> (Native oyster)		X				
<i>Cancer</i> sp. (unidentified crab)	X	X		X		X
<i>Littorina</i> sp. (unidentified periwinkle)				X		
<i>Balanus</i> sp. (unidentified barnacle)				X		X
<i>Siliqua patula</i> (Pacific razor clam)					X	X
<i>Helix</i> sp.						X
<i>Cerithidea californica</i> (California horn snail)						X
<i>Penitella penita</i> (Flat-topped piddock)						X
<i>Amphissa versicolor</i> (Variegated amphissa)						X
Land snail				X	X	

proportion of crab remains recovered (20.4%) was by far the most of any California site he had investigated, and that mussels had lower proportions than most other sites (Greengo 1951:10).

Henn (1970) summarized results of shellfish studies from CA-MRN-216, and I include the species he identified in Table 5.1. His findings suggest that *Saxidomus nuttalli* (Washington clam) and *Protothaca staminea* (Pacific Littleneck clam) were the two most common shellfish found at the site. The lowest levels of CA-MRN-216 have *Saxidomus* dominating the faunal assemblage, in numbers more than three times greater than *Protothaca*. In the upper levels of the site, the numbers are approximately equal. This observation may have implications for the Tamal's changing use of resources over time, although the stratigraphic integrity of the site is uncertain. At CA-MRN-298, Wilson (1970) summarized shellfish data, which I also include in Table 5.1. Wilson's observations followed very closely those of Henn for CA-MRN-216.

Mammal Remains

A number of the mammal bones from the sites have been preliminarily identified, but the majority remain unidentified. A student project as part of a U.C. Berkeley paleontology course in the mid-1940s identified 159 of the faunal specimens from CA-MRN-232, 20 of the specimens from CA-MRN-242, and 68 of the CA-MRN-271 specimens (Table 5.2)(Thompson 1946). Of the 192 mammal bones recovered from CA-MRN-307, 68 could be identified—78% of these were terrestrial species, while 22% were sea mammals (see Table 5.2). At CA-MRN-216, species were identified by presence only, so there is no data available for relative quantitative analysis, although mammal bones constituted just 1.7% of the overall faunal assemblage (Henn 1970). From the limited data available, it appears that marine mammals dominated the assemblages at CA-MRN-232, CA-MRN-242, and CA-MRN-271, while CA-MRN-307 had a more terrestrial focus. There is no data available regarding mammal remains from CA-MRN-298 (Wilson 1970).

Fish Remains

In 1946, Beardsley also had a number of fish specimens from CA-MRN-232 and CA-MRN-242 identified by William I. Follett at the California Academy of Sciences (Beardsley 1941e). Follett also identified 64 fish specimens recovered by Meighan at CA-MRN-307 between April 1950 and February 1951. Follett's results revealed that at least six different fish species were represented at CA-MRN-307, with slightly fewer numbers at CA-MRN-232 and CA-MRN-242 (Table 5.3). Follett observed that all species were likely common to the shallow, mud-bottomed estuaries near CA-MRN-307 throughout the year, and they would likely be readily captured by hook and line or by net (Follett 1964). Similar results were found at CA-MRN-216, where marine fishes constituted just 1.3% of the total faunal remains recovered from the site by weight (see Table 5.3)(Henn 1970). There is no data available regarding fish remains from CA-MRN-271 or CA-MRN-298.

Interestingly, Follett also speculated that the absence of *Myliobatis californica* (Bat stingray) from the assemblage, which is commonly found in other Bay Area sites, indicates possible winter habitation for CA-MRN-307, as the Bat stingray is found in the estuaries seasonally except in winter. He also noted that Bat stingray remains were absent from the CA-MRN-232 and CA-MRN-242 assemblages, as well (Follett 1964:34), and Henn (1970) draws the same conclusion at CA-MRN-216.

Table 5.2. Mammal species identified at each site.

	<u>CA-MRN-232</u>	<u>CA-MRN-242</u>	<u>CA-MRN-271</u>	<u>CA-MRN-307</u>	<u>CA-MRN-216</u>	<u>CA-MRN-298</u>
<i>Enhydra lutris</i> (Sea otter)	66	10	8	8	X	
<i>Zalophus californianus</i> (California sea lion) or <i>Eumetopias jubatus</i> (Steller sea lion)	48	2	54	3	X	
<i>Phoca vitulina</i> (Harbor seal)	27	4	4	4	X	
<i>Callorhinus ursinus</i> (Northern Fur seal)	10	1	1			
<i>Taxidea taxus</i> (American badger)	8	3	1		X	
<i>Odocoileus columbianus</i> (Black-tailed deer)				43		No data available
<i>Odocoileus hemionus</i> (Mule deer)					X	
<i>Sylvilagus</i> sp. (rabbit)				4		
<i>Cervus</i> sp. (elk)				4	X	
<i>Lepus</i> (?) sp. (hare or jackrabbit)				1		
<i>Thomomys</i> sp. (Pocket gopher)				1	X	
<i>Canis</i> sp. (dog, coyote, or wolf)					X	

Table 5.3. Fish species identified at each site.

	<u>CA-MRN-232</u>	<u>CA-MRN-242</u>	<u>CA-MRN-271</u>	<u>CA-MRN-307</u>	<u>CA-MRN-216</u>	<u>CA-MRN-298</u>
<i>Triakis semifasciata</i> (Leopard shark)	X	X		X		
<i>Rhacochilus toxotes</i> (Rubberlip surfperch)	X	X		X	X	
<i>Embiotoca jacksoni</i> (Black perch)	X	X		X	X	
<i>Damalichthys vacca</i> (Pile perch)	X	X		X	X	
<i>Taeniofoca lateralis</i> (Striped surfperch)	X					No data available
<i>Platichthys stellatus rugosus</i> (<i>Southern starry flounder</i>)				X		
<i>Hyperprosopon argenteum</i> (Walleye surfperch)				X		
<i>Leptocottus armatus</i> (Staghorn sculpin)					X	

Bird Remains

In addition to shellfish remains and mammal and fish bone, the PAHMA catalog also lists 518 specimens of unmodified bird bone from CA-MRN-232 and 363 specimens from CA-MRN-242. The twelve bird bones recovered during Beardsley's 1941 excavation at CA-MRN-271 remain unidentified. Meighan identified at least 22 bird species represented in the CA-MRN-307 faunal bird bone assemblage, including a variety of terrestrial, estuarine, shore, and sea birds. He found that 80% of the assemblage was comprised of anserine species (ducks and geese)(Meighan 2002:70). All would have been locally available on and around the Point Reyes Peninsula. At CA-MRN-216, Henn found that avifauna constituted just 1.1% of the faunal assemblage by weight, but only *Chen hyperboreus* (snow goose) has been specifically identified. There is no data available regarding bird remains from CA-MRN-298 (Wilson 1970).

CONCLUSION

Excavations around *tamál-húye* by various researchers between 1940 and 1973 have left a rich archaeological record, including extensive museum collections and archival holdings of primary source documents about the investigations. In this chapter, I have summarized and analyzed the artifact assemblages, features, and faunal remains from CA-MRN-232, CA-MRN-242, CA-MRN-271, CA-MRN-307, CA-MRN-216, and CA-MRN-298 to provide a broad context for my investigation into the encounters at *tamál-húye*. This discussion situates the introduced sixteenth-century artifacts within a broader cultural framework, and provides a foundation for my intra-site GIS analysis, which is the subject of Chapter Seven.

CHAPTER SIX

PREVIOUS EXCAVATION METHODOLOGIES AND GEOGRAPHIC INFORMATION SYSTEM (GIS) RECONSTRUCTION

INTRODUCTION

In this chapter I analyze excavation methodologies of previous investigators working at *tamál-húye* during the 1940s to 1970s, and I discuss the implications of these various methodologies for my Geographic Information System (GIS) reconstructions of the excavations at CA-MRN-232, CA-MRN-242, CA-MRN-271, CA-MRN-307, CA-MRN-216, and CA-MRN-298. I then detail the methods I used to incorporate the original excavation material into a GIS project to be used for exploratory spatial data analysis (ESDA).

In general, I reconstructed Heizer, Beardsley, and Meighans's CA-MRN-232, CA-MRN-242, CA-MRN-271, and CA-MRN-307 excavations, and the San Francisco State College (SFSC), Santa Rosa Junior College (SRJC), and Drake Navigators Guild (DNG) CA-MRN-216 and CA-MRN-298 excavations in a GIS by utilizing published reports, original excavation maps and notes, and provenience information taken from artifact inventories located in the Phoebe A. Hearst Museum of Anthropology [PAHMA] and Point Reyes National Seashore Museum and Archive. By combining this primary documentation with a series of assumptions related to standard archaeological practice at the time, and high-resolution mapping of the sites as part of this project, I was able to reconstruct original excavation units and plot artifacts and features with considerable accuracy. This allows me to conduct a series of analyses about intra-site spatial patterning, which is presented in Chapter Seven.

EXCAVATION METHODOLOGIES

University of California Excavation Methods, 1940-1941

Although there are few details specifically recorded about the excavations Robert Heizer and Richard Beardsley directed at CA-MRN-232, CA-MRN-242, and CA-MRN-271 in 1940-1941, standard archaeological practice used by the University of California Archaeological Survey can illuminate much about the likely excavation methods used. Using standard procedures practiced by University of California archaeologists at the time (see Heizer 1949c), the excavators likely excavated each 5 ft. (1.5 m) unit or 10 ft. (3 m) section in arbitrary 12 in. (30 cm) levels (this is verified by examining recorded depth information for each artifact) using a long-handled, round-point standard no. 2 excavating shovel. Excavation would likely have proceeded using the "shovel broadcast" method, which included spreading-out each shovel-full of soil and examining for artifacts. Trowels may have been used for more detailed excavation around burials or other features.

It was acceptable practice at the time to judgmentally screen soil from only portions of an excavated site, for example when large quantities of artifacts were encountered, when very small artifacts were likely, or when soil was associated with burials or other features. "Occasionally," wrote Heizer, "when time permits, all excavated deposit is screened" (Heizer 1949c:23). During the excavation at CA-MRN-271, for example, Beardsley noted that they screened all excavated soil from the first 12 in. (30 cm) level, and "a good portion" from the next 12 in. (30 cm) level

(Beardsley 1941a). Later tests by Meighan (1950c) indicate that careful excavation without screens could miss up to 25% of artifacts, especially smaller ones. Because Heizer and Beardsley's objective was to locate historical material, especially Chinese porcelain fragments, he and his crew undoubtedly excavated the deposit carefully, but they still probably missed some material. Even when they did screen excavated deposits, they likely used ½ in. (1.27 cm) screens, which would have contributed to loss of even more small materials.

Artifact provenience recording methodology may also have an effect on the accuracy of the final site plan. During Heizer and Beardsley's excavations, they did not create an artifact catalog in the field. Instead, they delivered artifacts and faunal remains to the University of California Anthropology Museum for cataloging by museum staff. Artifacts were paired with an artifact slip that included site, date, and location/depth. The general accumulation of faunal remains was sorted at the museum, and occasional artifacts (lithics, cut bird bone, etc.) were cataloged separately. The excavators also delivered burial and cremation cards, survey cards, and site maps for each site to the museum for cataloging (Beardsley 1941e).

Finally, in addition to excavation methods and screening practice, the overall research design may have impacted how artifacts and features were recorded in the field. Since Heizer and Beardsley were focused on locating sixteenth-century introduced artifacts and burials (e.g. Heizer 1949c:25), it is possible they may have been biased regarding which artifact-types they recorded with point provenience and which were given more general lot provenience—this possibility is addressed later in the chapter.

At CA-MRN-232, Heizer and Beardsley aligned their 1940-1941 excavation along an arbitrary “trench north,” which Heizer indicated was oriented 20° west of north (Heizer 1940a:6). The initial excavation trench (Trench A) was 6 ft. (1.8 m) wide and 70 ft. (21 m) long, divided into 10-ft. (3 m) sections (Sect. 1N, 2N, 1S, etc) (Heizer 1940a:6), although none of the subsequent trenches were similarly sub-divided. They established Datum A on the southwest corner of Trench A, Section 1N, between Section 1N and Section 1S. Datum A was used to measure artifact locations throughout the excavation (see Figure 4.3).

Based on analysis of various site maps and artifact provenience for CA-MRN-232 listed in the PAHMA catalog, in 1940 the Berkeley team excavated the primary Trench A (approx. 70 ft. by 6 ft. [21 m by 1.8 m]), a secondary Trench B (approx. 12 ft. by 4 ft. [3.6 m by 1.2 m]), and seven smaller test pits ranging in size from 4 ft. by 4 ft. (1.2 m by 1.2 m)(Pit 3) to 15 ft. (4.6 m) by 4 ft. (1.2 m)(Pit 6)—more than 700 sq. ft. (65 sq. m) total (see Figure 4.3). During the 1941 excavation, Beardsley and his crew completed a series of trenches parallel and adjacent to Trench A, each 6 ft. (1.8 m) wide, also aligned to “trench north,” and placed progressively eastward (inland) from Trench A—these include Trenches C, D, E, F, CC, DD, EE, and FF. They also completed four additional shorter and narrower trenches, labeled Trenches G, H, I, and J, as well as three smaller units, labeled Pits 8, 9, and 10 (see Figure 4.3) (Beardsley 1954:23). The majority of trenches and pits were dug to the bottom of the midden deposit at 40 to 50 in. (100 cm to 127 cm), although selected areas were only dug to 12 in. (30 cm) or 24 in. (60 cm) depth. It is unknown to what extent, if any, the deposit was screened.

At CA-MRN-242, Heizer and Beardsley also aligned their 1940-1941 excavation along an arbitrary “trench north,” which was oriented 35° west of north (Heizer 1940a:13). The initial excavation trench (Trench A) was 6 ft. to 8 ft. (1.8 m to 2.4 m) wide and 40 ft. (12 m) long, divided into 10-ft. (3 m) sections (Sect. 1S, 2S, etc.)(Heizer 1940a:13). None of the subsequent trenches, however, were similarly sub-divided. The excavators established Datum A on the northwest corner of Trench A—this became the northwest corner of Section 1S, and this datum

was used to measure artifact locations throughout the excavation in both 1940 and 1941 (see Figure 4.4).

Again using the various site maps and artifact provenience for CA-MRN-242 found in the PAHMA catalog, in 1940 the Berkeley team excavated the primary Trench A along the bluff edge; a secondary trench parallel to Trench A, which they established to the east away from the bluff, and a number of smaller test pits and perpendicular trenches ranging in size from 2 ft. to 4 ft. (0.6 m to 1.2 m) wide and 2 ft. to 16 ft. (0.6 m to 4.9 m) long (see Figure 4.4). During the 1941 excavation, Beardsley and his crew completed a series of trenches and pits between the 1940 trenches and extending to the east, in addition to a number of units along the bluff face (Beardsley 1954:21). Most of the trenches and pits were dug to the bottom of the midden deposit, which varied across the site from 15 in. (38 cm) to nearly 70 in. (178 cm) deep (Beardsley 1941e, 1946a). Like at CA-MRN-232, it is unknown to what extent, if any, the deposit was screened.

Because there are detailed notes and site maps from the CA-MRN-232 and CA-MRN-242 excavations (see Figures 4.3 and 4.4), and because all artifacts were given point provenience relative to a single site datum at each site, reconstructing the excavation units and plotting artifacts and features in GIS proved to be relatively straightforward (see below). Reconstructing Beardsley's excavation of CA-MRN-271 in a GIS, however, proved to be more challenging. The first challenge was to reconstruct the excavation strategy Beardsley and his crew used, and to determine the methods they used for recording artifact locations. Because this site was never published to the level of detail of CA-MRN-232 and CA-MRN-242, there is no detailed description of the excavation, nor is there a formal site map. The only site map I could locate is a not-to-scale sketch map drawn by Treganza after his 1945 excavation, which shows the location of both his 1945 units and the 1941 excavation relative to a single site datum (see Figure 4.5) (Beardsley 1946a). While this map proved useful in some regards, in others it proved to be inaccurate. Unfortunately, it does not represent the 1941 excavation in enough detail to depict individual excavation units, nor does it accurately represent the location of Treganza's 1945 units relative to Beardsley's 1941 units. In addition to Treganza's map, there is also a rough sketch by Beardsley, which offers several clues to how he organized the 1941 excavation (Beardsley 1946a). By combining this sketch with the available artifact provenience data in the PAHMA catalog, and plotting all available information in GIS, I was able to work out the excavation and artifact recording strategy for the 1941 excavation.

The University of California team excavated a total of three discrete but contiguous trenches at CA-MRN-271 in 1941, labeled trenches A, B, and AA. Each 5 ft. (1.5 m)-wide trench was aligned linearly along "trench north," and was divided into 10 ft. (3 m) long sections, numbered beginning at the site datum. Because all excavations were conducted north of the site datum, the sections were numbered 1N, 2N, 3N, etc. The trench A excavation began at section 4N and continued to section 8N, and therefore totaled 50 ft. (15 m) long by 5 ft. (1.5 m) wide. Both trenches B and AA began at section 5N and continued to 8N, making them each 40 ft. (12 m) long by 5 ft. (1.5 m) wide. It appears that only half of trench A, section 4N (one 5 ft. [1.5 m] by 5 ft. [1.5 m] unit) was excavated, resulting in a total of 25 5 ft. (1.5 m) by 5 ft. (1.5 m) units excavated by the crew in 1941. While I could not locate documentation about the depth of each section, examining the recorded depth of each artifact recovered in the PAHMA catalog indicates that 88% of artifacts were recovered from between 0 to 24 in. (0 to 61 cm), and only 4% from below 24 in. (61 cm)(the other 8% have no documented depths). This suggests that most of the excavation was likely conducted to a depth of 24 in. (61 cm), and only a small percentage of

units dug to deeper depths. If 24 in. (61 cm) is the average depth of excavation, then the total excavated volume equals 1,250 cu. ft. (35 cu. m), just slightly more than Beardsley's estimated 1,000 cu. ft. (28 cu. m)(Beardsley 1941a).

Treganza excavated an additional three trenches (labeled A, B, and C) in 1945, which were not contiguous with the 1941 excavation. These trenches were irregularly sized (10 ft. [3 m] by 6 ft. [1.8 m], 23 ft. [7 m] by 5 ft. [1.5 m], and 8 ft. [2.4 m] by 6 ft. [1.8 m]) and did not fit within the previously established grid system. Treganza's excavation only recovered 11 cataloged artifacts from these three trenches. Because of the uncertainty of the location of Treganza's excavation relative to the earlier work, I do not include the artifacts from the 1945 excavation in my GIS spatial analysis, even when Treganza recorded exact provenience.

University of California Excavation Methods, 1949-1951

The University of California's 1949 excavation at CA-MRN-232, under the direction of Clement Meighan, used a different excavation methodology and system of organization than Heizer and Beardsley did in 1940-1941. Because the purpose of the 1949 excavation was to locate potentially small historical artifacts, excavators devised a system to double check all material excavated from the site to ensure nothing was missed. As Meighan noted, "[i]nitial excavation was done with shovels, after which the dug deposit was passed through a half inch screen. As a further check, the material which remained in the screen was dumped down a chute onto the beach where it was washed and again examined. By this method, it is believed that a virtual hundred per cent recovery was attained" (Meighan 1950c:15). Excavators attempted to locate and record artifacts *in situ*, and the screen and beach-washing was considered a final check only (Meighan 1950c:15). Investigators found site conditions challenging, as soil broke-up into small clods of heavy soil that obscured artifacts (Meighan 1950c:16). Researchers excavated in 6 in. (15 cm) arbitrary levels, although Meighan noted that excavator sometimes inadvertently dug into the next level when trying to complete their present level (Meighan 1950c:18).

Meighan's 1949 excavations at CA-MRN-232 attempted to excavate those areas on the site that had not been previously excavated by Heizer and Beardsley. The 1949 project excavated the entire western edge of the site along the bluff above the estero in 12 partial and full 10 ft. (3 m) by 10 ft. (3 m) units, and in addition dug four 10 ft. (3 m) by 10 ft. (3 m) internal blocks in areas not excavated by Heizer and Beardsley in 1940-1941 (see Figure 4.6) (Meighan 1950b)(PAHMA Catalog). Meighan's excavation was generally shallower than Heizer and Beardsley's, with a maximum artifact depth of 40 in. (1 m).

Using evidence pieced together from published materials, as well as unpublished field notes, excavators at CA-MRN-307 proceeded in 5 ft. (1.5 m) by 5 ft. (1.5 m) excavation units, which were dug using arbitrary 12 in. (30 cm) levels. The researchers did not screen soil uniformly across the site—for example, in trench A, the team screened all but the lowest 12 in. (30 cm) of each unit, which Meighan characterized as too wet to screen. In trench B, however, only the top 12 in. (30 cm) was screened (Meighan 1950d). Because the site was not completely screened, there may have been a bias towards collecting larger artifacts, and small objects may have been inadvertently missed. Most artifacts were point-provenienced relative to either the northwest or southeast corner of each unit, although the majority of faunal remains and some other materials were only given unit-level provenience and collected in 12 in. (30 cm) levels. A number of artifacts and other materials lack provenience altogether.

San Francisco State College, Santa Rosa Junior College, and Drake Navigators Guild Excavation Methodologies, 1961-1973

Excavation methods used by Treganza and his students from SFSC during the 1960s were relatively straightforward and conducted according to accepted archaeological practice at the time. Like the earlier University of California excavations, this included the use of large-scale clearing excavations. Site CA-MRN-216 was primarily excavated using 10 ft. (3 m) by 10 ft. (3 m) units, with the exception of Treganza's 1964 test units and excavations in the fall 1967, both of which used 5 ft. (1.5 m) by 5 ft. (1.5 m) units. Unfortunately, Treganza's excavations in 1964 did not record specific artifact provenience, but only recorded provenience by arbitrary levels within each 5 ft. (1.5 m) by 5 ft. (1.5 m) unit. Beginning in 1965, all excavations used ¼ in. (0.6 cm) screens and excavated in arbitrary 12 in. (30 cm) levels. Faunal remains, flaked stone debris, beads, and "bituminous material" were recorded by level, while all other artifacts were given point-provenience in three dimensions. Features and burials were "recorded and photographed according to standard practice" (Treganza and King 1968:20).

At site CA-MRN-298, after experimenting with a variety of excavation techniques, the DNG/SRJC excavation at the site's eastern locus (CA-MRN-298E) from 1961 to 1963 used 5 ft. (1.5 m) by 5 ft. (1.5 m) units (except for a number of 2.5 ft. [0.75 m] by 2.5 ft. [0.75 m] test units at the site margins) and dug in 6 in. (15 cm) arbitrary levels. All material was screened through ¼ in. (0.6 cm) screens. All formal artifacts, including beads and bead blanks, were given point provenience, while flaked stone debris was recorded by unit. Faunal remains were collected by unit, but not recorded by level (Von der Porten 1963:16-19). Beginning under SFSC's auspices in 1965-1966, excavation methods at CA-MRN-298E changed, and beads, lithic debris, and faunal remains were recorded in 1 ft. (30 cm) levels without the use of point provenience (Treganza and King 1968:23; Upson 1967).

With the exception of Treganza's 1959 excavation, SFSC researchers used a similar excavation methodology at CA-MRN-298's western locus (CA-MRN-298W) as they did at the eastern locus. Beginning in 1966 and continuing through 1969, they excavated each 5 ft. (1.5 m) by 5 ft. (1.5 m) unit in arbitrary 12 in. (30 cm) levels until they were 6 in. (15 cm) below the midden into sterile soil. Like the excavation at CA-MRN-298E, at CA-MRN-298W all material was screened through ¼ in. (0.6 cm) screens (Upson 1967). Beads and bead blanks, lithic debitage, and faunal remains were again collected and recorded using lot provenience in 12 in. (30 cm) levels, and were given a single artifact number per unit and level (Upson 1969:3). All other artifacts were recorded with point provenience relative to the unit datum, which was the southwest corner of each 5 ft. (1.5 m) by 5 ft. (1.5 m) unit.

After a three-year hiatus on research on Limantour Spit, when SRJC resumed work at CA-MRN-298W in 1972 they continued to use the same pattern of 5 ft. (1.5 m) by 5 ft. (1.5 m) units that previous researchers had used, and they continued to screen all site deposits through ¼ in. (0.6 cm) screen (Péron, et al. 1973:19). The excavators recorded point provenience for all artifacts, however, including beads and bead blanks—a change from the previous practice.

In sum, although a number of different researchers excavated key sites around *tamál-húye* from the 1940s to the 1970s, and although a variety of excavation methodologies were employed, using original excavation data and carefully analyzing the previous archaeological practices has allowed me to reconstruct the excavations at CA-MRN-232, CA-MRN-242, CA-MRN-272, CA-MRN-307, CA-MRN-216, and CA-MRN-298 within a GIS. While not all artifacts or feature locations could be accurately reconstructed due to limitations in original field

methodologies or gaps in the excavation records, in all cases the majority of artifacts and features from each site could be included in the GIS to allow ESDA of intra-site patterning. In the next section, I document in detail the methods I used to incorporate data from all six sites in the GIS.

RECONSTRUCTING “OLD” EXCAVATIONS IN GIS

To conduct spatial analysis of artifact patterning within a GIS, my first task was to organize the site, feature, and artifact data in a GIS compatible format. My GIS analysis was conducted using Esri’s ArcGIS 9.3 software on a PC platform. To begin, I needed to position previous excavations in real-world coordinates as accurately as possible. This proved challenging, since the location of individual excavation units at each site has been “lost” over time. I used clues found in the historical record of the excavations, as well as detailed topographic site mapping that I conducted as part of this project, to position the excavations.

Site Mapping, 2009

To determine if high-resolution topographic site maps could be used to discern previous excavation unit boundaries from the 1940s to 1970s excavations, which are no longer visible to the naked eye, I conducted site mapping operations at CA-MRN-216, CA-MRN-242, CA-MRN-271, and CA-MRN-298 in August 2009, along with Timothy G. Smith (GPS Program Coordinator, National Park Service, Information Technology Center). If previous excavation unit boundaries could be identified, then original excavation units can be accurately positioned in a GIS. We conducted a high-resolution, real-time kinematic (RTK) Global Positioning System (GPS) survey using two Trimble R8 receivers to collect high-resolution (centimeter-level accuracy) topographic mapping points at each site in order to produce detailed, topographic site maps. National Park Service (NPS) researchers had previously mapped sites CA-MRN-232 and CA-MRN-307 in 2002 using a total station and collected spatial information with similar accuracy, and those data were also made available to me for this project. I reviewed their work to see if previous excavation units were visible, which they were not.

Methodology

For the RTK survey at CA-MRN-216, CA-MRN-242, CA-MRN-271, and CA-MRN-298, the first step was to visit each site and visually determine the site boundary based on materials (mostly shell) visible on the site surface. This was accomplished at CA-MRN-216 and CA-MRN-298 by Point Reyes National Seashore (PRNS) Archeologist Mark Rudo, PRNS Site Steward Peter Van der Naillen, and myself, and at CA-MRN-271 by myself working alone, before beginning the mapping project. After determining the estimated boundary at each site, we used a WAAS (Wide Area Augmentation System)-enabled Garmin GPS V hand-held GPS receiver (typically accurate to <5 m) to collect a number of GPS points defining the boundary. We later added these points to an ArcGIS project, layered over a 1 ft. (30 cm)-resolution aerial image, and drew an estimated site boundary using the points and features visible in the aerial image as a guide. At CA-MRN-242, which is defined by a steep bluff on two sides, we worked only from the aerial image to create an estimated site boundary. We then created a 3-m (10 ft.) grid over each site in ArcGIS that we later used for conducting the high-resolution GPS mapping. We exported the grids as shapefiles and loaded them onto a Trimble TSC2 Controller

used to collect data during mapping operations. These shapefiles became the primary tool used to position each point during the surveys (see below).

Working with Smith, I collected high-resolution topographic mapping points on each site using an RTK survey that utilized two Trimble R8 GNSS (Global Navigation Satellite System) Receivers. RTK survey is a process where GPS signal corrections are transmitted in real time from a base station receiver established over a known control point or local datum point to a remote rover receiver. An RTK survey with a Trimble R8 GNSS Receiver uses both the code phase of GPS signals, as well as the dual-frequency carrier phase, which delivers the most accurate GPS information. An RTK base station actively measures and can compensate for a number of sources of error inherent in GPS survey, including atmospheric errors and delays, satellite orbital errors, and other variables in GPS geometry, which can increase accuracy of the survey to centimeter-level. Receiver specifications indicate that horizontal accuracy for an RTK survey is 1 cm (0.4 in.) and vertical accuracy is 2 cm (0.8 in.), although in practice our accuracy was slightly better than these specifications due to the short baseline between base station and rover. To begin each survey, we set-up one R8 receiver known as the “base” unit over a local site datum or control point while we used the other receiver known as the “rover” unit to collect each topographic mapping point. The Trimble R8 includes a built-in 450 MHz transmit/receive UHF radio, allowing real-time communication between the base station and rover unit. In addition, the receivers are Bluetooth enabled, for wireless communication between the receivers and a controller. To collect and display field data, we used a Trimble TSC2 Controller, a handheld field computer for controlling the receivers. We needed just one controller for the survey—the controller was used to communicate with both R8’s (base and rover) by toggling back-and-forth to communicate with each receiver.

To begin work at each site, we created our own primary control point or local site datum for the base station using either an existing monument or creating our own with a 3.8 cm (1½ in.) diameter aluminum cap on a 1.2 m (4-ft.) length of 1.3 cm (½ in.) diameter rebar. We placed the Trimble R8 base receiver over the control point and set it up to run in RTK and infill or static survey mode for at least 3+ hours. This methodology is used to bring sub-centimeter real-world coordinates to the control point and simultaneously provide RTK corrections to the rover. This method of field data collection provides an efficient use of field time while providing the accuracy required for the project. In the field, all points collected with rover are referenced or relative to the control point, and although the overall accuracy is not accurate because the control point position is only estimated at this time, the relative positional accuracy is still sub-centimeter within the network of points. After the field work is completed for the day, the base station or infill collected static data is converted to Rinex data exchange files and sent to NGS OPUS (National Geodetic Survey Online Positioning User Service) for processing and a sub-centimeter position for the control point is established, then all the mapping points are shifted based on the new, corrected control point position, bringing the collected points to sub-centimeter accuracy in the real-world.

By using the 3-m (10 ft.) grid shapefiles in the Trimble controller as a backdrop, and by working in centimeter-level accuracy in real time, we eliminated the need for physically establishing a grid on site using measuring tapes, stakes, or any other physical tools during the mapping process. We were able to move the survey rod holding the R8 rover receiver around while observing the screen on the controller, and could position the receiver directly on the point we wanted to collect. Once at the location, we leveled the receiver using the bull’s eye level attached to the survey rod, and pressed the key to collect a point. During RTK operations the

receiver actually collects many points within 5 seconds and averages them for increased accuracy and to meet our desired precision requirements. We then moved 3 m to next point, observing the screen on the controller to position the rover receiver, and repeated the process. Using this methodology, the survey could easily be accomplished with one person, who could collect more than 100 points per hour.

In addition to collecting systematic data points in 3 m intervals, we also collected judgmental points in areas of high topographic relief, or filled-in with additional systematic data as time allowed. Finally, in addition to the high-resolution topographic mapping points, we also collected continuous 2D RTK survey points, which lack vertical accuracy due to collection methods, to define other site features such as the site boundary, bluff edges, or trails that bisect the site. These continuous surveys could be set-up to collect points based on fixed time or fixed distance—we chose the latter, and set the controller to collect a survey point every 0.5 m (1.6 ft.). Lastly, we also established a secondary control point on each site, which can be used as a backsight for conventional (total station) surveys in the future.

Once the RTK data was collected and processed, the end product was a comma-delimited CSV file for each site that included X, Y, and Z measurements for each point. Horizontal (X,Y) data was collected in Universal Transverse Mercator (UTM), Zone 10 using the North American Datum of 1983 (NAD83, CORS96). Elevations (Z value) were collected as height above Mean Sea Level (MSL), using the North American Vertical Datum of 1988 (NAVD88). The GEOID03 model was used to convert between NAD83 GPS ellipsoidal heights (HAE) and NAVD88 orthometric heights (MSL).

Finally, the CSV files were opened in ArcGIS using ArcMap 9.3, and data processed using the Spatial Analyst and 3D Analyst extensions. Plan view maps were created in ArcMap 9.3, while 3D graphics were created in ArcScene 9.3.

Mapping Operations

Mapping operations began August 24, 2009 at CA-MRN-216 on Limantour Spit. This is the only site we mapped that had a previously-installed survey monument on-site. We used this existing NPS brass cap (TLS184A) as our primary control point. In addition, we installed a secondary control point approximately 17 m (56 ft.) south of the primary control point. The secondary control point, a 3.8 cm (1½ in.) diameter aluminum survey cap (labeled “CA-MRN-216, 8-24-09”) attached to a 1.2 m (4 ft.) length of 1.3 cm (½ in.) rebar driven into the sediment, can be used as a backsight for a conventional (total station) survey in the future. After installing control points, we began the RTK survey and systematically collected data on a 3 m (10 ft.) grid across the entire site, as well as additional judgmental points in areas of high relief. In total, we collected 584 topographic mapping points on CA-MRN-216, along with the primary and secondary control points. This completed mapping operations on the site.

The next two days, August 25-26, 2009 we shifted our mapping operation to CA-MRN-298, also on Limantour Spit. We established primary and secondary control points on the eastern locus of CA-MRN-298 (also known as CA-MRN-298E). The primary control point is labeled “CA-MRN-298, 8-25-09, C” (for “control”), while the secondary control point, is 26 m (85 ft.) to the southeast and is labeled “CA-MRN-298, 8-25-09, B” (for “backsight”). Beginning on the site’s eastern locus (CA-MRN-298E), we collected data on our pre-established, 3 m (10 ft.) grid, completing survey of CA-MRN-298E and most of CA-MRN-298W (the site’s western locus) on August 25. On August 26 we completed systematic data collection on CA-MRN-

298W, as well as a substantial number of judgmental points in areas of obvious disturbance and high relief on both site loci. In two days, we collected nearly 600 systematic survey points and more than 400 judgmental points, for a total of 987 topographic survey points at CA-MRN-298. We also collected continuous, 2D RTK survey points every 0.5 m (1.6 ft.) along a trail that bisects the southwestern edge of the site.

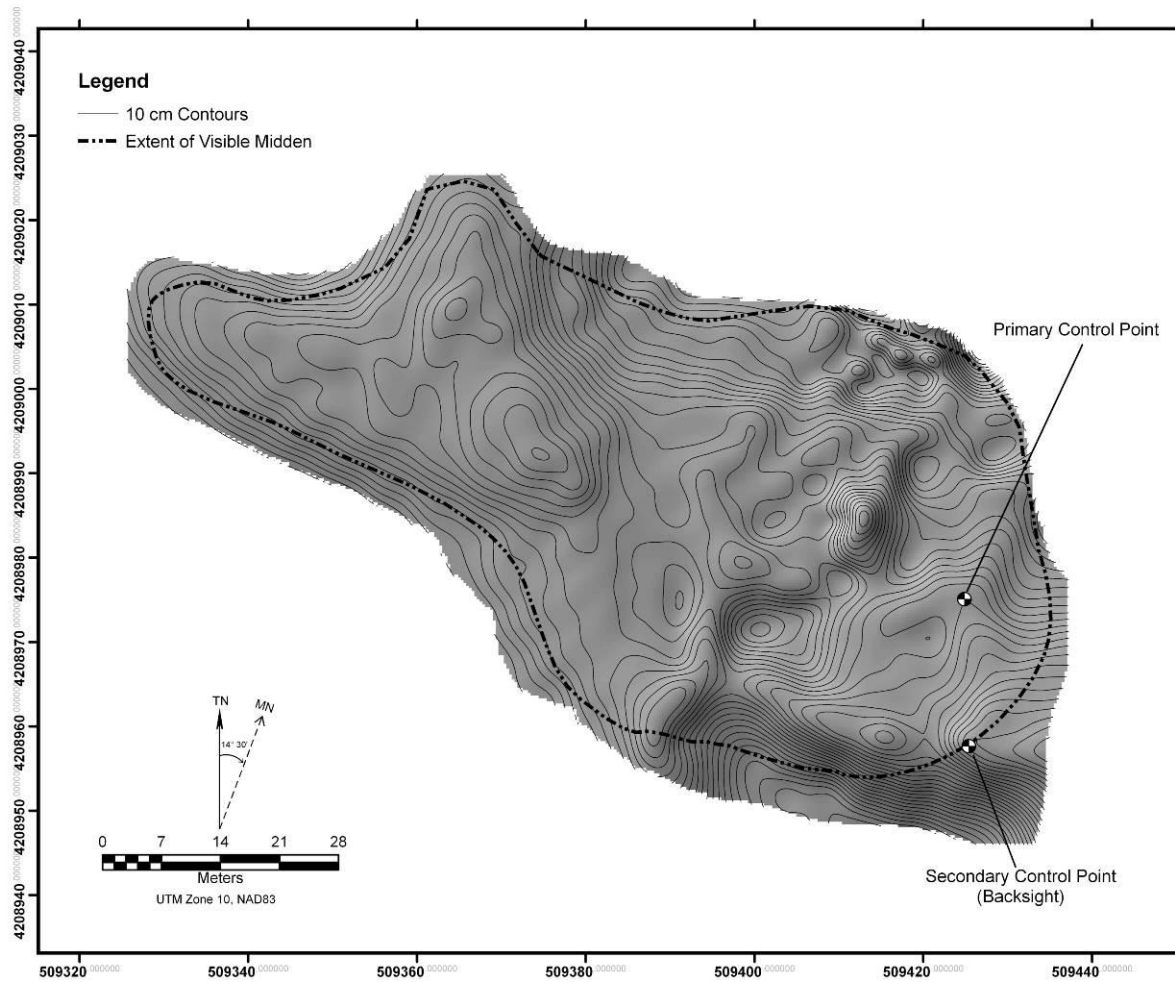
The fourth day of mapping operations, August 27, 2009, we moved to Bear Valley where we mapped CA-MRN-271. First, we established a primary control point (labeled “CA-MRN-271, 8-27-09, C”) and a secondary control point (labeled “CA-MRN-271, 8-27-09, B”) approximately 21 m (69 ft.) to the northwest. We then collected data on a pre-established 3 m (10 ft.) grid, plus added an additional point in the center of each grid square, for a total of 426 high-resolution topographic points at CA-MRN-271. During the survey we collected points within the previously reported site boundary (Beaudry 1983:32), although we did not see signs of surface midden in all areas. Unlike the Limantour Spit sites, thick vegetation across CA-MRN-271 prevented complete systematic data coverage. In particular, a thick tree canopy along the site’s eastern edge, sloping down towards Coast Creek, precluded GPS data collection in that area. The inability to work under a tree canopy proved to be a major disadvantage to this type of survey compared to a conventional survey, and it is hoped that site mapping can be completed in the future using a conventional (total station) survey utilizing our control point and backsight. The two surveys can then be combined into a single data set, and a new site map created. In addition to the systematic and judgmental topographic points, we also collected continuous, 2D RTK survey points along two trails that bisect the site, collected a number of points defining an estimated boundary of visible surface remains, and recorded the position of a single *Olivella* shell bead observed on the site surface (but was not collected).

On August 28, 2009, the last day of mapping operations, we mapped CA-MRN-242 on the eastern shore of Drakes Estero. We again established a primary control point (labeled “CA-MRN-242, 8-28-09, C”) and a secondary control point (labeled “CA-MRN-242, 8-28-09, B”). We then collected data on a pre-established 3 m (10 ft.) grid, plus added an additional point in the center of each grid square in the core-area of the site, for a total of 306 high-resolution topographic points. We also collected spatial data as part of a continuous, 2D RTK survey of the bluff edge surrounding the site and along the site boundary (based on visible shell on the surface), collecting points every 0.5 m (1.6 ft.). Finally, we collected points down the center of a deep erosional gully that bisects the southern part of the site.

Results

High-resolution topographic mapping at CA-MRN-216, CA-MRN-242, CA-MRN-271, and CA-MRN-298 was successfully accomplished in the allotted time, and accurate, detailed maps of site topography were produced (Figures 6.1-6.4). With regard to original project goals of delineating previous excavation boundaries, we can detect original excavation units on CA-MRN-216 and CA-MRN-298—in both cases the observed features are clear enough to allow a reasonable estimation of the location of previous units (Figures 6.5 and 6.6), and these were used as the basis for beginning my GIS reconstructions of those sites. No previous excavation units could be discerned at CA-MRN-242 or CA-MRN-271, however. Because the latter sites were excavated in 1940-1941, while CA-MRN-216 and CA-MRN-298 were excavated in the 1960s, it is possible that the additional 20 years of exposure erased evidence of the University of California excavations at CA-MRN-242 and CA-MRN-271. Another, more likely, explanation

Figure 6.1. Site map of CA-MRN-216, 2009. This image includes 10 cm elevation contours draped over a shaded relief image, and clearly shows the excavated site area on the eastern side.



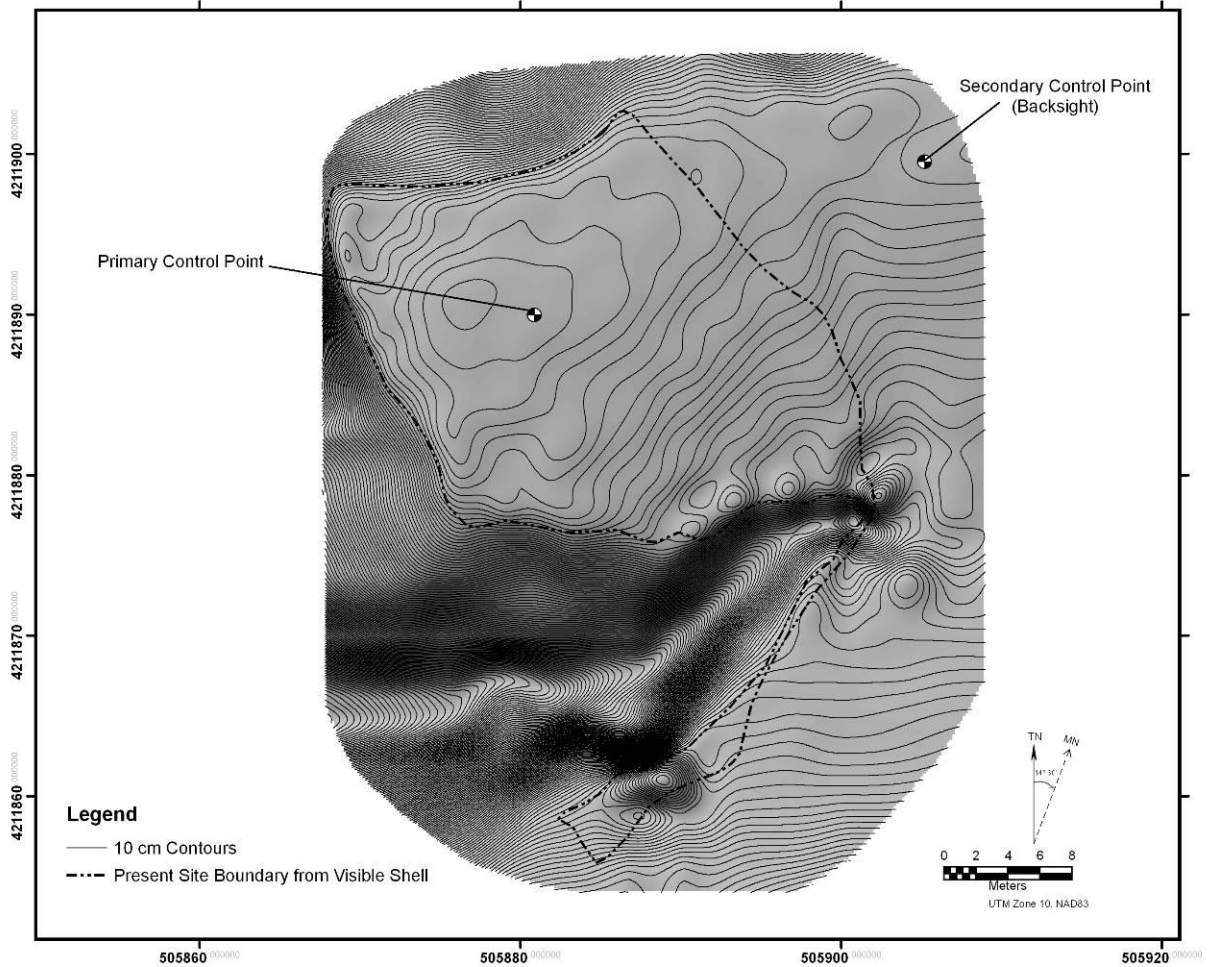
is that CA-MRN-242 and CA-MRN-271 were more completely backfilled than the Limantour Spit sites, which do not appear to have been filled. Examining total station data from CA-MRN-232 and CA-MRN-307 has led to a similar conclusion—there is no evidence of the previous excavation units in the topographic maps of the sites.

Excavation Reconstruction in GIS

Although my site mapping project met with mixed success in locating previous excavations in the real-world, other clues in the original excavation records allowed me to estimate the position of previous excavations at CA-MRN-232, CA-MRN-242, CA-MRN-271, and CA-MRN-307.

Beardsley’s site maps provided the basis for reconstructing the CA-MRN-232 excavations in real-world UTM coordinates necessary for GIS analysis, although my GIS site reconstruction has a number of built-in assumptions. First, while Heizer specifically notes that “trench north” for his excavation was established at 20° west of north (Heizer 1940a:6), he does not specify whether this refers to true north or magnetic north. In this case, aligning the

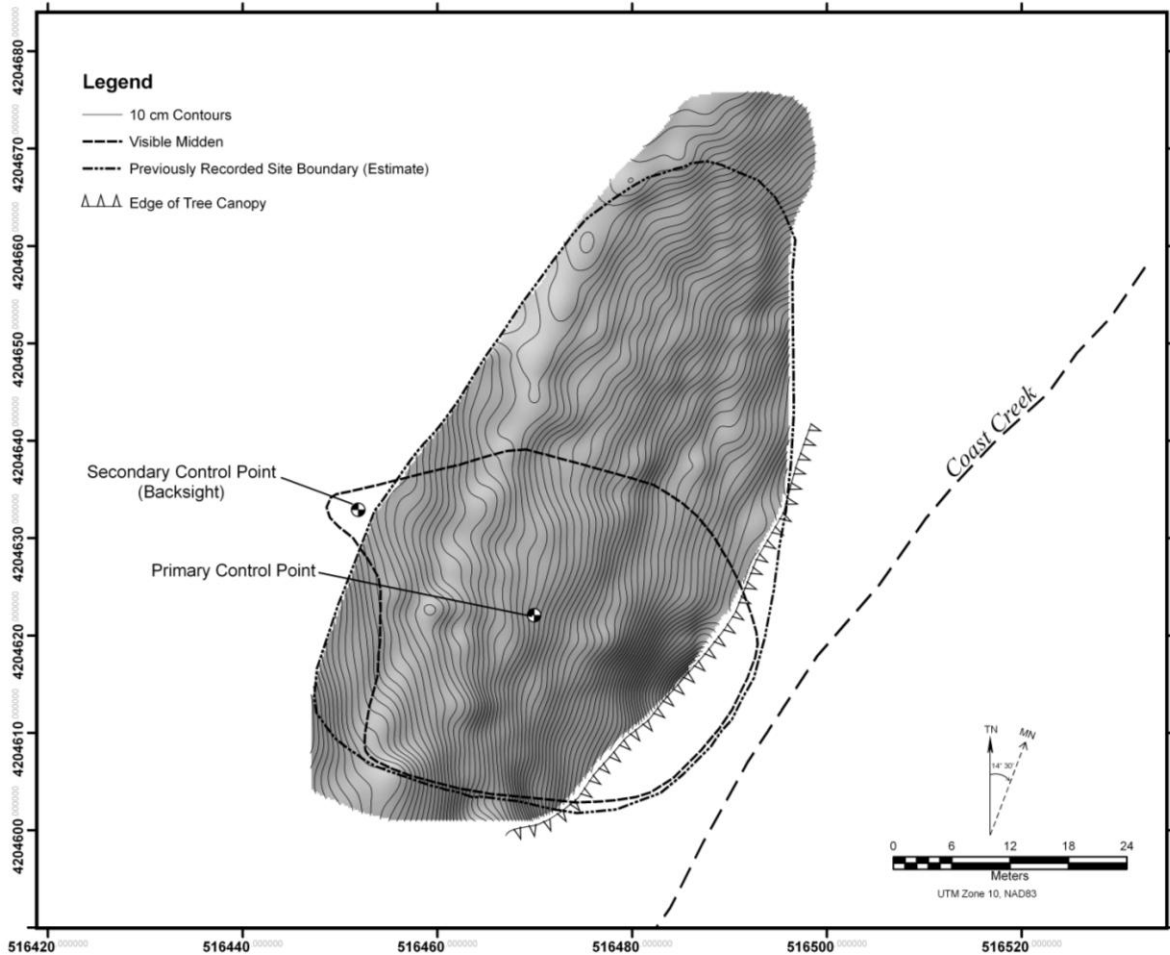
Figure 6.2. Site map of CA-MRN-242, 2009. This image includes 10 cm elevation contours draped over a shaded relief image. The previously excavated area is not discernible, although a portion may have been lost in the large erosional ditch that runs through the southern portion of the site.



excavation units to 20° west of true north, rather than magnetic north, is a better fit to the north arrows indicated on the various site maps, as well as the bluff edge depicted on the site maps.

Second, I estimated the real-world location of Datum A and the excavation units on-site at CA-MRN-232, based on several factors. As mentioned above, I initially used a modern total station map of the site from the NPS to look for evidence of the old excavation units in the current site topography—unfortunately, this did not yield any clues. Next, I positioned the site maps in GIS by aligning the bluff edge depicted on the maps with the bluff edge on a modern, high-resolution aerial image of the site. This yielded an estimated position for Datum A, although it does not account for erosion that has taken place in the past 65 to 70 years. Because University of California Archaeological Survey standard operating procedure called for leaving a permanent site datum whenever possible (Heizer 1949c:12), however, I visited the site with NPS archaeologists and site stewards and we conducted a metal detector survey in the vicinity of the estimated datum coordinates. This survey yielded a strong metal detector target within a few meters of the estimated position. We did not excavate to uncover the target but did collect an accurate GPS position for it. In the absence of other data, I subsequently used this position as the location for Datum A in the GIS, and aligned the site maps, excavation units, and artifact

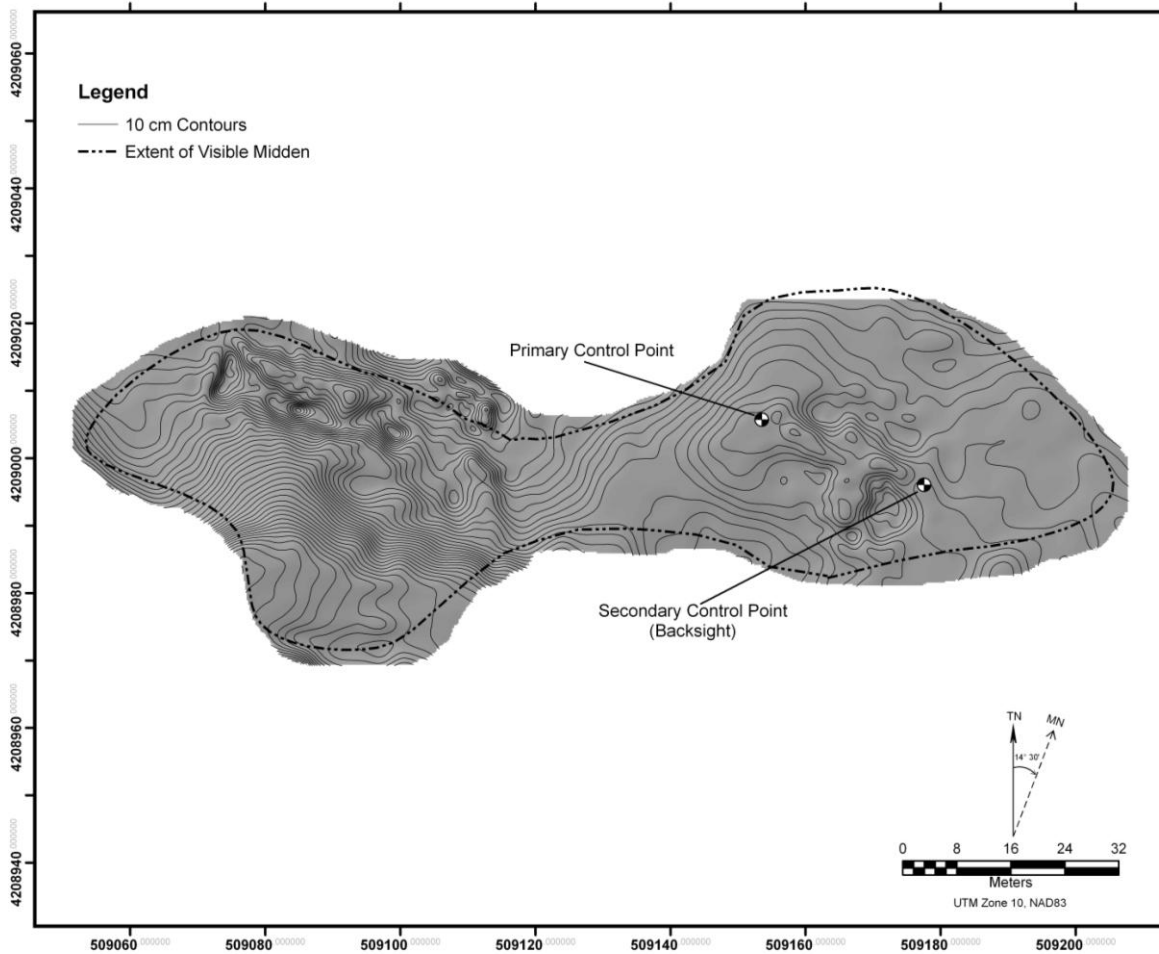
Figure 6.3. Site map of CA-MRN-271, 2009. This image includes 10 cm elevation contours draped over a shaded relief image. The previously excavated area is not discernible



locations from the 1940-1941 field work to that point (Figure 6.7). If a more precise location for Datum A is discovered in the future, the GIS database can easily be shifted to the more accurate coordinates.

In 1949, Meighan excavated additional sections of CA-MRN-232 in 10 ft. (3 m) by 10 ft. (3 m) units created by overlaying an arbitrary grid on the site. He labeled the grid with numbers along the horizontal axis and letters along the vertical axis, giving each excavation unit a letter-number designation (e.g., a typical block is E-5). His grid does not align with the 1940-1941 excavation trenches, but is aligned along a seemingly arbitrary bearing of approximately 319°. There are very few field notes and other original materials from Meighan's excavation at CA-MRN-232, and only a single map that indicates how his 1949 excavation units related to Heizer and Beardsley's 1940-1941 excavation trenches and pits (see Figure 4.6). The map depicts Meighan's excavation grid and completed units, and includes a light, hand-drawn sketch showing the 1940-1941 excavation area (Meighan 1950b). In the GIS, I aligned the sketch of the 1940-1941 excavation units on Meighan's map with the location of the 1940-1941 units I had previously positioned using procedures outlined above. Because Meighan's map is hand-drawn and not entirely accurate, the spatial relationship between excavation units from the two projects is tenuous, and creates issues with the spatial analysis of artifacts discussed in Chapter Seven. In

Figure 6.4. Site map of CA-MRN-298, 2009. This image includes 10 cm elevation contours draped over a shaded relief image. The data clearly show the previously excavated area of CA-MRN-298W in the western section of the site, and the previously excavated area of CA-MRN-298E in the eastern section.

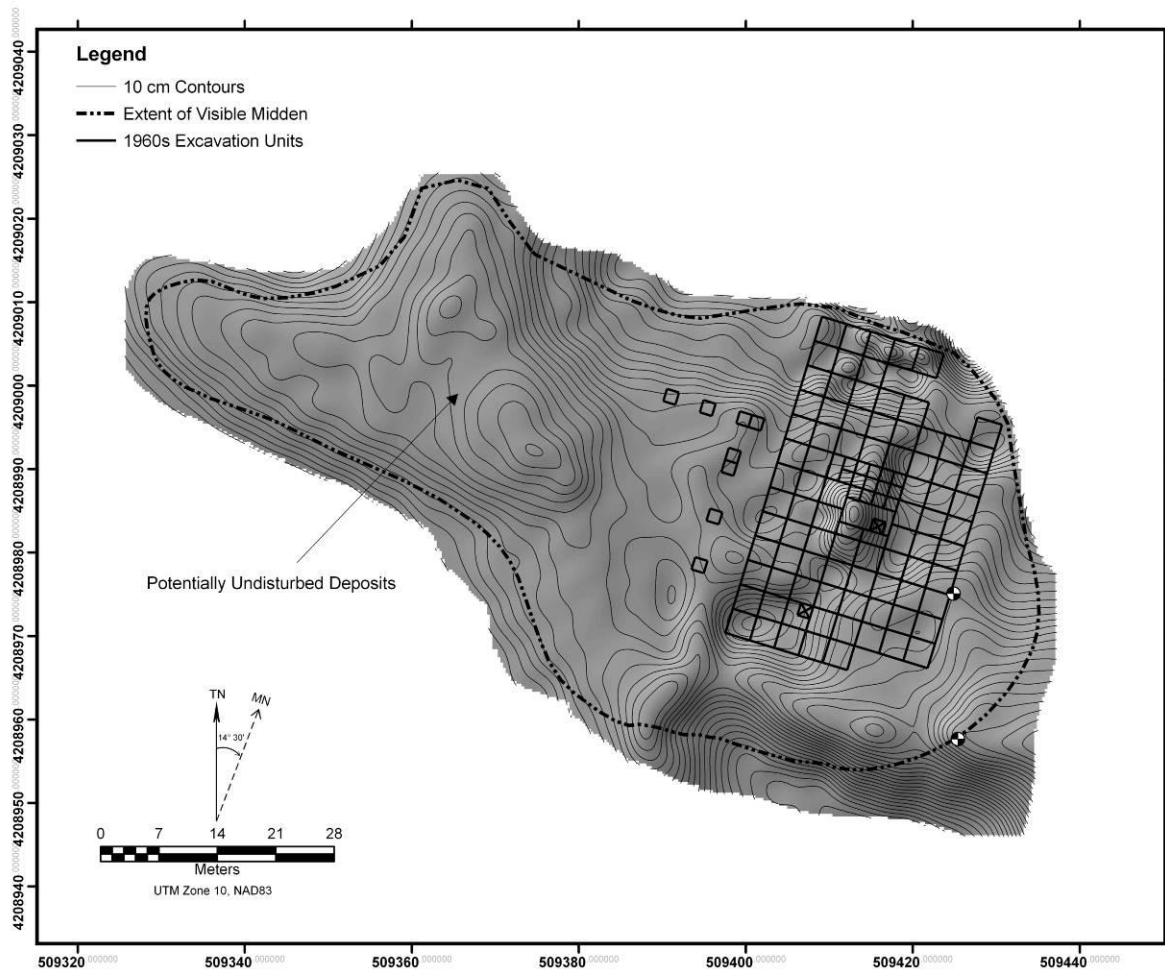


addition, Meighan’s excavation methodology did not include point provenience of artifacts, but instead he recorded artifact location by lot provenience. For all these reasons, I do not include spatial analysis of Meighan’s 1949 excavation at CA-MRN-232 in Chapter Seven, although I do include a discussion of the artifacts he recovered in Chapters Five and Eight.

When estimating the real-world position of the old excavations at CA-MRN-242, I faced similar issues as I did for CA-MRN-232. Again, Beardsley’s site maps provided the basis for reconstructing the excavations in real-world UTM coordinates necessary for GIS analysis, and again my site reconstruction has a number of built-in assumptions. Heizer noted that “trench north” for the excavation was established at 35° west of north (Heizer 1940a:13), but like at CA-MRN-232, he does not specify whether he referred to true north or magnetic north. Aligning the excavation units to 35° west of true north, rather than magnetic north, however, is a better fit to the north arrows indicated on the various site maps, as well as the bluff edge.

I estimated the real-world location of CA-MRN-242’s Datum A and the excavation units, based on a best fit between historic site maps and topographic data I collected on site. I positioned the site maps in GIS by aligning the bluff edge depicted on the maps with the bluff edge from the topographic map I created, and this yielded an estimated position for Datum A,

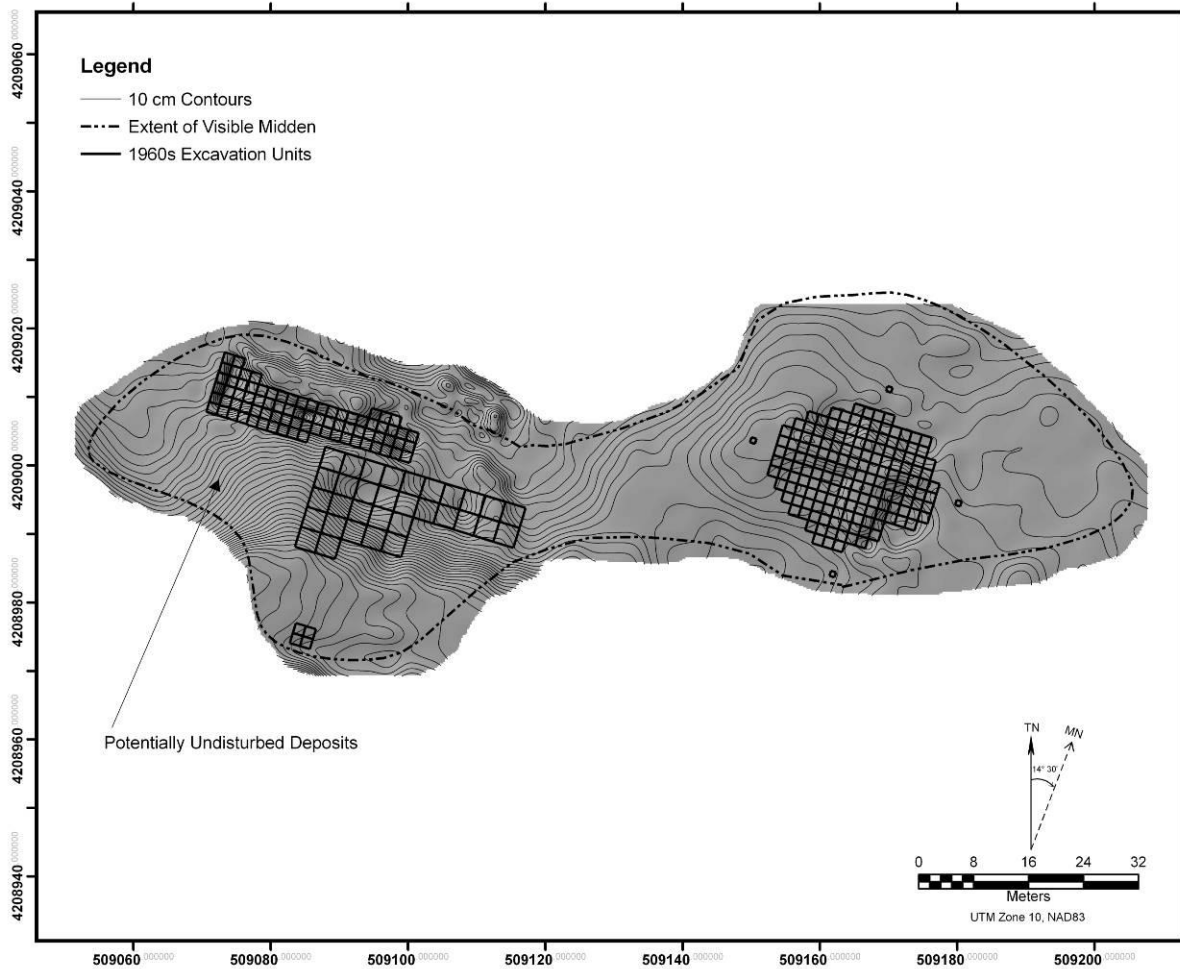
Figure 6.5. Map of CA-MRN-216 showing estimated location of previous excavation units. Compare to Figure 4.8.



although I am unsure of the accuracy because of severe erosion that has affected the site since 1940 (see Chapter Four). In the absence of other data, however, I subsequently used this position as the location for Datum A in the GIS, and aligned the site maps, excavation units, and artifact locations from the 1940-1941 field work to that point (Figure 6.8). If a more accurate position is discovered in the future, the GIS database can be easily moved to the new position.

Treganza's sketch map (see Figure 4.5) provided the basis for reconstructing CA-MRN-271 in real-world UTM coordinates necessary for GIS reconstruction, although based on individual artifact locations plotted in GIS (see below) the map does not depict the correct location of the 1941 excavation relative to the site datum. My site reconstruction of CA-MRN-271 also has a number of assumptions built into it. First, the Treganza drawing indicates the primary site datum for both the 1941 and 1945 excavations were the same—the northernmost of the two California Buckeye trees on the eastern edge of the site along Coast Creek. For my GIS site reconstruction, I assumed that is correct and I placed the grid datum at the UTM coordinates of the tree, which is still on-site today, and whose position I collected during the GPS survey of the site. I also assumed the Treganza sketch map's north arrow (i.e. "trench north") indicates magnetic north in the case of CA-MRN-271, even though this was not true for CA-MRN-232 or CA-MRN-242. In this case, magnetic north is a better fit to the Treganza sketch map. In 1945,

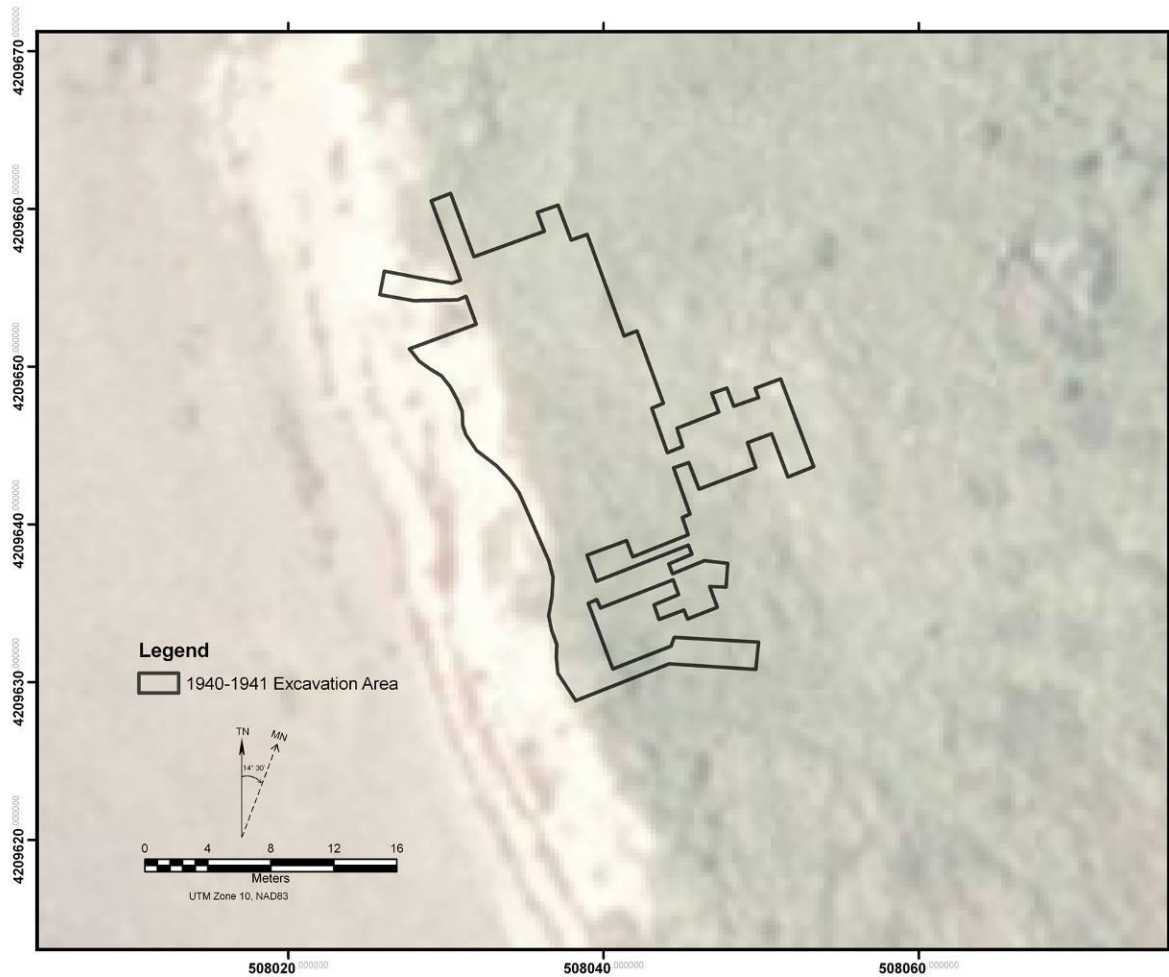
Figure 6.6. Map of CA-MRN-298 showing estimated locations of previous excavation units. Compare to Figure 4.10.



declination at the site location was $17^{\circ} 57' E$, which I rounded to $18^{\circ} E$ —that is the bearing to which I aligned the site grid in the GIS (Figure 6.9).

Based on existing data for CA-MRN-307, as well as maps and notes recently donated to the PAHMA by Joan Meighan, the widow of Clement Meighan, there is enough information to reconstruct many original artifact locations on-site for detailed spatial analysis. I reconstructed the CA-MRN-307 excavation in GIS using Meighan’s field notes, site maps, and artifact inventories located in the PAHMA. Meighan’s site maps provided the basis for reconstructing the CA-MRN-307 excavations in real-world UTM coordinates necessary for GIS analysis. First, existing site maps (Meighan 1950b, 2002) indicate the orientation of the excavation units relative to the drainage bordering the southern edge of the site (see Figure 4.7). In the GIS, I oriented these maps by overlaying them on a modern 30 cm (1-ft.) resolution aerial image where the drainage is evident, which gave me the final unit orientation—15 degrees west of true north. Second, I estimated the real-world location Meighan’s excavation units on-site, based on several factors. Initially, I used the 2002 NPS total station map of the site to look for evidence of the old excavation units in the current site topography—unfortunately, this did not yield any clues. Next, I positioned the site maps in GIS by aligning the beach-edge and the drainage on the

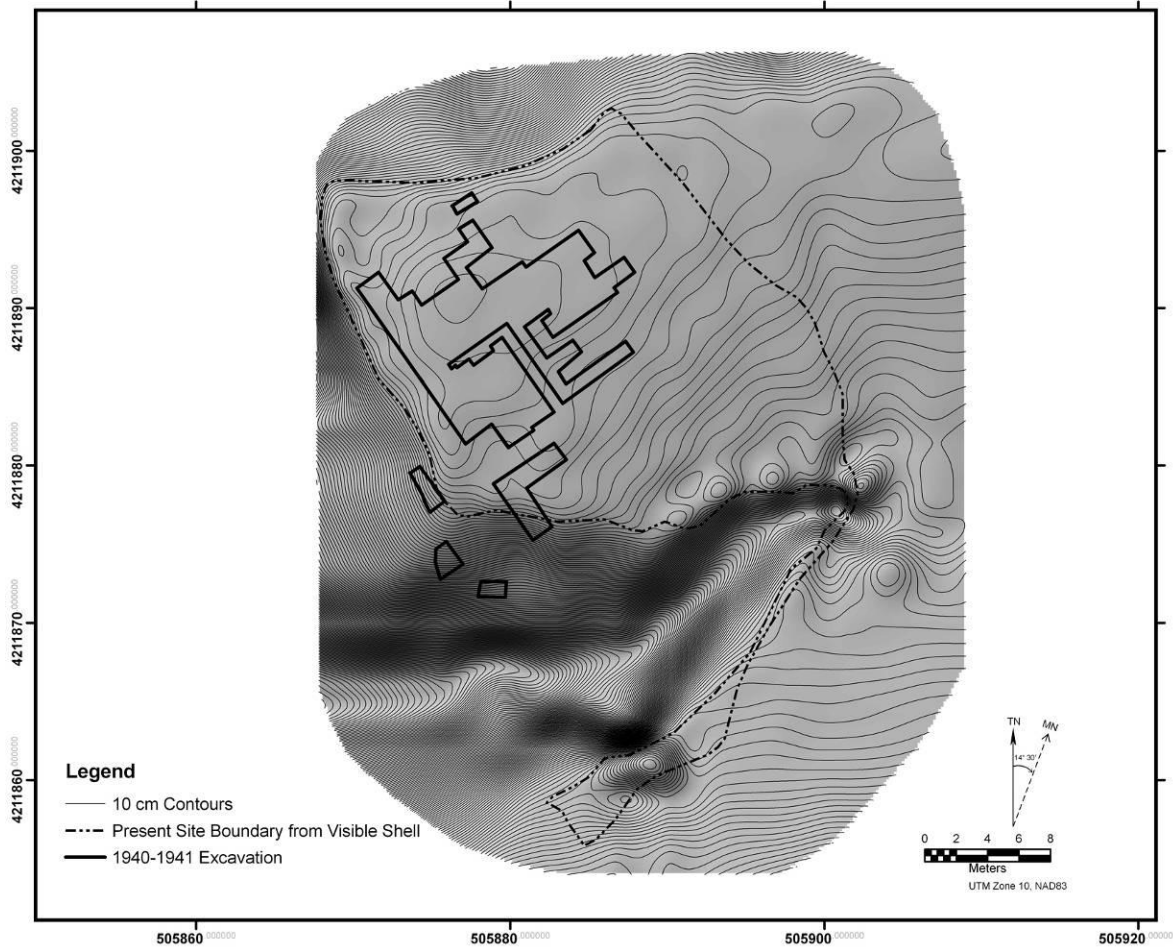
Figure 6.7. Map of CA-MRN-232 showing estimated location of previous excavation units over a 2007 aerial image (displayed with partial transparency). Compare to Figure 4.3.



southern-edge of the site depicted on the site maps with the beach-edge and drainage on a modern, high-resolution aerial image of the site. This yielded an estimated position for Meighan’s excavation units in the GIS, and I aligned the site maps, excavation units, and artifact locations from the 1949-1951 field investigations to that point (Figure 6.10). Even if the overall position is not precise, the unit and artifact locations are internally-consistent and spatial analysis will not be affected. If a more precise location for the excavation units is discovered in the future, the GIS database can easily be shifted to the more accurate coordinates.

At CA-MRN-216 and CA-MRN-298, I located the excavations in the real world as accurately as possible using the results of the high-resolution topographic site survey described above. This allowed me to visibly observe remnants of the old excavation units and plot their locations in real-world UTM coordinates necessary for GIS analysis (see Figures 6.5 and 6.6). I then scanned and georectified site maps from the researchers who excavated the site, and oriented them towards magnetic north, as indicated (Treganza and King 1968). This yielded an estimated position for the various excavation units in the GIS, and I aligned the site maps, excavation units, and artifact locations from the 1961-1973 field investigations to that point. As with the other sites, even if the overall positions are not precise, the unit and artifact locations are

Figure 6.8. Map of CA-MRN-242 showing estimated location of previous excavation units. Compare to Figure 4.4.

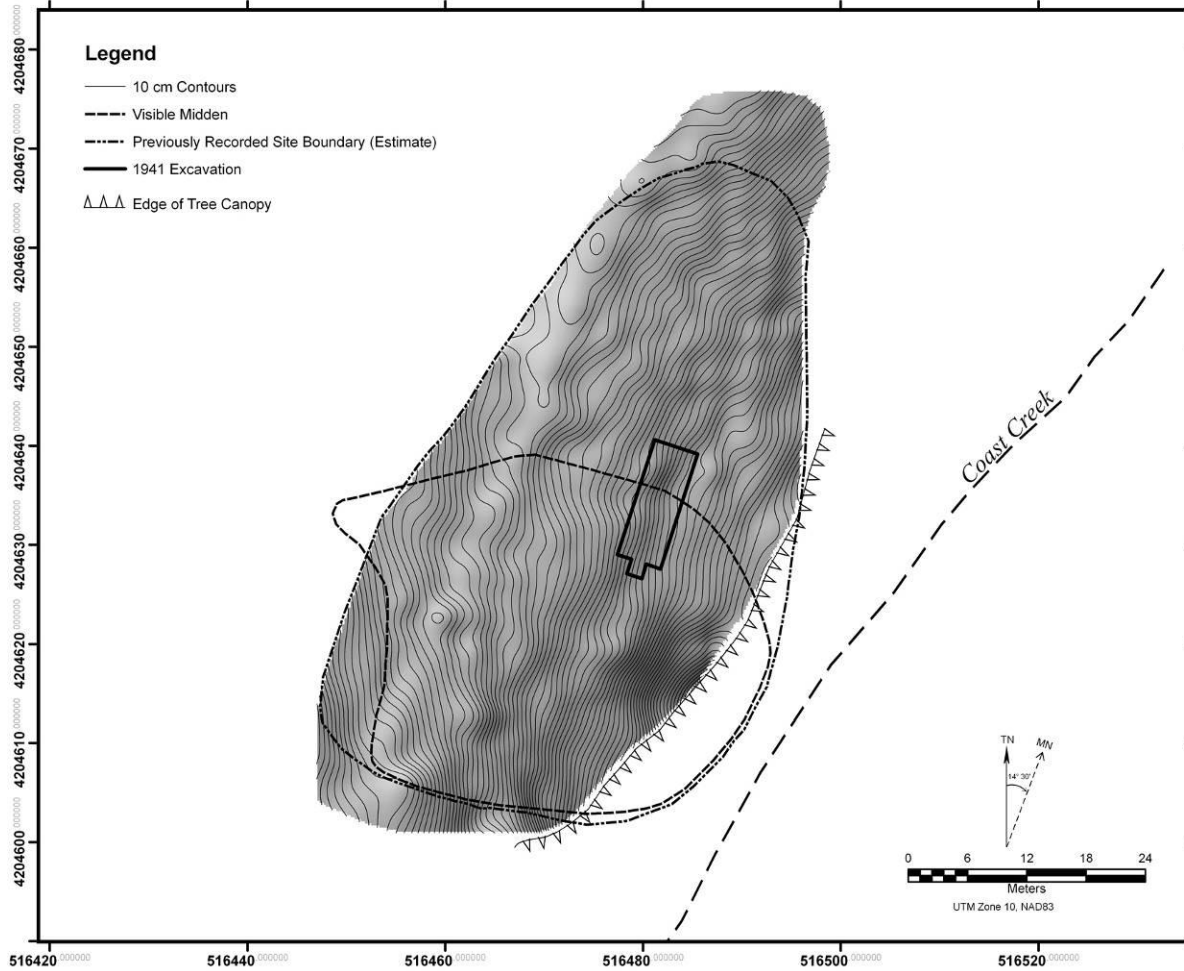


internally-consistent and spatial analysis will not be affected. If more precise locations for the excavation units are discovered in the future, the GIS database can easily be shifted to the more accurate coordinates.

Plotting Artifact Locations

After locating the original excavation units in real-world UTM coordinates within a GIS environment, my next step in reconstructing the 1940s to 1970s excavations at *tamál-húye* was to plot artifact locations for each site based on original provenience data. This process had a number of inherent complications. First, like most excavations, the various excavators who conducted field work at the six sites in my study used a number of levels of provenience, from point provenience (to the nearest inch) of selected artifacts to no provenience at all for others. They also recorded a number of intermediate levels of provenience, such as unit, trench, or area. In addition, some of the original records contained conflicting information. In the end, because of the high percentage of artifacts with point provenience relative to the rest of the assemblage from each site, I separated the artifacts that had point provenience recorded from the rest of the artifacts and I only plotted those artifacts in the GIS for analysis. For the purposes of plotting

Figure 6.9. Map of CA-MRN-271 showing estimated location of previous excavation units. Compare to Figure 4.5.

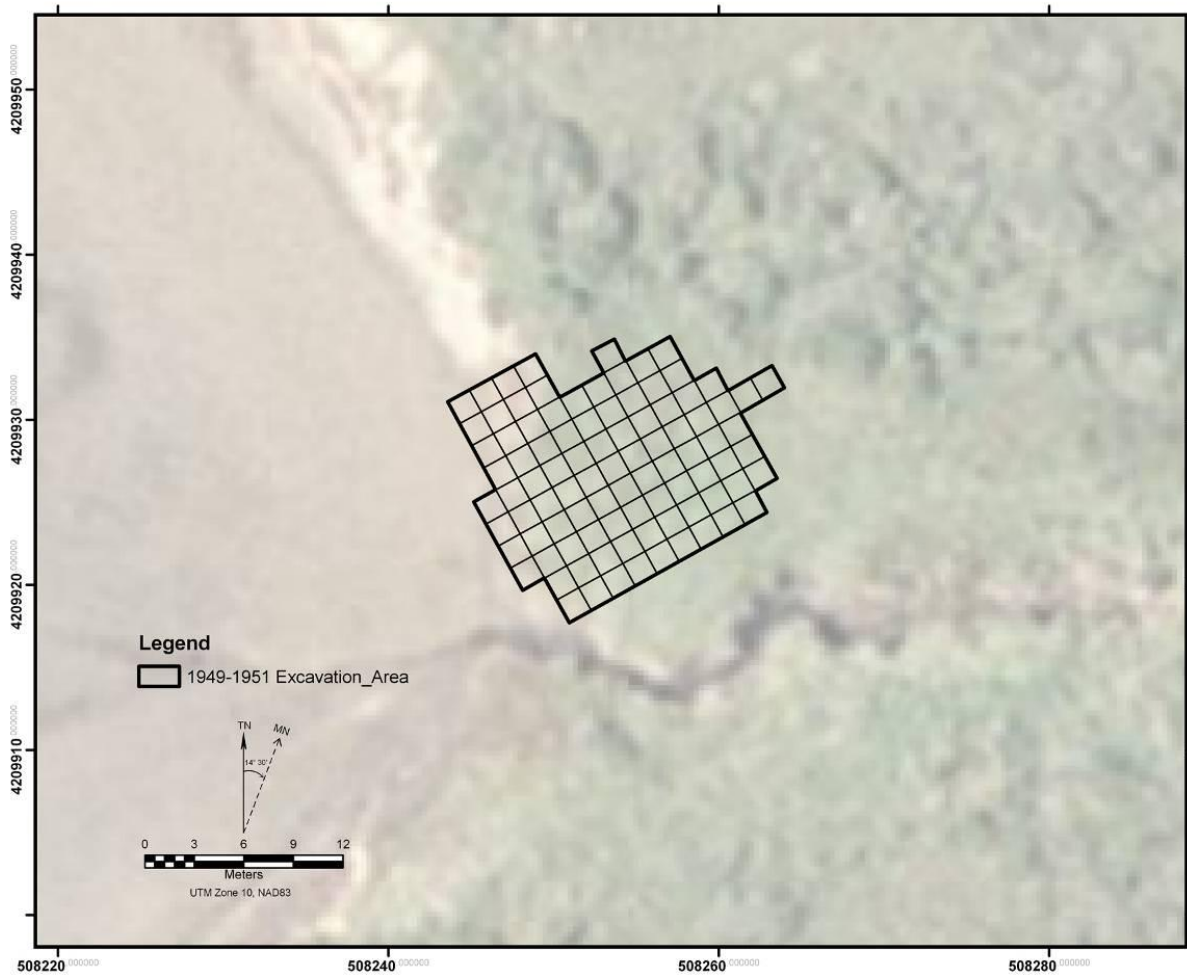


vertical artifact provenience in GIS, when a depth range is given instead of a precise depth, I plotted the artifact at the mean value of the range.

For CA-MRN-232, CA-MRN-242, and CA-MRN-271 Beardsley included trench number and depth for some artifacts in his field notes for the 1940-1941 excavations, but the artifact location data I used in most cases are from the original PAHMA catalog cards for the site, which include more precise provenience information. Although Beardsley included specific provenience information in his archived field notes for select artifacts, there is no comprehensive field catalog archived for the site, so the original source of the provenience information recorded on the typed catalog cards in the PAHMA is unknown or no longer exists (Joan Knudson, personal communication, 3/6/09). I assume that the information on the catalog cards is correct, except when there is a major discrepancy with Beardsley's notes (e.g., 10' vs. 10"), in which case I give the field notes priority. Likewise, since there are few field notes available for Meighan's 1949 excavation at CA-MRN-232, I rely solely on provenience information included on museum catalog cards.

At CA-MRN-232, Heizer and Beardsley recovered a total of 798 objects in 1940-1941 (including the artifacts associated with the 13 burials recovered during the excavation)(Figure

Figure 6.10. Map of CA-MRN-307 showing estimated location of previous excavation units over a 2007 aerial image (displayed with partial transparency). Compare to Figure 4.7.



6.11). This does not include faunal shell and bone remains, which generally do not have provenience information and are addressed separately in Chapter Five. Point provenience is recorded for 632 of the 798 objects (79%) (Figure 6.12). Slightly less precise, 20 artifacts (2%) have a specific section range identified as recovery location (e.g., Trench A, 0-10 ft. [0-3 m] north and 3 ft. [0.9 m] east of Datum A). Even less specific, 20 artifacts (3%) have only a single section or pit identified (e.g., Trench A, section 2N or Pit 2) and 18 artifacts (2%) have only a single trench identified (e.g., Trench A). Finally, 108 artifacts out of 797 (14%) have no provenience recorded. Either precise depth (in inches) or a depth range is recorded for most artifacts that are given locational information (whether point-, section-, or trench-level provenience). For the purposes of plotting the artifact location in GIS, when a depth range is given instead of a precise depth, I plotted the artifact at the mean value of the range. For the spatial analysis I present in Chapter Seven, I rely solely on the 632 artifacts with point provenience that Heizer and Beardsley recovered during the 1940-1941 excavations.

In 1949, Meighan used 10 ft. (3 m) by 10 ft. (3 m) units when excavating CA-MRN-232, and for artifact provenience he recorded locations to the nearest one-quarter unit (e.g., unit E-5, SE—a 5 ft. [1.5 m] by 5 ft. [1.5 m] area). Again excluding faunal shell and bone, Meighan

Figure 6.11. Total artifacts recovered at CA-MRN-232 by artifact category, 1940-1941 (n=798).

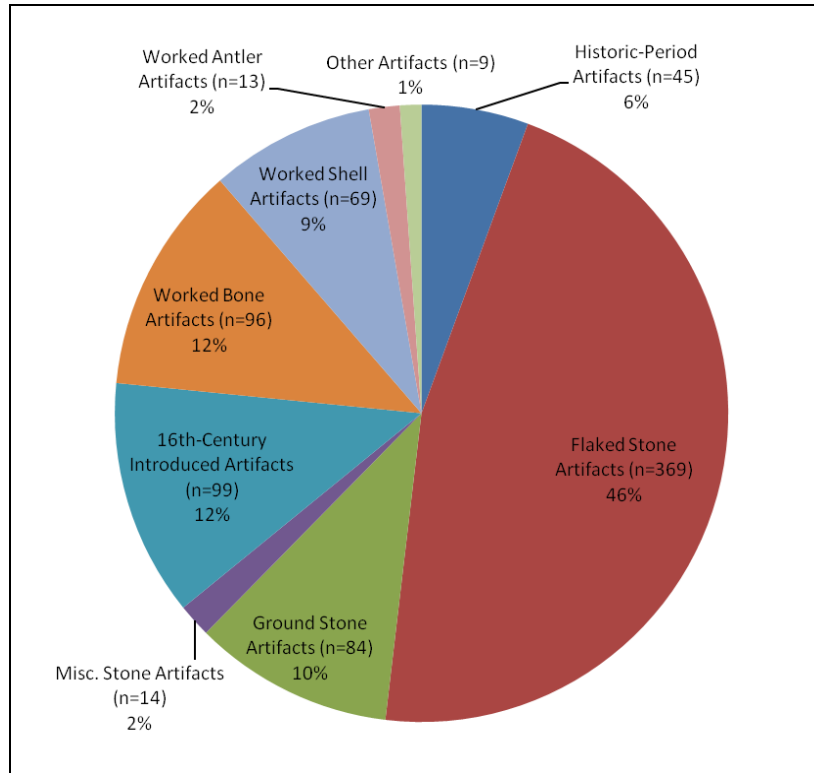
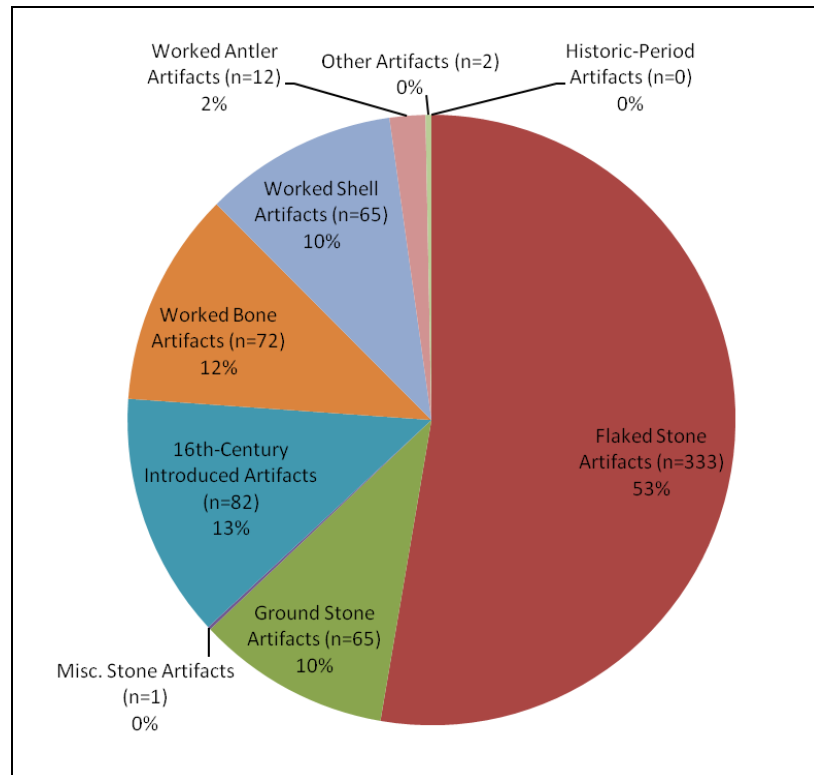


Figure 6.12. Artifacts recovered with point provenience at CA-MRN-232 by artifact category, 1940-1941 (n=632).



recovered at least 525 objects during the 1949 excavation at CA-MRN-232 (there are several lots of shell beads associated with burials that I did not examine and for which I do not have accurate counts) (Figure 6.13). Of these 525 artifacts, 355 artifacts (68%) have provenience to the nearest quarter unit, 18 artifacts (3%) have provenience to the nearest unit, and 152 artifacts (28%) have no recorded provenience (Figure 6.14). Because artifacts from the 1949 excavation at CA-MRN-232 are only given unit-level provenience and the exact spatial relationship between the 1940-1941 and 1949 excavation units is imprecise, I do not include these objects in my spatial analysis of CA-MRN-232 presented in Chapter Seven. None of the artifacts recovered in 1946 or 1950 have locations recorded, so I also do not include any of them in my spatial analysis, although I consider the entire assemblage for my overall artifact analysis (see Chapter Five).

Heizer and Beardsley recovered a total of 1,539 objects from CA-MRN-242 in 1940-1941 (including the artifacts associated with the 34 burials recovered from the site, but not including faunal remains)(see Figure 5.2). The majority of artifacts (1,327 of 1,539, 86%) are associated funerary objects recovered from the 33 burials. Point provenience is recorded for 1,460 of the 1,539 objects (95%)(Figure 6.15), including all artifacts recovered from burials. Slightly less precise, 37 artifacts (2%) have only a single section or pit identified (e.g., Trench A, section 2S or Pit 2) and six artifacts (0.4%) have only a single trench identified (e.g., Trench A). Finally, 36 artifacts out of 1,539 (2%) have no provenience recorded. Because so many artifacts are associated with burials, and it appears that sixteenth-century introduced objects were almost never placed in burials (see Chapter Five), I focused the spatial analysis of CA-MRN-242 on the 135 provenienced artifacts that were recovered in use-related contexts.

At CA-MRN-271, Beardsley and Treganza recovered a total of 299 objects (see Figure 5.3). Point provenience is recorded (or could be inferred) for 60 objects from the 1941 excavation and eight objects from the 1945 excavation, for a total of 68 objects with exact locations recorded (23% of the total assemblage)(Figure 6.16). As I mentioned above, however, I did not include the eight artifacts from Treganza's 1945 excavation in my GIS spatial analysis. Slightly less precise, a total of 44 artifacts have a specific trench and section identified as recovery location (e.g., trench A, section 6N—a 50 sq. ft. [4.6 sq. m] area)(15%). Even less specific, three artifacts have a single trench but more than one section identified (e.g., trench AA, section 7-8N—a 100 sq. ft. [9.3 sq. m] area)(1%), two artifacts have a single section but more than one trench identified (e.g., trench A-B, section 6N—a 100 sq. ft. [9.3 sq. m] area)(0.6%), and 61 artifacts have both multiple trenches and sections as provenience (e.g., trench A-AA, sections 7-8N—a 200 sq. ft. [18.6 sq. m] area)(20%). Finally, 49 artifacts are given a single trench as provenience (either A, B, or AA—a 200 or 225 sq. ft. [18.6 or 21 sq. m] area)(16%) and 16 artifacts are given more than one trench (AA-B—a 400 sq. ft. [37 sq. m] area)(5%). Finally, there are 45 artifacts out of 299 (15%) that have no provenience recorded. Either precise depth (in inches) or a depth range is recorded for most artifacts that are given locational information (whether point-, section-, or trench-level provenience).

Before attempting to assign the most specific location information possible to as many artifacts from CA-MRN-271 as I could for spatial analysis in GIS, I plotted the 68 artifacts with exact location information, and then looked more closely at the trench and section information for each. Focusing on the 1941 excavation, I found that 28 of 60 objects (46%) with point provenience recorded include either a trench or section designation that does not fit my inferred grid pattern. For some artifacts, the error is small enough (less than 0.5 m) that the discrepancy may be measuring or recording error. For others, the error is large enough (0.5 to more than 3 m) that the discrepancy is likely recording or transcribing error, either during excavation, when

Figure 6.13. Total artifacts recovered at CA-MRN-232 by artifact category, 1949 (n=525+).

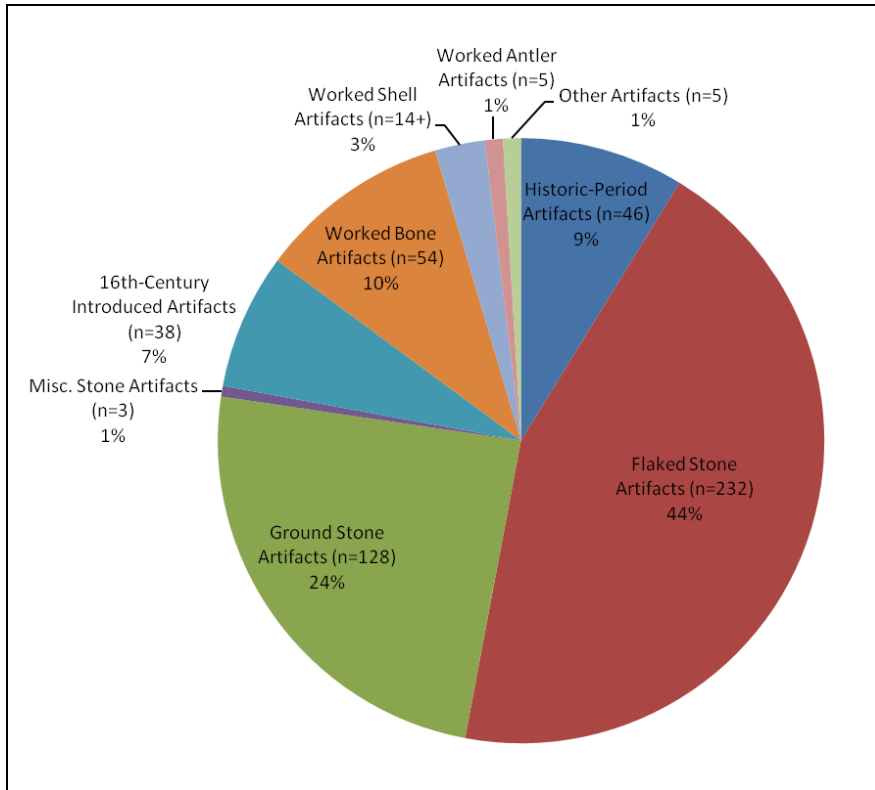


Figure 6.14. Artifacts recovered with unit provenience at CA-MRN-232 by artifact category, 1949 (n=355).

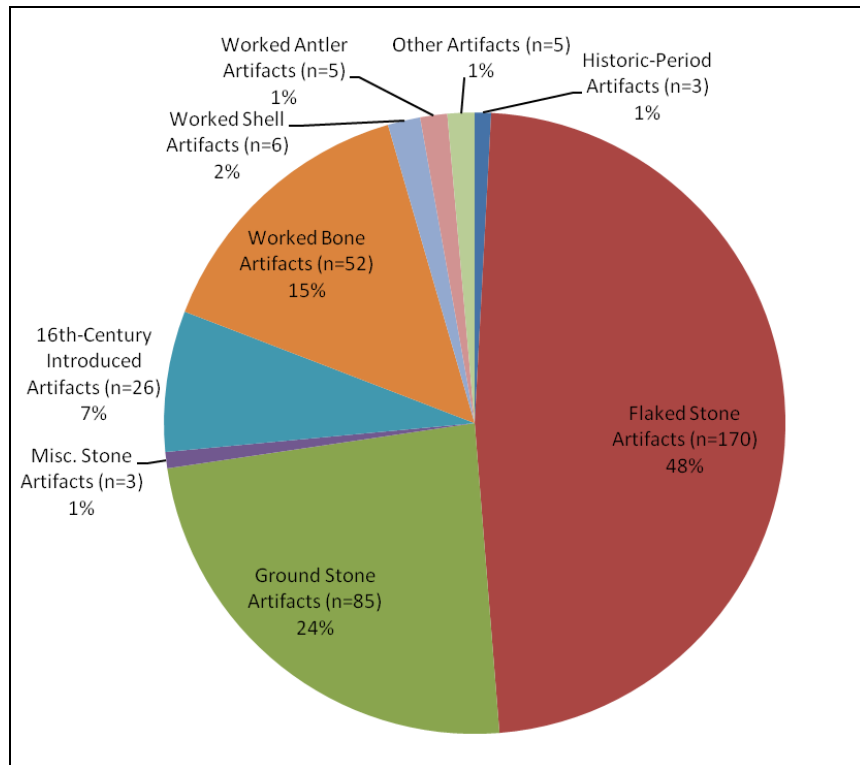


Figure 6.15. Artifacts with point provenience at CA-MRN-242 by artifact category, 1940-1941 (n=1,460).

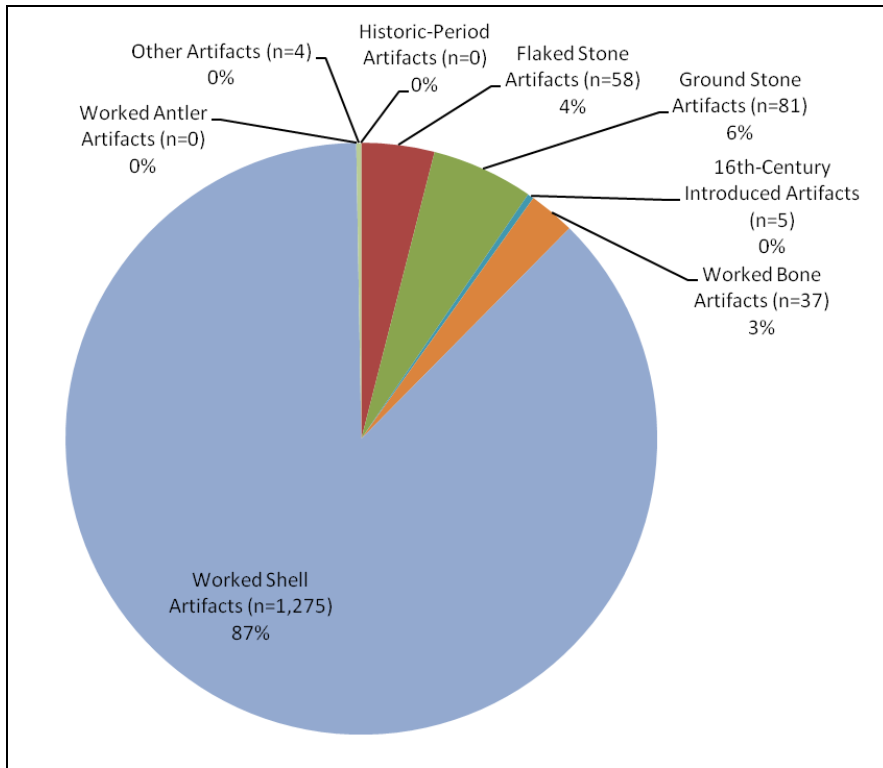
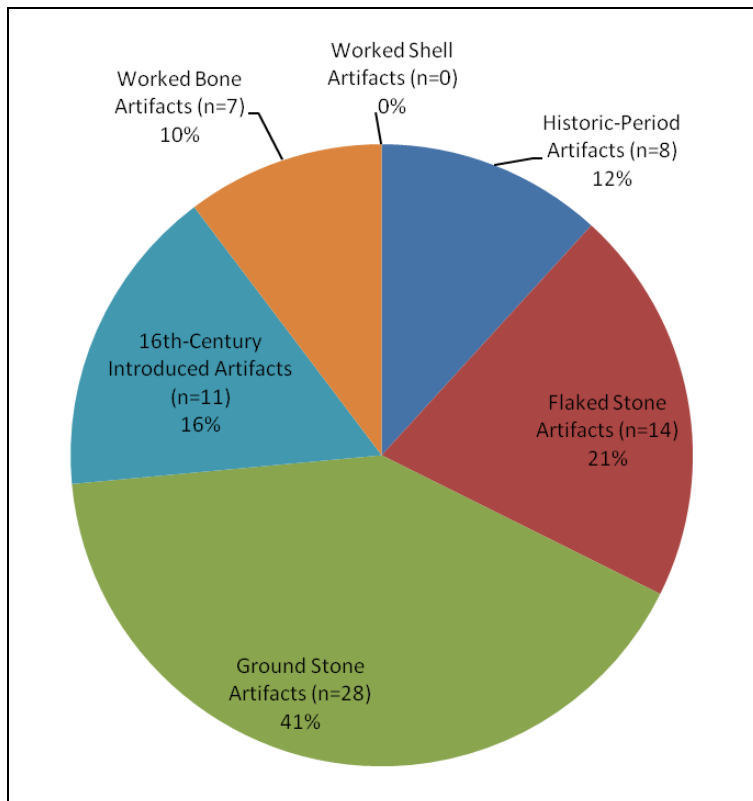


Figure 6.16. Artifacts recovered with point provenience at CA-MRN-271 by artifact category, 1941 (n=68).



the measured artifact location was recorded on an artifact form or in field notes, when that figure was entered into an artifact catalog, or when the artifact catalog was typed onto catalog cards in the PAHMA. Since only the catalog cards are currently extant, it is impossible to trace the source of the error. In view of this systemic error in the provenience data, it seems inadvisable to base spatial analysis solely on trench and section designations when nearly half of them may be incorrect. I therefore only use the objects with specific location information for my spatial analysis (which reduces the sample size available significantly, as well as reducing the effectiveness of the statistical analysis), and I assumed the specific provenience information recorded on the PAHMA catalog cards to be correct. I include a total of 51 artifacts from CA-MRN-271 in my GIS spatial analysis.

At CA-MRN-307, Meighan recovered a total of 561 objects in 1949-1951 (not including the single burial recovered from the site, nor faunal remains)(see Figure 5.4). Point provenience is recorded for 460 of the 561 objects (82%)(Figure 6.17), while 85 artifacts (15%) have only the excavation unit recorded and 16 artifacts (3%) have no provenience recorded. Because of uncertainty in the location of several units listed in PAHMA provenience records for the site, I deleted seven artifacts from the total list of provenienced items, resulting in 453 artifacts included in my GIS spatial analysis. Precise depth (in inches) or a depth range is recorded for most artifacts that have provenience recorded information.

Researchers recovered a total of 2,460 objects from CA-MRN-216 during excavations between in 1964-1967 (see Figure 5.5). Point provenience is recorded for 1,618 of the 2,460 objects (66%)(Figure 6.18). Less precisely, 594 artifacts (24%) have unit-level provenience, which means they were likely found in screens, level bags, or are shell artifacts that were routinely given only unit-level locations. Finally, 248 artifacts out of 2,460 (10%) have no provenience recorded. Either precise depth (in inches) or a depth range is recorded for most artifacts that are given locational information (whether point- or unit-level provenience).

At CA-MRN-298, excavators recovered a total of 2,973 objects from CA-MRN-298 during all excavations between 1956-1973 (see Figure 5.6). They recorded point provenience for 1,854 of the 2,973 objects (62%)(Figure 6.19), while 991 artifacts (33%) have unit-level provenience and 125 artifacts out of 2,973 (4%) have no provenience recorded. Again, either precise depth (in inches) or a depth range is recorded for most artifacts that are given provenience information (whether point- or unit-level provenience). During several of the CA-MRN-298 excavations, including the original 1956 site tests, and Treganza's work in 1959 and 1964, researchers' did not record artifact provenience. The 1956 test pits and Treganza's large-scale excavation in 1959 both took place at CA-MRN-298W, while Treganza's more modest 1964 excavation took place at CA-MRN-298E. This resulted in a greater percentage of provenienced artifacts at CA-MRN-298E (1,093 of 1,620, or 67%) than from CA-MRN-298W (761 of 1,350, or 56%)(Figures 6.20-6.23). Despite this shortcoming, a substantial number of artifacts excavated from both CA-MRN-298E and CA-MRN-298W have point provenience associated with them. Because of the spatial separation of the two site loci at CA-MRN-298, and the completely different provenience systems for each, I conducted spatial analysis of each loci separately. I then looked for spatial patterning of the site as a whole.

Comparing Provenience of Introduced Artifacts vs. Indigenously-Manufactured Artifacts

Since the researcher's primary goals at each of the sites excavated in *tamál-húye* was to locate sixteenth-century introduced artifacts and burials (e.g. Heizer 1949c:25), I examined

Figure 6.17. Artifacts recovered with point provenience at CA-MRN-307 by artifact category, 1949-1951 (n=460).

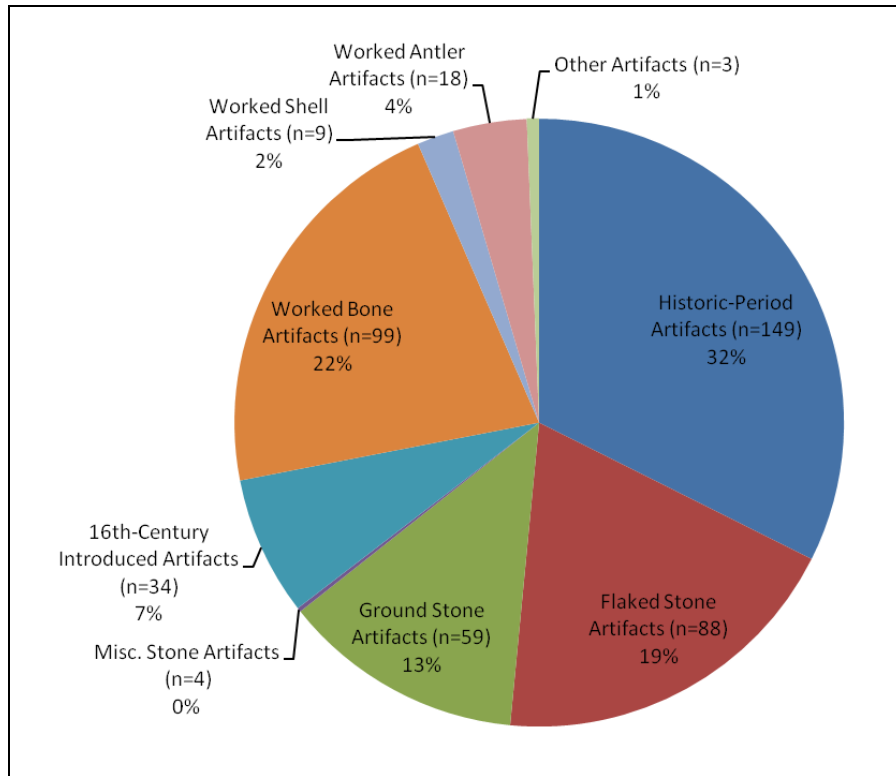


Figure 6.18. Artifacts with point provenience at CA-MRN-216 by artifact category, 1964-1967 (n=1,618).

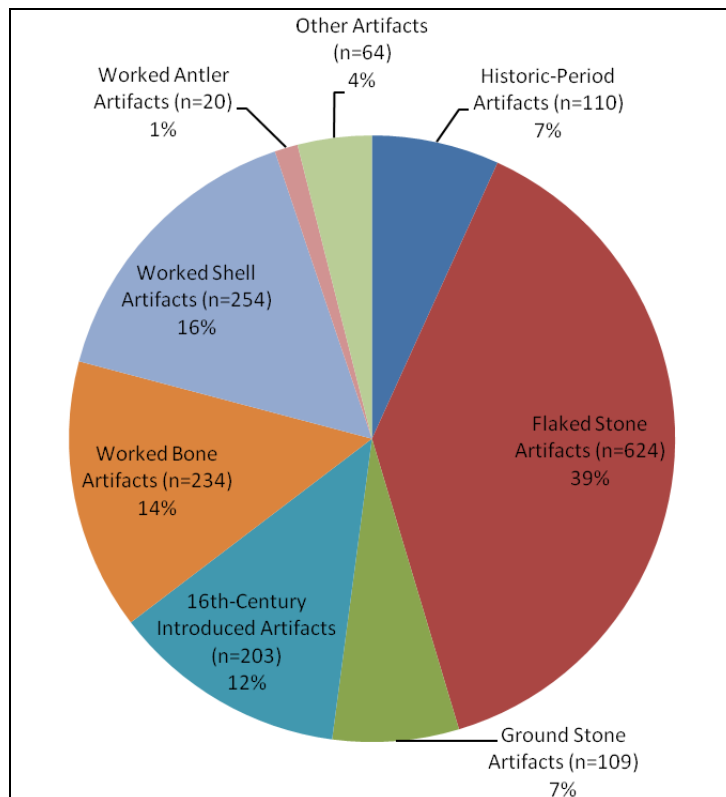


Figure 6.19. Artifacts with point provenience at CA-MRN-298 by artifact category, 1956-1973 (n=1,854).

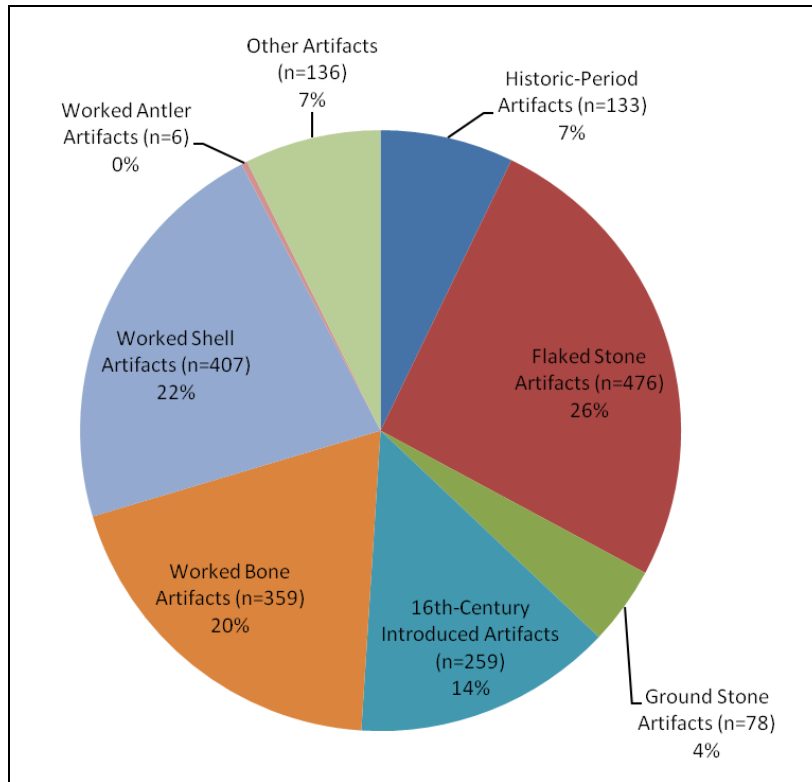


Figure 6.20. Artifacts recovered at CA-MRN-298E by artifact category, 1956-1973 (n=1,620).

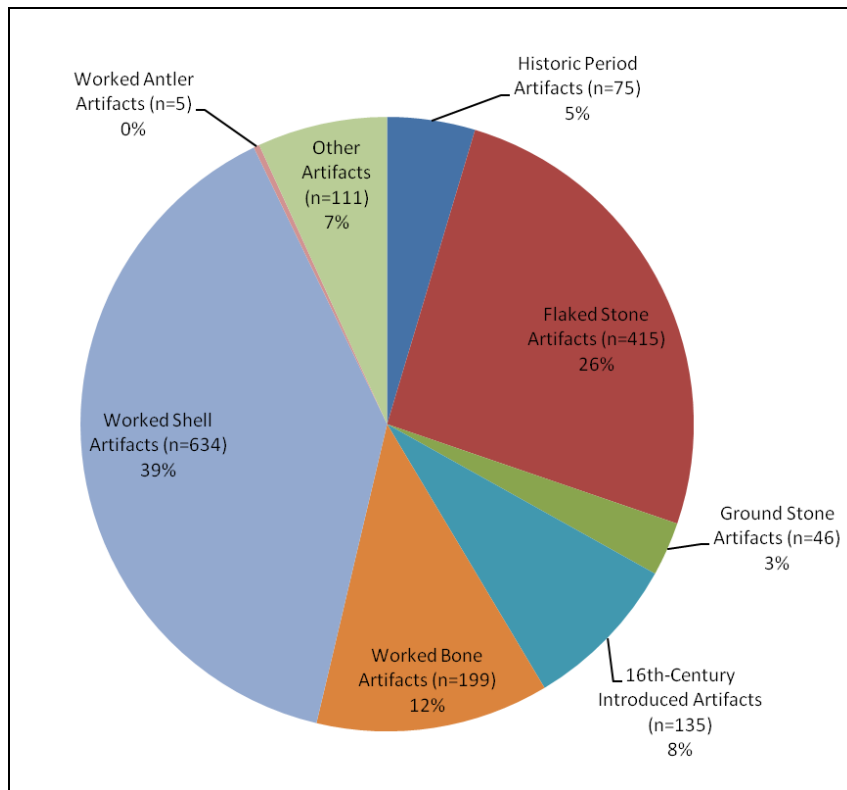


Figure 6.21. Artifacts with point provenience at CA-MRN-298E by artifact category, 1956-1973 (n=1,093).

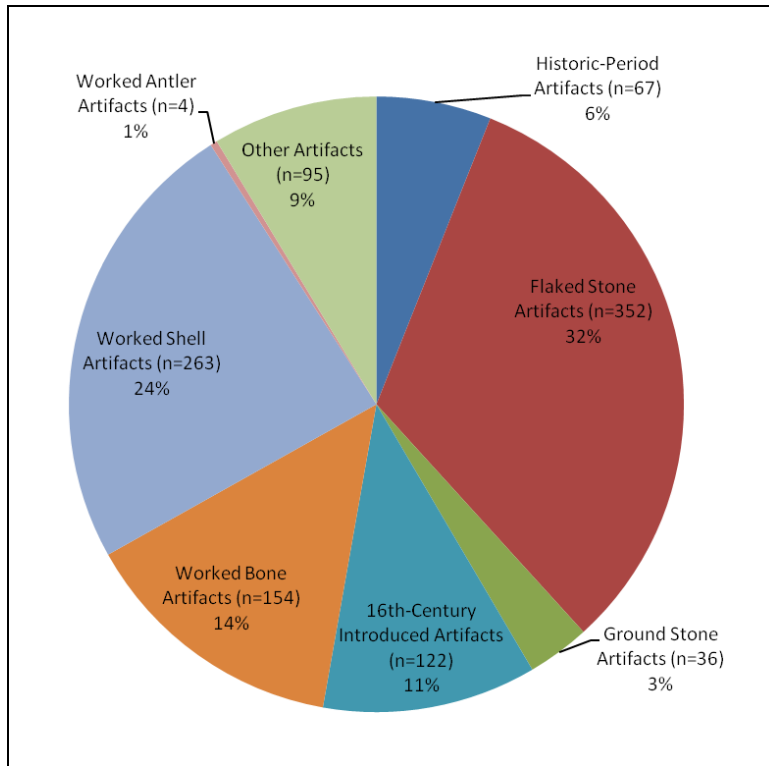


Figure 6.22. Artifacts recovered at CA-MRN-298W by artifact category, 1956-1973 (n=1,350).

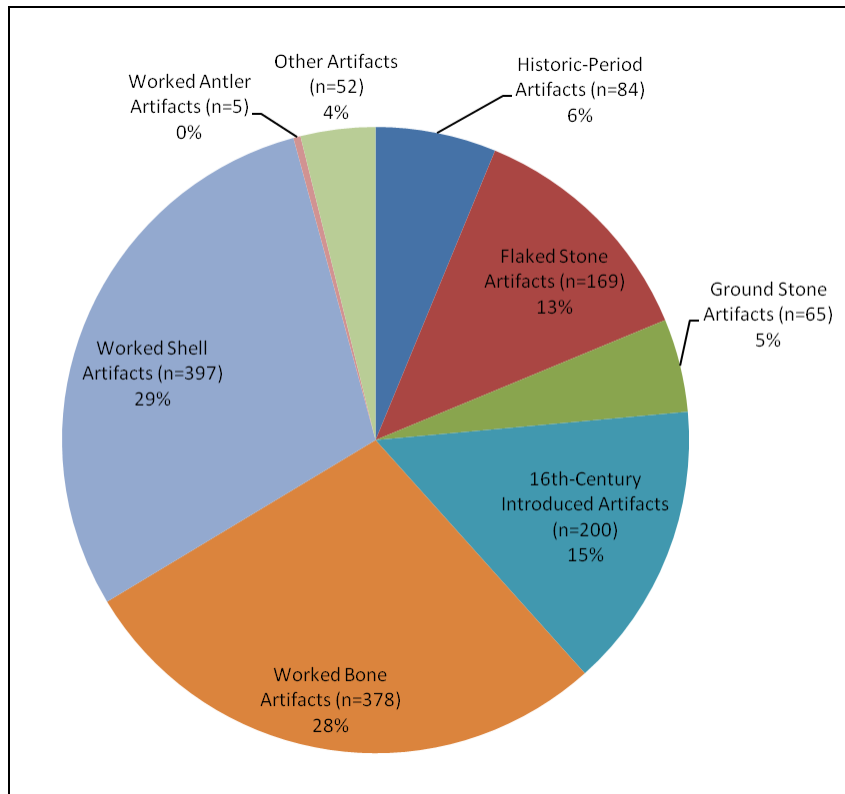
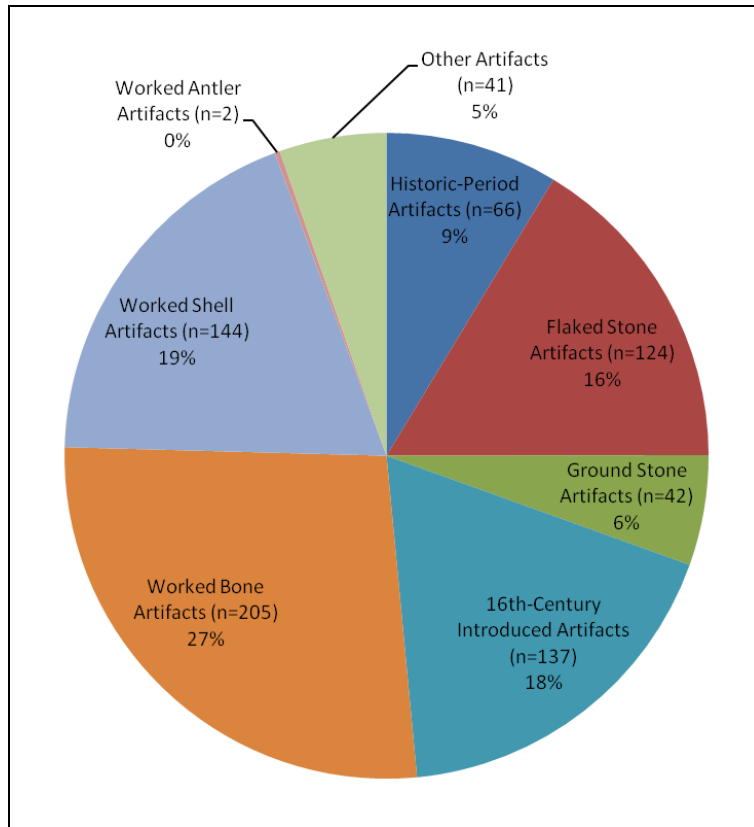


Figure 6.23. Artifacts with point provenience at CA-MRN-298W by artifact category, 1956-1973 (n=761).



whether that research focus may have biased whether non-sixteenth century artifacts received point-provenienced locations or not. I compared the total number of each recovered object class with the total number of each object class with exact location information for all excavations. At CA-MRN-232, CA-MRN-242, CA-MRN-271, excavators were most biased against historic-period objects, few of which were given point provenience, but otherwise the sixteenth-century objects were not recorded more precisely than other artifact classes (Figures 6.24-6.27). The sixteenth-century introduced artifacts with exact provenience at each site are comparable to the percentage of flaked stone artifacts, ground stone artifacts, worked bone artifacts, and worked shell artifacts with point provenience. This indicates that even though sixteenth-century artifacts were the focus of the University of California archaeologist's excavations, they did not bias the researcher's documentation of California Indian-manufactured artifacts.

At CA-MRN-307, on the other hand, it appears the excavators were remarkably equitable in recording artifact provenience (Figure 6.28). Other than the miscellaneous stone artifact category (only one of four miscellaneous stone artifacts was given precise provenience), it seems that sixteenth-century objects were not recorded more precisely than other artifact classes.

Examining data from the 1964-1967 CA-MRN-216 excavations and the 1956-1973 CA-MRN-298 excavations, it appears excavators were not biased against any particular artifact class, with the exception of shell beads and bead blanks (46% of which were given point provenience at CA-MRN-216 and 39% at CA-MRN-298), and again there is no evidence that sixteenth-century objects were recorded more precisely than other artifact classes (Figures 6.29 and 6.30).

Figure 6.24. Percentage of each artifact category with point provenience at CA-MRN-232, 1940-1941.

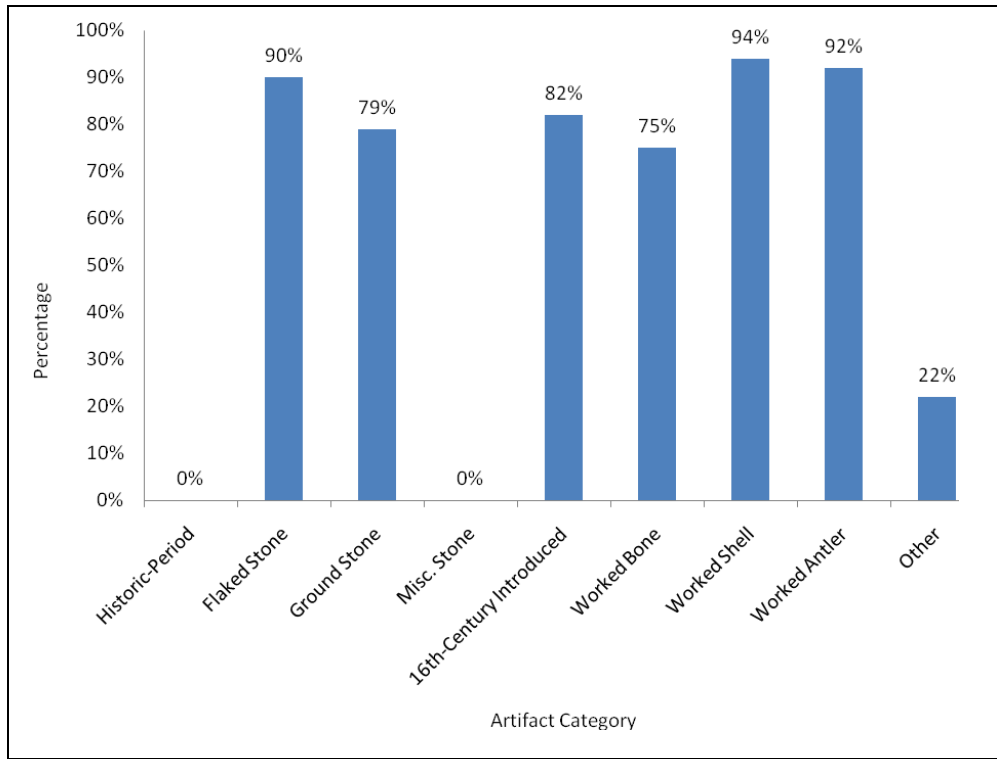


Figure 6.25. Percentage of each artifact category with point provenience at CA-MRN-232, 1949.

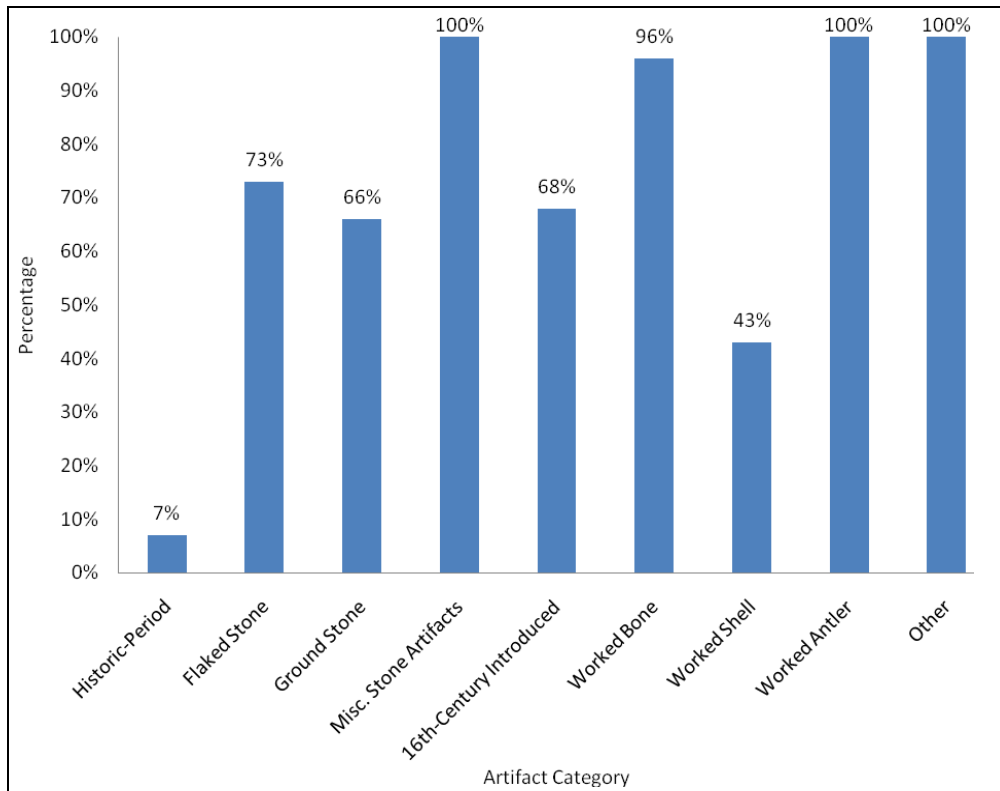


Figure 6.26. Percentage of each artifact class with point provenience at CA-MRN-242, 1940-1941.

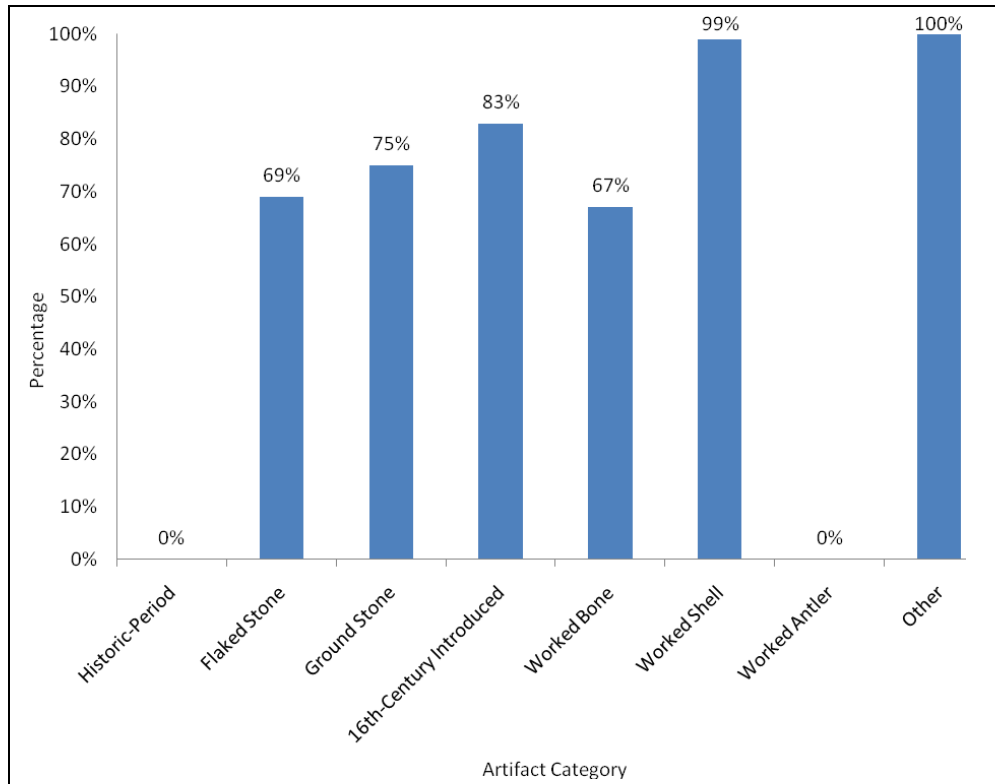


Figure 6.27. Percentage of each artifact class with point provenience at CA-MRN-271, 1941.

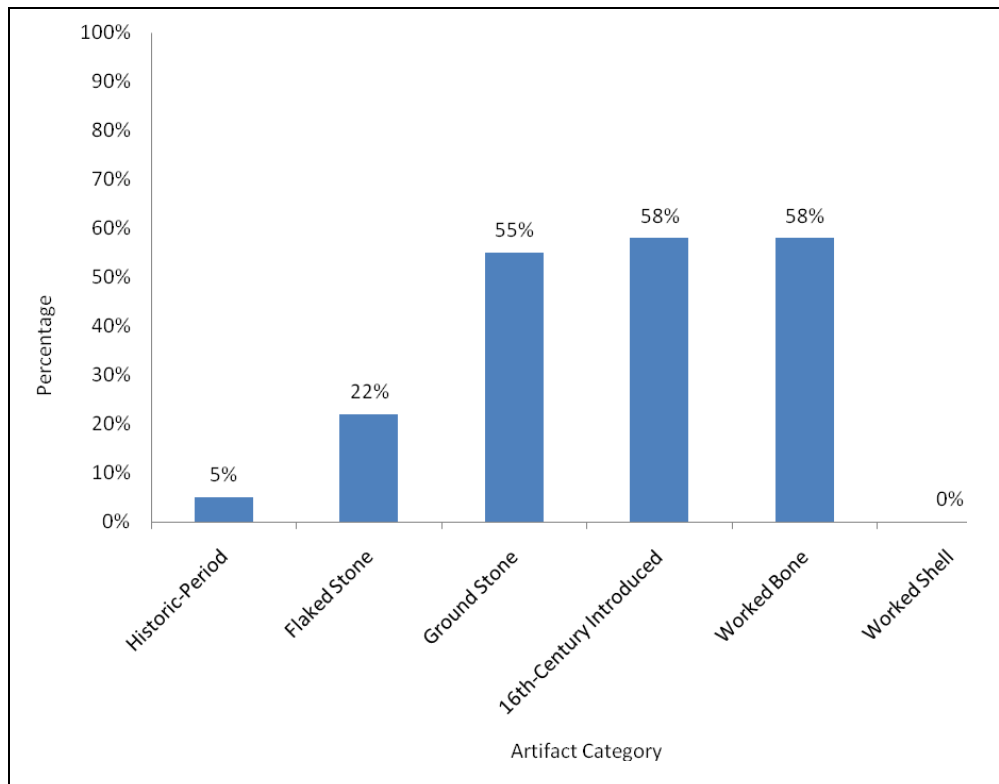


Figure 6.28. Percentage of each artifact class with point provenience at CA-MRN-307, 1949-1951.

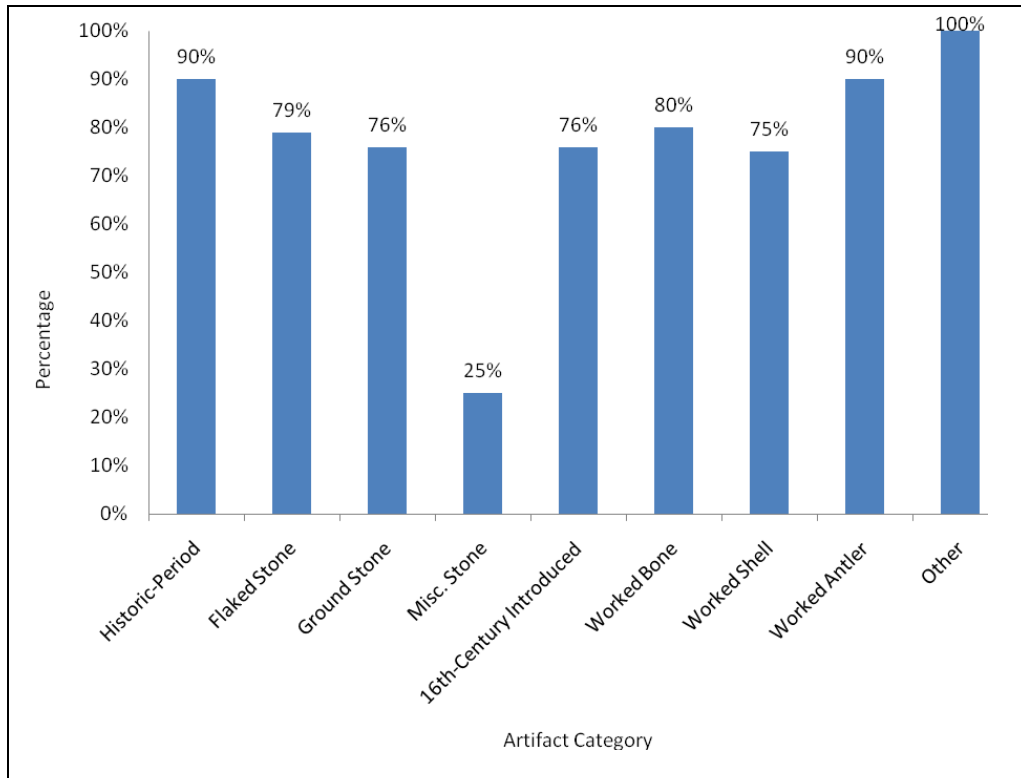


Figure 6.29. Percentage of each artifact class with point provenience at CA-MRN-216, 1964-1967.

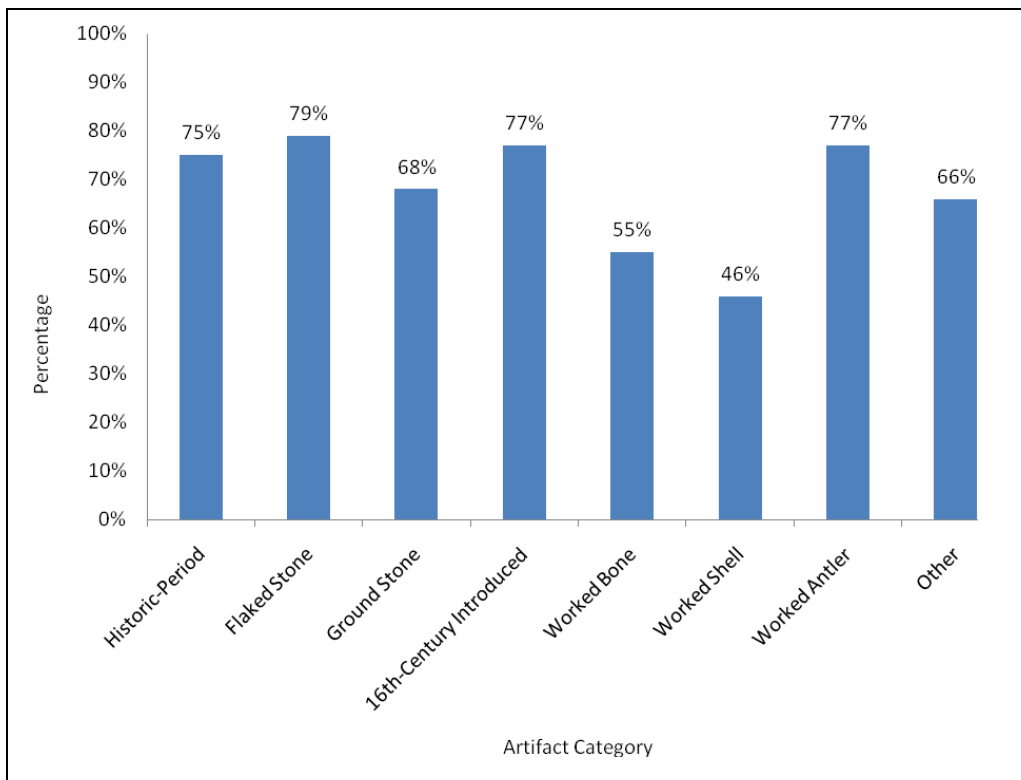
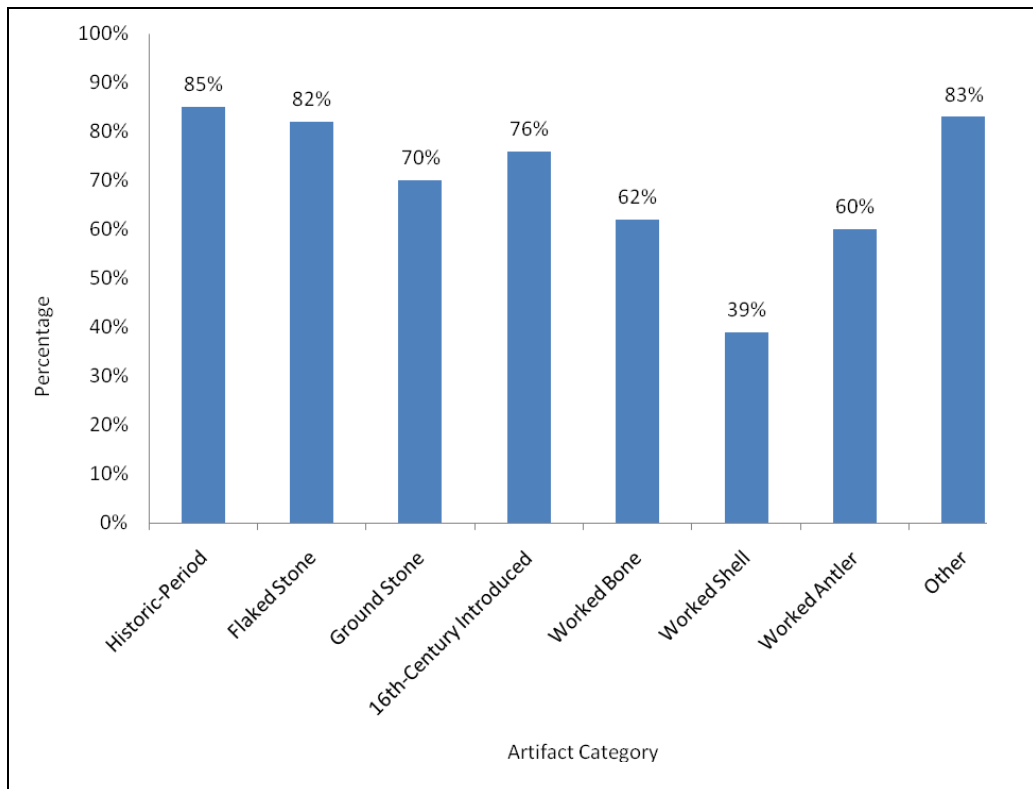


Figure 6.30. Percentage of each artifact class with point provenience at CA-MRN-298, 1956-1973.



CONCLUSION

Despite the limitations inherent in using “old” excavation data and the challenges of reconstructing the spatial structure of sites based on work conducted by a number of different researchers, I have been able to recreate the provenience of a substantial number of artifacts and features for analysis within a GIS. Using a combination of historical documentation and field research, I was able to reasonably estimate the real-world locations of the original field excavations at each site for inclusion in the GIS. I then used original artifact provenience data from artifact catalogs, museum catalog cards, and field notes to “populate” each site with individual artifacts. The biggest limitation was with the original excavation methodology, which resulted in a number of artifacts receiving less than full point provenience. Nonetheless, I have an extensive assemblage of provenienced artifacts to work with from each site. The next step is to conduct ESDA of intra-site patterning for each site, and compare the results between sites. This analysis is the focus of Chapter Seven.

CHAPTER SEVEN

GEOGRAPHIC INFORMATION SYSTEM (GIS) ANALYSIS OF PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

INTRODUCTION

This chapter focuses on spatial analysis of artifact and feature distributions conducted within a Geographic Information System (GIS). My analysis focuses on evaluating the context and spatial associations of the full artifact assemblage from each of the six sites that form the core of my study, including both introduced and indigenous materials, to generate interpretations about how artifacts may have been associated with particular activities and how they were used in daily cultural practices. The artifact's spatial patterning, reconstructed from original excavation records, may reveal if introduced artifacts were associated with specific activities or classes of indigenous artifacts that reflect particular practices. I begin by discussing the overall methodological approach that I use for my GIS spatial analysis, including a discussion of each of the analytical tools that I use. I then discuss the results of the analyses for each of the sites, and finally compare each of the sites.

METHODOLOGICAL APPROACH

Background

In the past, culture contact and colonialism studies often used the presence or absence of European, or other “introduced,” artifact categories to gauge the degree of “assimilation” an indigenous group had undergone as a result of contact with colonial enterprises. These artifact-based “acculturation” approaches assumed cultural assimilation based on incorporation of European material culture into their cultural practices (Deetz 1978; Farnsworth 1989a, 1989b; Hoover 1989, 1992), an assumption researchers now recognize as overly simplistic and problematic (Loren 2000; Rubertone 2000; Saunders 1998; Silliman 2009). Later studies, while also artifact-based, acknowledged limitations of earlier methods and included a more nuanced recognition of multiethnicity and the material complexity of pluralistic communities (Birmingham 2000; Deagan 1990, 1983, 1995; Farnsworth 1992; Hoover 1992). Importantly, these approaches assume reciprocal movement of both material goods and subsequent culture change, and consider the complexity of who used what artifacts, moving beyond simplistic notions that “Indian” artifact forms were used by Indians, and vice versa. In addition, and most importantly, they consider *how* the artifacts were used, and they recognize that when foreign objects are incorporated into indigenous practice in ways that do not change underlying behavior, then no cultural transformation has occurred. Thus the presence of European objects in native contexts alone cannot be used to assume acculturation.

More sophisticated methodologies based on the presence of European or other “introduced” artifacts consider indigenous worldview in addition to utilitarian concerns, and examine in more detail the context of recovered objects (Cabak and Loring 2000; Marshall and Maas 1997; Rogers 1990; Wagner 1998). These approaches demonstrate that indigenous groups approached cross-cultural encounters with outsiders from their own particular worldview, and actively chose what aspects of the introduced culture to incorporate within their own. Wilkie and

Farnsworth (1999; 2005), for example, demonstrate how enslaved Africans often chose ceramics based on cultural considerations that served to reinforce group identity (see also Farnsworth 1996; Wilkie 2000). Cabak and Loring (2000) used a similar approach to examine Inuit incorporation of English stamped earthenware into domestic assemblages, and Marshall and Maas (1997) illuminated how indigenous populations on the American Northwest coast included European ceramics in ritual and social contexts, and the role such ceramics played in culture change. From an archaeological standpoint, recognizing the unique role that introduced material culture may play in indigenous cultural practices requires a detailed knowledge of the object's context. As Mills reminds us about "inalienable possessions,"

...it is clear that contextual data are needed for their recognition and interpretation. Certain classes of objects can be conjectured to be inalienable objects based on their general forms but cannot be verified without knowing their depositional contexts. It is this attention to their biographies, and especially their deposition in structured ways, that provide keys to their social use, and that places archaeological data squarely at the forefront of studies of materiality (Mills 2004:247).

More recent approaches move beyond interpretation based on artifactual evidence alone to include a wide range of additional archaeological data sets, including organization of residential space, trash disposal methods, food choice and preparation, and settlement layout—"contextual" approaches that examine material remains within the context of daily practice (Burley, et al. 1992; Crowell 1997; DeCorse 1992, 1998; Harrison 2004; Kelly 2002; Loren 2000, 2001; Silliman 2004; Williamson 2004b). Lightfoot et al. (1998; 1997), for example, utilized a "contextual" approach that situates artifacts physically within the built environment and conceptually within the notion of daily practice. Rather than using universal acculturation models, Lightfoot and his colleagues interpreted material culture excavated at Fort Ross within specific cultural contexts and the larger spatial organization of the site, while they nested the site within larger regional and pan-regional contexts. They focused on aspects of daily practice that result in archaeologically-recoverable material assemblages, including domestic material culture and other artifacts, but which highlight the organization of residential space, methods of trash disposal, choice and preparation of food, and settlement layout. By examining each of these data sets along a comparative baseline, they make the case that social identity in pluralistic communities is comprised of a combination of worldviews from the individual ethnicities represented, each referenced in different ways and at different scales (see also Lightfoot 1995; Martinez 1997).

Present Methodological Approach

The methodological approach I utilize in this study combines aspects of a number of different approaches such as those outlined above. I combine artifact-based and contextual approaches when examining the material remains from the sites at Point Reyes. I examine the relationship between introduced sixteenth-century artifacts and contemporary indigenously-manufactured objects to identify potential associations and spatial patterns. Because of the historical contingencies of the sixteenth-century cross-cultural encounters at *tamál-húye*, by comparing the "European" objects from the site to the "Indian" artifacts from the site, I am

obviously not looking at degrees of acculturation or assimilation, but am instead attempting to understand how the Tamal people viewed the material culture from the shipwreck and how they incorporated it into their cultural practices. Using spatial analysis of artifact distributions within sites has been a fundamental element of archaeological interpretation for decades (i.e., Hodder and Orton 1976), but recent developments in computing power and development of sophisticated, GIS software allows complex spatial analysis to be more fully integrated into developing interpretations at the sites.

For the spatial analysis of artifact distributions in GIS, my goal was to compare distributions of introduced sixteenth-century artifacts, primarily Chinese blue-and-white export porcelain, to other categories of objects used by Tamal individuals living at the sites to identify potential associations. Determining exactly what artifact categories to compare, however, was a primary concern. My first consideration was to discriminate objects based on their age. Because objects from earlier and later time periods were likely not in use during the late-sixteenth and early-seventeenth centuries when the Tamal likely actively made the introduced objects from the *San Agustín* as part of their material culture, I separated all Middle Period (2500 to 1000 B.P.) and Historic Period (post-1770) artifacts (based on association, stratigraphy, and artifact type) as separate distributions, and I do not include them in my comparisons. I therefore focus my analyses on the distributions of possible Late Period (1000 B.P. to contact) objects, as well as Protohistoric Period objects (the introduced sixteenth-century artifacts from the *San Agustín*).

As discussed in Chapter Five, I initially categorized artifacts based on artifact type and raw material (flaked stone, ground stone, worked bone, worked antler, worked shell, sixteenth-century introduced material, and historic objects). To make meaningful comparisons that would directly address my primary research question, however, an important consideration during my GIS analysis was to, as much as feasible, compare *practices* represented by artifacts, rather than simply comparing *artifact types* (Hodder and Orton 1976:29). Silliman (2009) recently pointed out that categorizing artifacts as simply “European” or “indigenous” can be problematic when evaluating cross-cultural encounters, and that highlighting cultural practices, rather than artifact-types, can result in more nuanced interpretations (see also Loren 2000, 2001). He noted that a focus on practice, not objects, is particularly important for understanding not only the meaning or value put on objects, but for whom the objects were meaningful or valued. For spatially analyzing artifact distributions within the GIS, therefore, I re-classified the artifacts based on association with general cultural practices or use during their daily lives. To determine how the Tamal incorporated introduced objects from the *San Agustín* shipwreck into their cultural practices, it is necessary to compare introduced sixteenth-century object distributions to other artifact groups based on cultural practices, rather than artifact types. Ground stone artifacts, for example, were used in many different contexts: mortars and pestles were used for food processing, steatite and magnesite beads were used as ornaments, and charmstones may have had a symbolic function as objects that brought luck or had spiritual significance (Collier and Thalman 1996). I initially classified each of these artifacts as ground stone objects, but to accurately compare spatial distributions of these objects with other artifact categories, it is necessary to re-classify these objects based on their potential use by the Tamal people, and to group them with other similar artifacts from different categories. For example, large, ornate obsidian bifaces were likely used symbolically during dances and other ceremonies, and not for hunting, and should therefore be categorized with charmstones and not with normal projectile points.

Finally, since there is no evidence that sixteenth-century introduced objects were associated with burials (see Chapter Five), during my analysis I separated burials and associated funerary objects from the rest of the Late Period assemblages, and do not consider them in my comparison of artifact distributions. Objects located with inhumations and cremations were not recovered from use-related contexts, and so to include them with the other artifacts of the same categories would falsely skew the spatial distributions. In addition, the contemporary descendents of the Tamal, the Federated Indians of Graton Rancheria, asked that I not physically examine associated funerary objects in the museum collections. I did, however, create GIS layers for burials at each site to examine the broad distribution for any relevant patterns.

Based on this new classification scheme, the functional grouping of artifact distributions I use to compare to the introduced sixteenth-century artifacts are food processing (this includes both animal and plant processing artifacts, such as bifaces and mortars, as well as faunal bone and shell), craft production (primarily bone awls and awl fragments), hunting and fishing (including projectile points and net weights), lithic production (hammerstones, flakers, and lithic debitage), ornamentation (shell and ground stone beads and ornaments), and symbolic artifacts (charmstones and other objects that may have had ritual meaning).

Geographic Information System (GIS) Analysis

As discussed in detail in Chapter Six, for this study I reconstructed as completely as possible the previous excavations conducted at six key sites in *tamál-húye* during the 1940s to 1970s within a GIS, and I used exploratory spatial data analysis (ESDA) to analyze intra-site artifact and feature patterning (also known as distributional analysis). Plotting artifacts from each site in GIS allows me to statistically analyze spatial patterns and relationships between various artifact classes using ESDA, a method that combines graphic and statistics functions within a GIS to search for general trends (McCoy and Ladefoged 2009:265). In particular, I evaluate whether introduced sixteenth-century objects from the *San Agustín* are clustered in statistically-significant ways, and if so, whether the clusters are associated with clusters of particular indigenously-manufactured artifact-types that may represent specific cultural practices.

An approach utilizing ESDA has as its foundation a technique known as exploratory data analysis (EDA)(Clark 1982; Williams, et al. 1990). In contrast to a more formal methodology involving hypothesis formulation and evaluation of test implications, EDA "...emphasizes flexible, open minded exploration to facilitate the discovery of unexpected patterns ..." (Williams, et al. 1990:243). Clark (1982), however, recommends that hypotheses generated using EDA be confirmed using confirmatory data analysis (CDA). According to Williams, et al.,

EDA involves iterative, stepwise examination and visual inspection as well as evaluation of both orthodox and alternative representations of data structure. In recognition of the multidimensional complexity of data analysis, EDA places emphasis on graphic representations of data, including display features such as colour-coded overlays of data and three-dimensional plot rotations of multivariate relationships, to bring the human brain's full visual processing capabilities into the gestalt of pattern recognition....EDA offers great promise in providing an alternative to the constraints and rigidity of confirmatory hypothetico-deductive methods where complex processes must be viewed as simple cause and effect relationships (Williams, et al. 1990:244).

Evaluation of spatial patterning in a GIS is an especially effective way to use ESDA for archaeological applications. I use this methodology in conjunction with point pattern and distributional analysis using several statistical tools to evaluate whether spatial patterns exist within the data sets from the six sites on which this study focuses.

While GIS has been a powerful tool for evaluating regional-level archaeological inquiry for many years (e.g. Conolly and Lake 2006; Ebert 2004; Gonzalez-Tennant 2009; Wheatley and Gillings 2002), using GIS for intra-site analysis has not developed at the same pace. Increasingly, however, archaeologists recognize the explanatory value that such studies can bring to archaeological interpretation (D'Andrea, et al. 2002; Katsianis, et al. 2008; McCoy and Ladefoged 2009; Nigro, et al. 2003; Spikins, et al. 2002).

True three-dimensional analyses, however, remain a challenge (Abdul-Rahman and Pilouk 2008; Batty 2005; Maguire, et al. 2005). Statistical tools available in the commercially-available ArcGIS software by ESRI apply only to two-dimensional data. Three-dimensional visualization in ESRI's ArcScene is useful and can lead to further understanding of spatial relationships, but because it is not possible to analyze spatial relationships in ArcScene, this is referred to as 2.5D data, and is not true three-dimensional data. ArcGIS's 3D Analyst extension can be used to manipulate, visualize, and display three-dimensional data (i.e. containing x, y, and z coordinates), but true three-dimensional analysis cannot be achieved. As Abdul-Rahman and Pilouk note, "[a]ny [three-dimensional] model should be able to describe relationships between data in such a way that information can be generated from them" (Abdul-Rahman and Pilouk 2008:23). Further, "[a] true 3D topology would allow spatial queries such as, 'what is next to,' 'what surrounds,' 'what is above, below, to the side of,' 'what is the relationship between this feature and surrounding feature,' etc. Stacked 2D representations do not allow these kind of queries, except for those entities on the same plan (in the same layer)" (Harris and Lock 1996:309). With ArcGIS, even using 3D Analyst, it is not possible to apply spatial statistics tools to three-dimensional data, or to generate new information about the features. Therefore, this is not true three-dimensional analysis. Nonetheless, examining the relationships between objects and features visually displayed in three-dimensions is still critical for generating a more complete understanding of the relationships between objects (Batty 2005:42). For each site, I created a 3D plot of artifacts and features and visually examined vertical and horizontal distributions for patterns that do not appear in a plan-view analysis.

Spatial statistics tools included in the GIS software (ArcGIS 9.3) allow me to examine the 2D distribution of artifacts and features across the site in a number of ways, which help me to draw conclusions about intra-site patterning. Spatial statistics allows comparison of spatial distributions of objects to hypothetical random spatial distributions for true spatial pattern analysis—when the observed distribution varies from the random distribution, the data can be considered to be patterned (Mitchell 2005:19). Using spatial statistics is a rigorous and objective way to identify patterns in the archaeological record and to ensure they are not due to random chance (Hodder and Orton 1976:241; Mitchell 2005:149). The tools that I use in this study include artifact density across the site's surface; mapping the arithmetic mean center of the distribution of each artifact type and calculating standard deviational ellipse of each artifact-type distribution; and calculating nearest neighbor index for the distribution of each artifact type, applying Ripley's *K*-function to each distribution, as well as using Nearest Neighbor Hierarchical Clustering to identify and statistically test the presence of artifact clusters. The latter tools, which incorporate point pattern analysis based on nearest neighbor statistics, compare an observed distribution of points (artifacts) to a hypothetical random distribution of

points to identify clustering or dispersion that in this case may be the result of cultural practices (Hodder and Orton 1976:30; Mitchell 2005). Critically, however, identifying patterns in the distribution of points does not give any insight into how those patterns were created (i.e., by human agency, or natural or cultural site formation processes), only that patterns are present (Hodder and Orton 1976:31-32). Interpreting what caused the patterns needs to take into account multiple lines of archaeological evidence, such as context and associations, as well as other types of evidence (historical, ethnographic, and oral traditions). Below I discuss the GIS tools used in my analysis in more detail.

Mean Center and Standard Deviational Ellipse

Archaeologists have used such tools as arithmetic mean center and standard deviational ellipses to measure artifact distributions for many decades, noting that it is a simple, effective way to display artifact patterning (Hodder and Orton 1976:207-208; Muckelroy 1978:190-191). As a way to measure geographic distributions, ArcGIS provides tools to examine a distribution of points and determine if there is a directional trend by generating the mean center point and a standard deviational ellipse for each distribution. The mean center of a point distribution is calculated simply by determining the mean x-coordinate and mean y-coordinate values for all points in the distribution. If there are overlapping points, or more than one point at a single location, the center is automatically weighted towards that location. The arithmetic mean center displays as a single point within the GIS (Mitchell 2005:33-37).

Standard deviational ellipses can be used as a tool used to measure compactness and orientation of a point distribution. This tool measures the standard distance (the average distance the points vary from the mean center) along both the x-axis and y-axis independently, resulting in an ellipse around the mean center of the point distribution. This ellipse is the standard deviational ellipse, which represents the standard deviation of the x- and y-coordinates from the mean center, encompassing 68 percent of the objects, or one standard deviation. The software can also display two or more standard deviations, which display as multiple ellipses (Mitchell 2005:44-50).

By calculating and comparing the arithmetic mean center and standard deviational ellipses for each of the artifact categories from the sites at *tamál-húye*, I can examine the resulting patterns to determine overlapping clusters that may represent associated objects. I can also analyze the distribution of mean center points using nearest neighbor statistics, Ripley's *K*-function, and nearest neighbor hierarchical clustering to determine if any of the artifact distributions cluster in a statistically meaningful way.

Density

Examining the density of artifact-types across a site surface is a standard archaeological method of analyzing intra-site spatial distributions to explore possible organization of space within the site. The density simply shows where objects are concentrated within a site by spreading point values over a surface. The number of objects within a user-defined circular search area around each point is calculated for each cell, whose size is specified by the user, in an output raster graphic. Using ArcGIS, density can be calculated in several ways. For my purposes, I use kernel density calculations (spreading the values for each point from the point location to a specified radius), which result in a smoother distribution of values and easier

interpretation of results. For my analysis, I defined a 2 m search radius and 10 cm output cell-size for each of the density calculations I performed. A population field option allows the user to account for locations that have more than one object (for example, when more than one artifact are associated with a single catalog number), which weights the results towards those points. Hypotheses about various distributions can be tested by adding and removing various object classes to the density calculations, or by modifying grid size (D'Andrea, et al. 2002:995-998).

Nearest Neighbor Statistics

Nearest neighbor statistics compare an observed distribution of points (in this case, artifacts) to a hypothetical random distribution of points to determine if the original data set is more clustered or more dispersed than the random distribution (Hodder and Orton 1976:40). Computing nearest neighbor statistics for a distribution of points involves calculating the average distance between objects, and then comparing that mean distance between to the mean distance between points in a random distribution (Mitchell 2005:18). This can be easily accomplished in ArcGIS with the Average Nearest Neighbor Distance tool, which measures the distance between each point and its nearest neighbor, and averages these distances. If the average distance between points is less than the average for a hypothetical random distribution, the distribution of points is considered clustered; if the average distance is greater than a hypothetical random distribution, the points are considered dispersed. The result is given as an index expressed as the ratio of the observed mean nearest neighbor distance divided by the expected distance from a hypothetical random distribution with the same number of points within the same total area. If the ratio is less than one, then the observed distribution is clustered—the closer to zero, the more clustered the points. If the ratio is greater than one, then the observed distribution is dispersed (Mitchell 2005:75, 88-90). While it may be visually evident from viewing the distribution whether points are clustered or dispersed, statistically analyzing the pattern will confirm your observations and measure the degree of clustering or dispersion (Mitchell 2005:75).

Interpreting the results of nearest neighbor statistics is based on proving a null hypothesis, which in the case of point pattern analysis is that the points are evenly (randomly) distributed within a study area, neither clustered nor dispersed. To help determine if the null hypothesis can be rejected, ArcGIS calculates a Z-score and a p-value as part of the nearest neighbor analysis. These are both measures of statistical significance. The Z-score is computed by dividing the difference between observed and expected values by the standard error (the distribution of mean distances around their average value). A positive Z-score indicates a dispersed pattern, while a negative Z-score indicates a clustered pattern. At the 95% confidence level, the Z-score would have to be less than -1.96 or greater than 1.96 to be statistically significant (Mitchell 2005:90-91). The p-value is the probability that the observed distribution is, in fact, random.

Because nearest neighbor statistics measure the distances between points within a specific study area, they are useful for comparing different distributions of points within the same fixed area (i.e., the excavated boundary of a site) to determine if one distribution is more or less clustered than another (Mitchell 2005:91). As a result, however, the nearest neighbor statistic is extremely sensitive to the extent of the area specified during the analysis—small changes in specified area can have dramatic effects on results. Within ArcGIS, the default value for area is that of the minimum-sized rectangle enclosing all points within the observed distribution (Mitchell 2005:95). For my analysis, however, I calculated the total area of each site

excavated and used that as the input value for area in the Average Nearest Neighbor Distance tool. This ensures that each distribution of points is being analyzed using the same area value, rather than a different area for each distribution that would result from the default value. This will ensure a more accurate comparison of clustering or dispersion between different distributions of artifact-types.

Ripley's *K*-function Analysis

Spatial analysis using Ripley's *K*-function is another way to evaluate the degree of clustering or dispersion of a distribution of points. It is similar to nearest neighbor analysis because it evaluates distances between points in a distribution, but instead of calculating the distance to each point's nearest neighbor, it counts all neighboring points within a given distance and compares the number of points at each distance with the number of points at that distance in a hypothetical random distribution. If the number of points is found to be greater than the random distribution, then the points are considered to be clustered at that distance. The analysis is performed at a number of specified distances and the results displayed on a graph to see at what distances the clustering/dispersion is greatest (Mitchell 2005:97-98). Because *K*-function analysis examines spatial patterning over a range of distances, it can identify clustering or dispersion of points at various scales—while clustering may not be evident at a smaller scale, it may emerge at larger scales. Within ArcGIS, Ripley's *K*-function is incorporated into the Multi-Distance Spatial Cluster Analysis Tool.

The Multi-Distance Spatial Cluster Analysis Tool in ArcGIS calculates a *K* value at each distance and plots the results on a chart with *K* values on the y-axis and distance on the x-axis. A random distribution produces a line at a 45 degree angle—if *K* values for an observed distribution are plotted above the line, the points are clustered; if the *K* values plot below the line, then the points are dispersed. To test if observed clustering or dispersion is statistically significant, the tool creates an envelope defining confidence limits for a random distribution and compares the *K*-values curve for the observed distribution. If the observed value exceeds the upper confidence limit, then it is considered a statistically significant clustered pattern at that distance (Mitchell 2005:98-100). For my analysis, I set the tool parameters to begin searching for neighboring points within 1 m, and then to search in 1 m increments to a total distance of 10 meters. In this way, I can examine potential clustering at a number of scales, from near-distance to broad-scale clustering.

Nearest Neighbor Hierarchical Clustering

Nearest neighbor statistics and Ripley's *K*-function analysis will indicate if a point distribution is clustered or dispersed, but neither actually identifies point clusters graphically or visually. To graphically identify clusters within the distribution of points, I use a technique known as nearest neighbor hierarchical clustering. This tool measures distances between points and their nearest neighbors, and compares those to distances expected from a hypothetical random distribution. It identifies which points are part of a cluster based on mean nearest neighbor distance (often used to establish a confidence level of what constitutes a "cluster") and a user-defined number of points that comprise a "cluster". The clusters are displayed graphically within ArcGIS by calculating the standard deviational ellipse for each cluster (see above). Nearest neighbor hierarchical clustering can also be used to identify clusters of clusters, to see if

objects are clustered at multiple scales—this is what makes the tool “hierarchical” (Mitchell 2005:152-154).

Nearest neighbor hierarchical clustering is not a toolset available within ArcGIS. Instead, I use a stand-alone software package called CrimeStat III, which is a spatial statistics program for analyzing the distribution of criminal incidents. Since the input data are based on point features, it can be used just as well for artifact locations as it can for crime scene locations. In addition, it can use ArcGIS shapefiles for inputting point distributions and it outputs results as shapefiles of standard deviational ellipses identifying clusters, which can be added to an existing ArcGIS project. CrimeStat III uses distance based on mean nearest neighbor distance and user-defined number of points to identify clusters, which maintains the statistical validity of the method. The user can also define a fixed distance that the software can look from each point, along with user-defined number to identify clusters (I used 3 objects to represent a “cluster” for all my calculations). The latter, however, results in cluster outputs that parallel the density graphics, and are not as statistically rigorous—by defining an analytical distance, the user can effectively create or delete as many clusters as they would like by manipulating the search radius.

Comparing Artifact Distributions

Nearest neighbor statistics and Ripley’s *K*-function may indicate the degree of clustering within each artifact distribution, and nearest neighbor hierarchical clustering can graphically display what artifacts are actually clustered, but these methods alone do not indicate how artifact distributions are related (Hodder and Orton 1976:207). To understand how different distributions may be patterned the results of each of these analyses performed on separate artifact distributions can be compared to see if any distributions are more or less clustered than other distributions. This still does not give an indication of whether certain artifact distributions are more closely related to each other than to others. To evaluate these relationships, I rely on visually comparing density distributions, mean centers, and standard deviational ellipses of each artifact category to see if concentrations of any specific artifact distributions are more closely related to each other. Although this is a subjective way at viewing the data, it can still be effective. To be more objective, however, I also calculate nearest neighbor statistics, perform Ripley’s *K*-function and nearest neighbor hierarchical clustering analyses on the distribution of mean center points of each artifact category to see if there is clustering, and if so, which distributions are clustered. This can give a statistically-validated indication that certain artifact distributions are related to each other.

GIS ANALYSIS AND RESULTS

For each site, after separating the total artifact assemblage into a series of Late Period, indigenously-manufactured artifact categories and introduced sixteenth-century artifact categories within the GIS, I measured density, mean center, and standard deviational ellipses of each distribution, and then calculated nearest neighbor statistics, conducted Ripley’s *K*-function analysis, and examined nearest neighbor hierarchical clustering for each distribution and compared the results. I also plotted the location of burials and features when data were available, and I plotted all artifact and feature distributions in three-dimensions to graphically and visually examine the results for possible associations.

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For the combined distributions of Late Period, indigenous artifacts and the combined sixteenth-century introduced object distributions, density, mean center point, and standard deviational ellipses all indicate artifact concentrations overlapping in the central part of the site. The mean center points for the distributions of Late Period artifacts and sixteenth-century introduced artifacts are separated by approximately 3 m, but there is considerable overlap of standard deviational ellipses and artifact concentrations indicated by density measurements (Figures 7.1 and 7.2).

For individual Late Period, indigenous and introduced artifact categories, density, mean center points, and standard deviational ellipses indicate significant overlap in the central portion of the site, with the exception of the iron fasteners from the *San Agustín*, which are concentrated in the southern part of the site. Porcelain overlaps to some degree with all indigenous artifact categories (craft production, food processing, hunting and fishing, lithic production, ornamentation, and symbolic artifacts)(Figures 7.3-7.10).

Nearest neighbor statistics indicate possible clustering among the combined Late Period artifact distribution, while the combined sixteenth-century introduced objects have a statistically random distribution. Examining individual artifact distributions, statistically significant clustering was indicated for the hunting and fishing artifact distribution, with possible clustering in the porcelain distribution. The remainder of the individual artifact distributions (food processing, craft production, symbolic, ornamentation, lithic production objects, and sixteenth-century iron fasteners) have either random or dispersed distributions (Appendix A).

Ripley's *K*-function analysis gives slightly different results than nearest neighbor statistics. While it also indicates statistically-significant clustering among the combined Late Period objects distribution (from 1-4 m), it also indicates the combined sixteenth-century introduced object distribution is clustered (from 0-6 m). For individual artifact distributions, Ripley's *K*-function analysis indicates that the hunting and fishing objects distribution shows statistically-significant clustering from 0-2 m, that there is some clustering of craft production objects around 3 m, and that porcelain is clustered from 0-7 m. Iron fasteners again indicate no statistically-significant internal clustering (see Appendix A).

Nearest neighbor hierarchical clustering indicates no clusters present for ornamentation, symbolic, or lithic production objects, while small clusters were identified for both categories of sixteenth-century introduced objects (porcelain and iron fasteners), as well as craft production, hunting and fishing, and food processing artifacts. The food processing and porcelain clusters are all separate and distinct, although there is an overlap of hunting and fishing (obsidian projectile points and fragments and a net weight), craft production (thin- and broad-point worked bone artifacts, likely awls and wedges), and iron fastener clusters in the central part of the site (Figure 7.11).

I compared the individual artifact distributions by combining the mean center points for each and calculating nearest neighbor statistics, conducting Ripley's *K*-function analysis, and examining nearest neighbor hierarchical clusters. The nearest neighbor statistics and Ripley's *K*-function analysis demonstrate that the distribution of mean center points is clustered within the site, and the nearest neighbor hierarchical clustering indicates that mean center points of all individual artifact distributions, except for sixteenth-century iron fasteners, are part of a single statistically-significant cluster located in the central part of the site (Figure 7.12). As I observed

Figure 7.1. Combined indigenously-manufactured artifact distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.2. Combined sixteenth-century introduced artifact distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

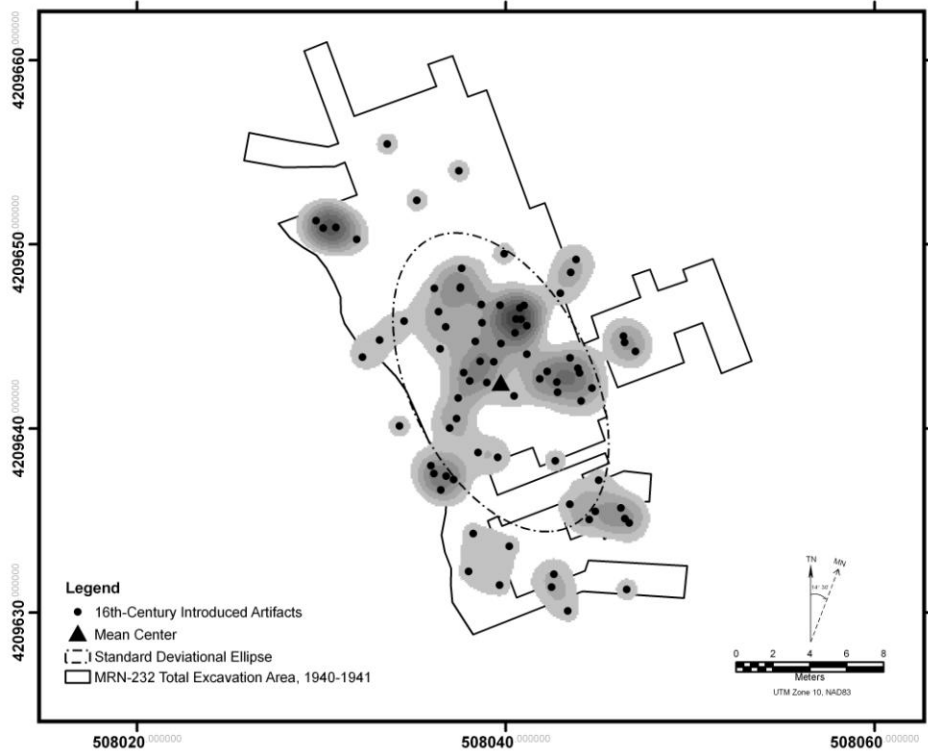


Figure 7.3. Sixteenth-century Chinese porcelain distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

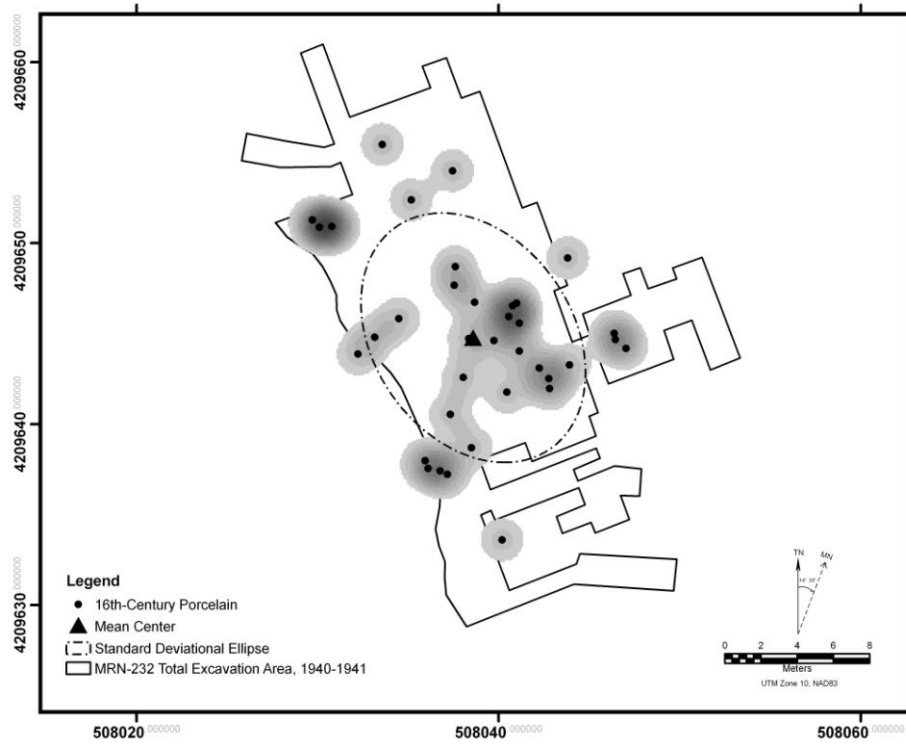


Figure 7.4. Sixteenth-century iron fastener distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.5. Hunting and fishing-related artifact distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

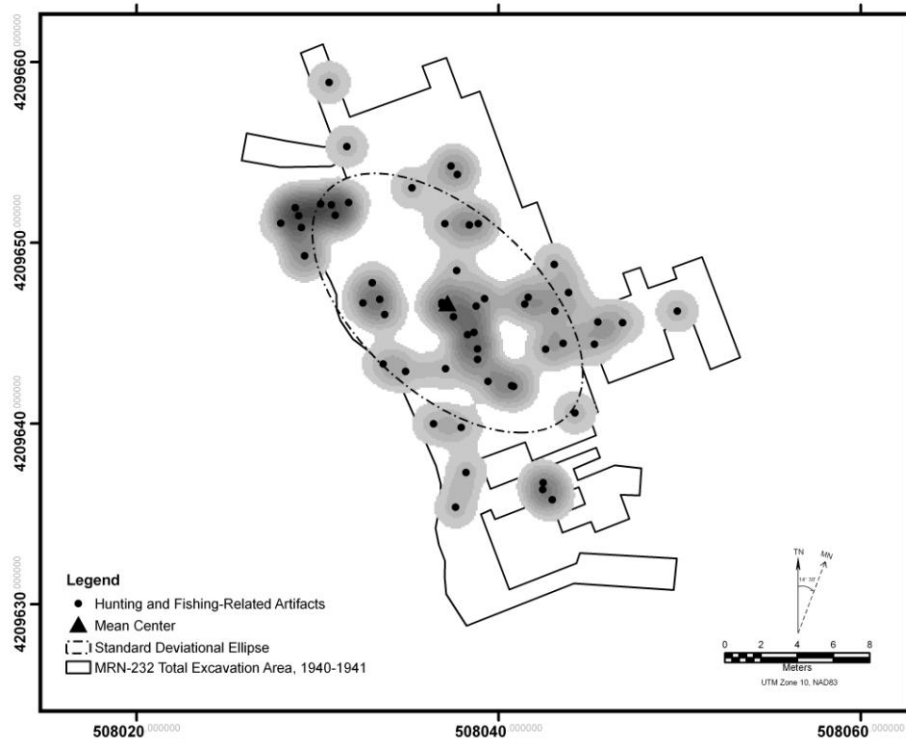


Figure 7.6. Craft production-related artifact distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.7. Food processing-related artifact distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.8. Lithic production-related artifact distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

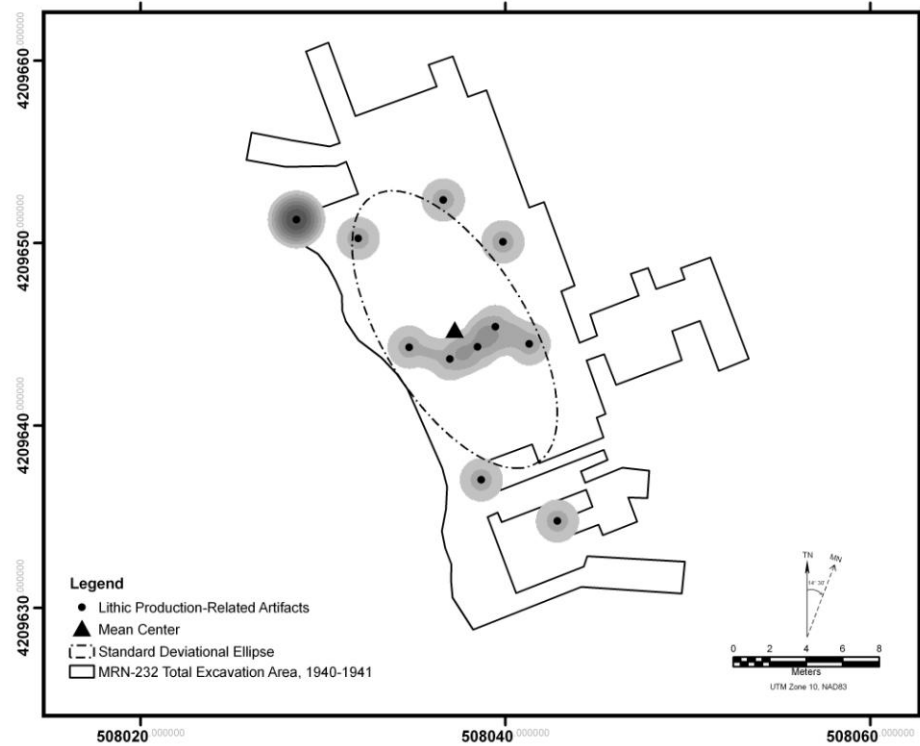


Figure 7.9. Ornementation artifact distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.10. “Symbolic” artifact distribution at CA-MRN-232, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

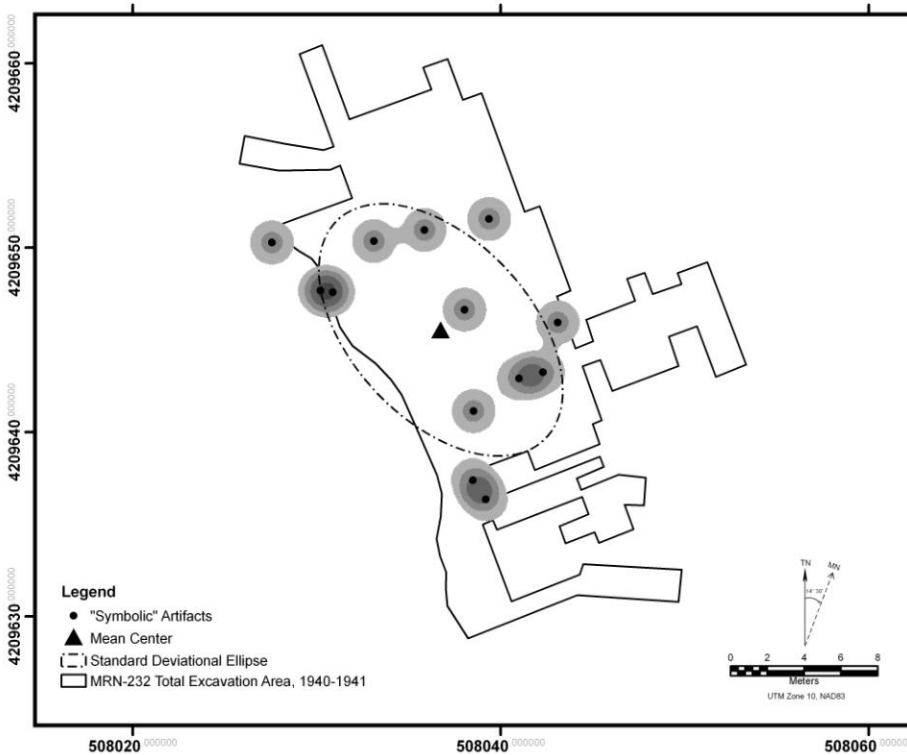


Figure 7.11: Nearest neighbor hierarchical clusters for all artifact distributions at CA-MRN-232.

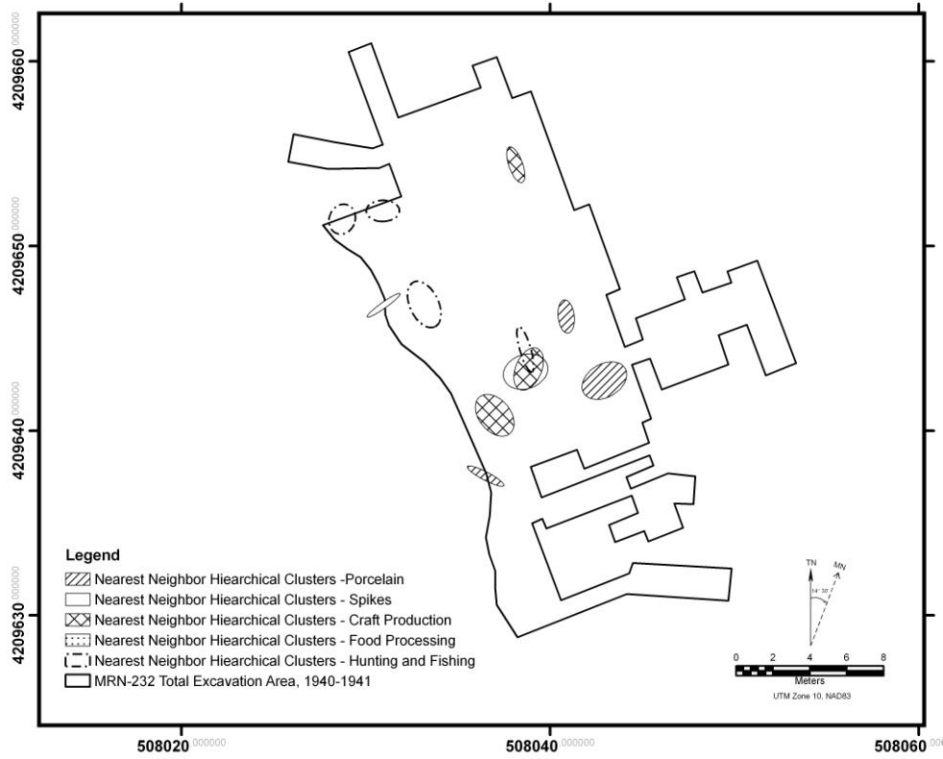
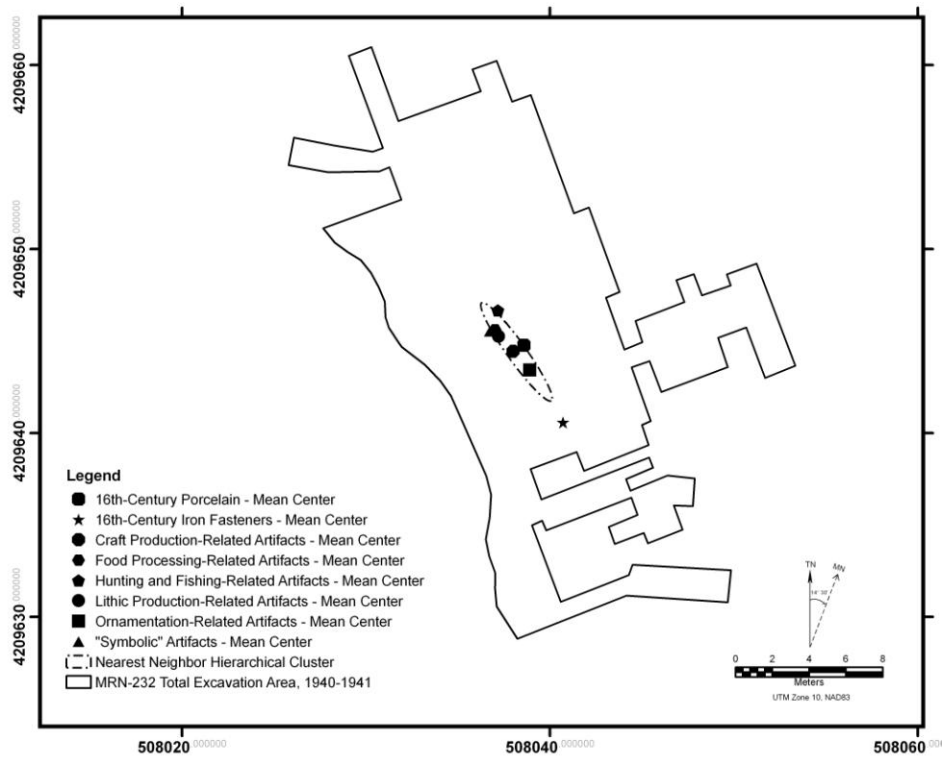


Figure 7.12. Mean centers for each artifact distribution at CA-MRN-232, with nearest neighbor hierarchical clusters indicated.



above, the mean center point, and peak density, of iron fasteners is located in the southern part of the site, although there is still some overlap with the other artifact distributions.

Examining the three dimensional artifact distributions offers some additional support for emerging patterns at the site. In the northwest portion of the site, there may be vertical and horizontal associations between an iron spike and a worked antler tine, possibly a flaker used for stone tool production. Several other similar associations are also present in the northeast-central part of the site. Porcelain fragments also appear in close vertical and horizontal proximity to indigenously-manufactured artifacts in several areas of the site. Most prominently, I observed a number of associations between obsidian projectile points and point fragments and porcelain fragments in several areas of the site. In addition there are individual fragments of porcelain in close proximity to at least two craft production-related artifacts (a broad-point worked bone tool and a thin-point worked bone tool), as well as a chalcedony biface that may have been used for either food processing or craft production. Finally, in the northwest part of the site there are possible associations between worked antler tines and a small cluster of porcelain fragments. While it is dangerous to place too much significance on individual associations of artifacts, they reinforce broader trends observed at the site.

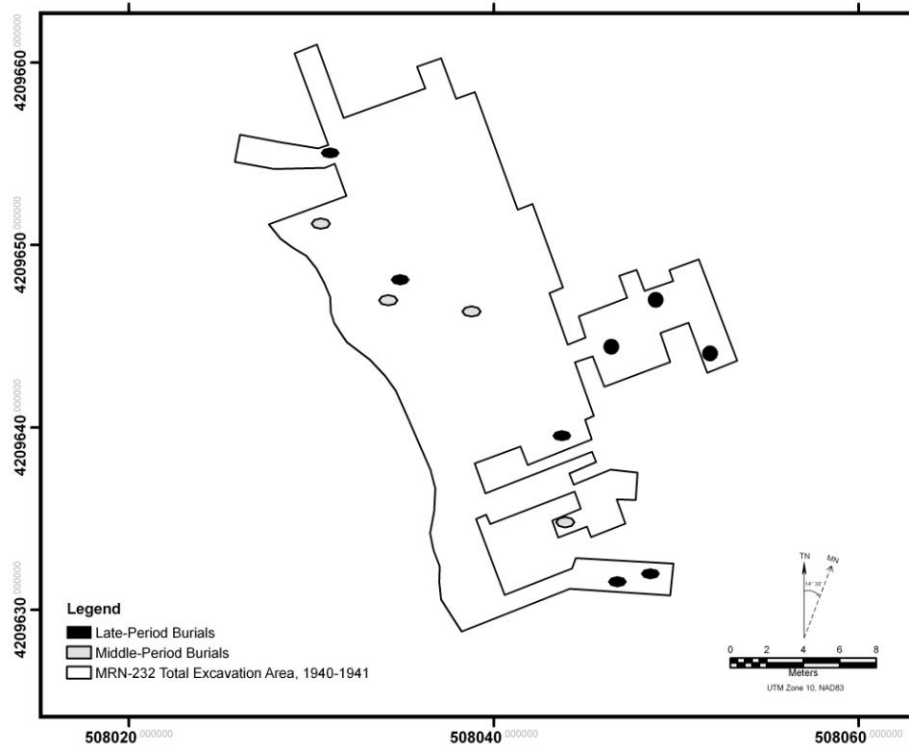
Although a number of hearth and other similar features were observed during excavations at CA-MRN-232, the excavators did not record their locations. Heizer, Beardsley, and Meighan recorded a total of eleven burials (seven inhumations and four cremations) attributed to the Late Period at CA-MRN-232. Two inhumations and a cremation do not have locations recorded for them, but the other inhumations are distributed in all areas of the site, although two of the inhumations are located at the southern extent of the site. The three cremations are all clustered near the eastern margin of the site, and appear to be spatially segregated from the rest of the site (Figure 7.13). No distributions of artifacts in use-related contexts are in clear association with any of the burials.

The results of spatial analysis of artifact distributions at CA-MRN-232 reveal that iron fasteners from the *San Agustín* are concentrated in the southern part of the site, separate from the highest concentration of all other artifact categories, including Chinese porcelain. Since no other artifact distributions are centered in the southern part of the site, it is difficult to draw conclusions about what this pattern means. It is possible that, as indicated by Heizer, Beardsley, and Meighan, the spikes were incidentally deposited from deteriorating timbers used in shelter construction. But there is also an overlapping cluster of iron fasteners, craft production artifacts, and hunting and fishing objects in the central part of the site, a pattern also observed on other sites (see CA-MRN-242 below). This may also indicate that the iron spikes were used in a manner similar to worked bone and antler wedges, thin-pointed worked bone artifacts like awls, or possibly as flakers or tools used for retouching flaked stone tools. While the distribution of porcelain fragments overlaps with all other artifact categories, there is possibly a greater association with hunting and fishing related objects than any other categories.

CA-MRN-242

Examining the overall distributions of Late Period, indigenously-manufactured objects, the density, mean center, and standard deviational ellipse are evenly spread across the entire site, with the mean center of the distribution, and the highest concentration of artifacts, located in the central part of the site. The introduced sixteenth-century artifacts, on the other hand, are concentrated in the northern section of the site—the mean center for introduced objects is more

Figure 7.13. Burial locations at CA-MRN-232.



than 5 m north of the Late Period combined mean center point. In addition, the standard deviational ellipse for the Late Period artifact distribution trends north-south along the axis of the excavated area of the site, while the introduced-object ellipse trends east-west across the northern section of the site. While the density of introduced objects is concentrated in the northern part of the site, it is represented by just four points, so the sample size is extremely small, and therefore it is difficult to make generalizations (Figures 7.14 and 7.15).

Turning to density, mean center points, and standard deviational ellipses for the distributions of discrete artifact categories, both introduced sixteenth-century artifact categories (porcelain and iron fasteners) are concentrated around individual points, as are the symbolic, lithic production, and food processing distributions—density measurements reveal no concentrations of any of these categories on the site. The hunting and fishing-related artifacts are more widely distributed and evenly concentrated across the site, with a peak in the central part of the site and a second large peak in the southwest part of the site. The distribution of craft production artifacts is spread evenly across the west-central part of the site, and also has a peak in the northwest corner, while the ornamentation artifact distribution is tightly clustered in the central part of the site (Figures 7.16-7.23).

Nearest neighbor statistics indicate that the distributions of all Late Period, indigenous objects, as well as the distribution of introduced sixteenth-century objects, are dispersed, with no clustering evident. Within each category, the porcelain distribution could not be analyzed (too few points were available), while the iron fastener distribution was identified as random. For Late Period object distributions, hunting and fishing and craft production objects are randomly distributed; lithic production, symbolic, and food processing artifact distributions were identified as dispersed; while only ornamentation objects show any statistically-significant clustering. This

Figure 7.14. Combined indigenously-manufactured artifact distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

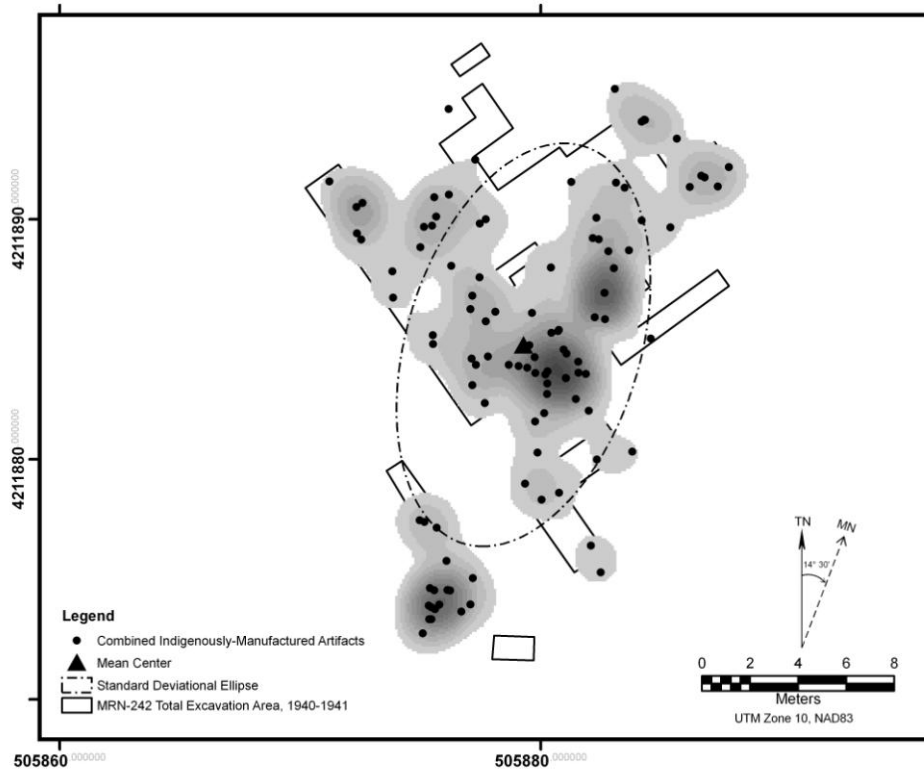


Figure 7.15. Combined sixteenth-century introduced artifact distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

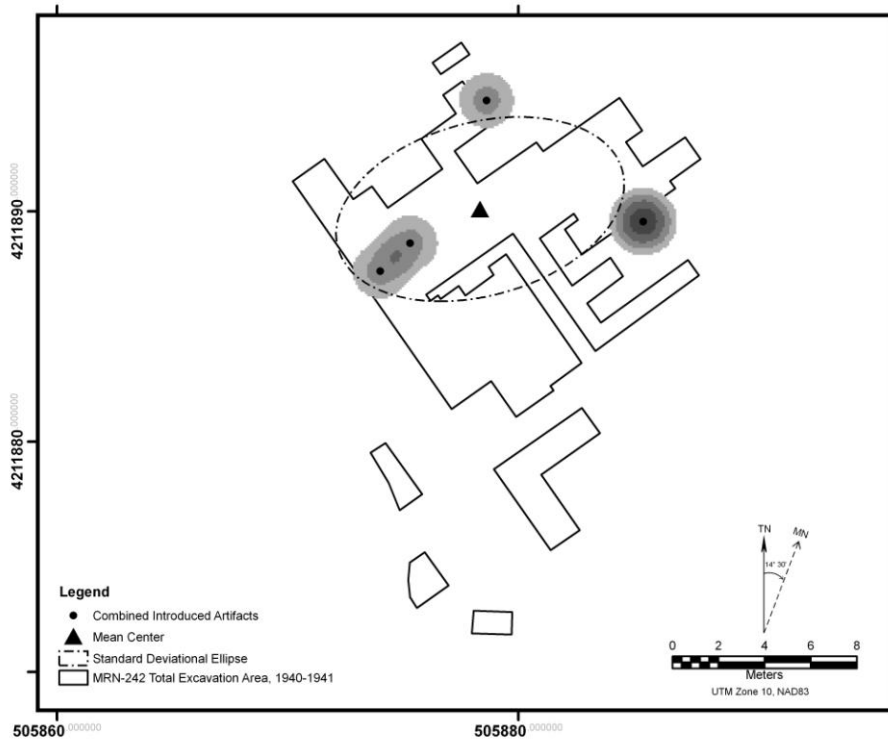


Figure 7.16. Sixteenth-century Chinese porcelain distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

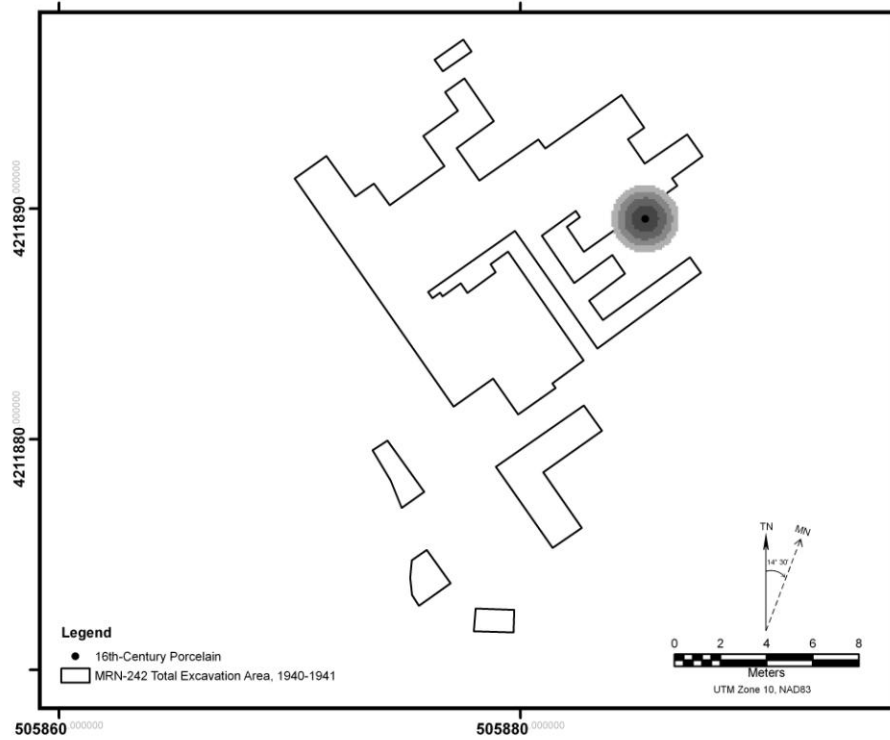


Figure 7.17. Sixteenth-century iron fastener distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

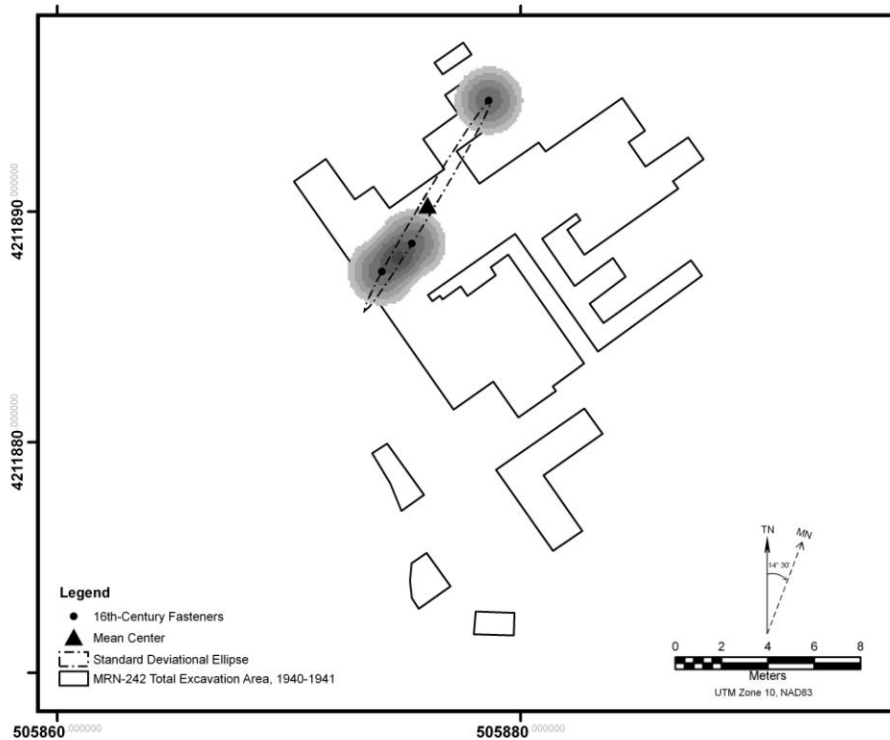


Figure 7.18. Hunting and fishing-related artifact distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

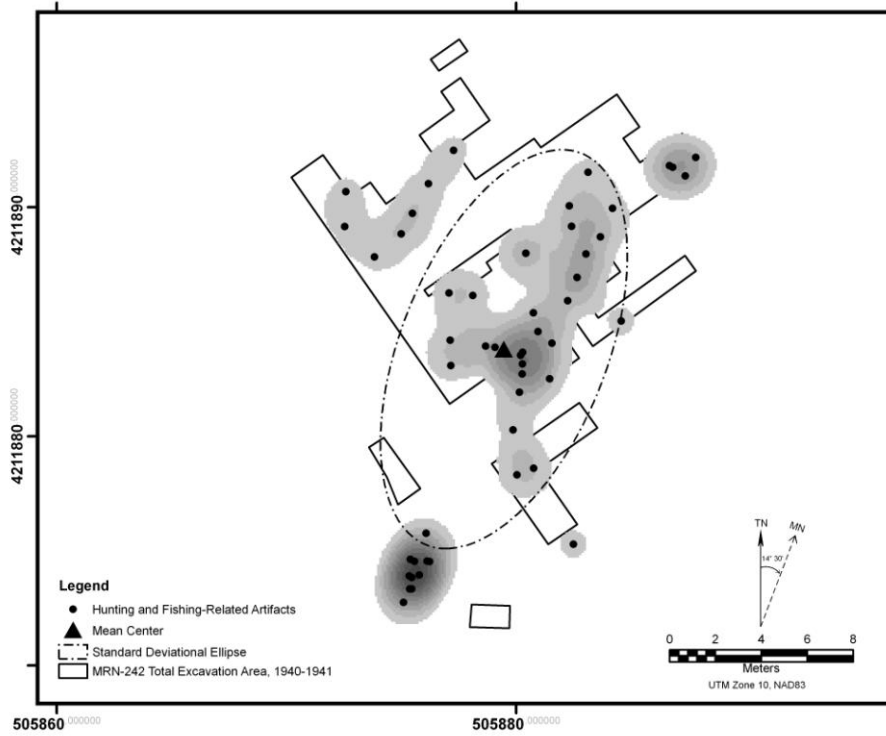


Figure 7.19. Craft production-related artifact distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

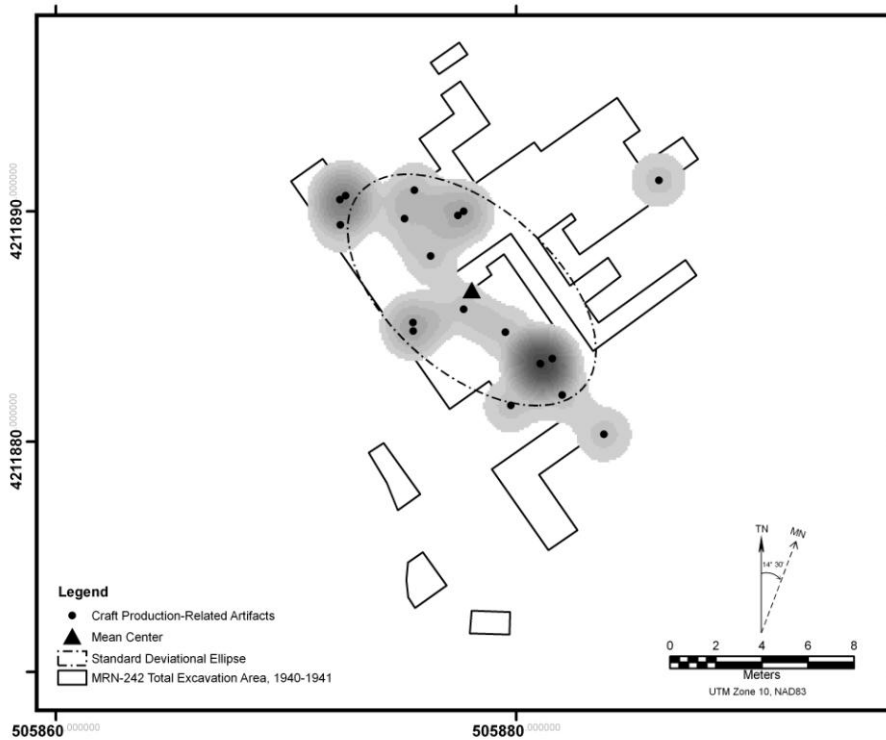


Figure 7.20. Food processing-related artifact distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

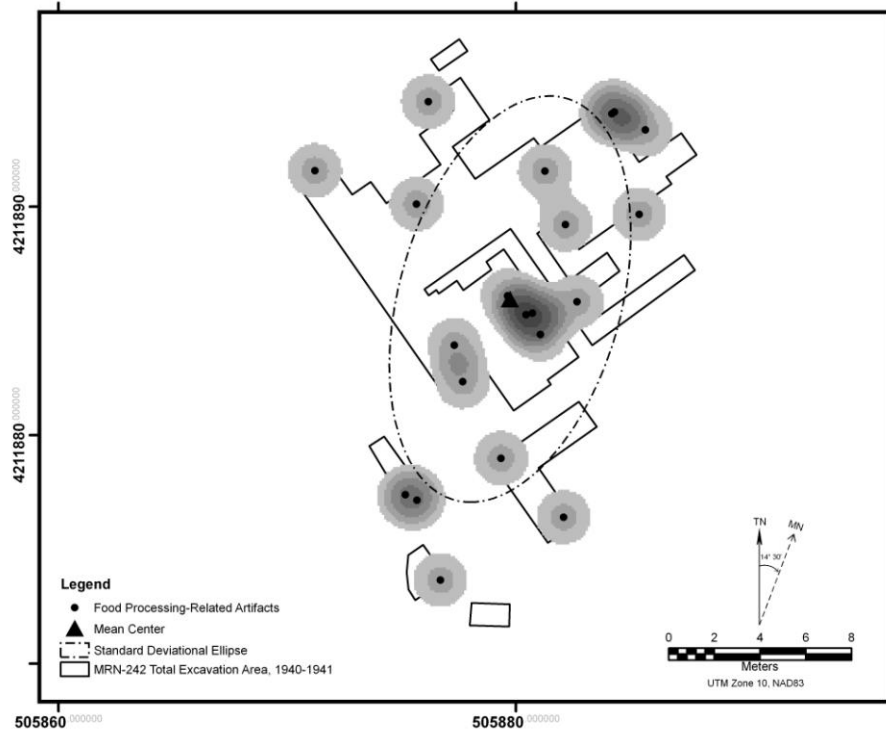


Figure 7.21. Lithic production-related artifact distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

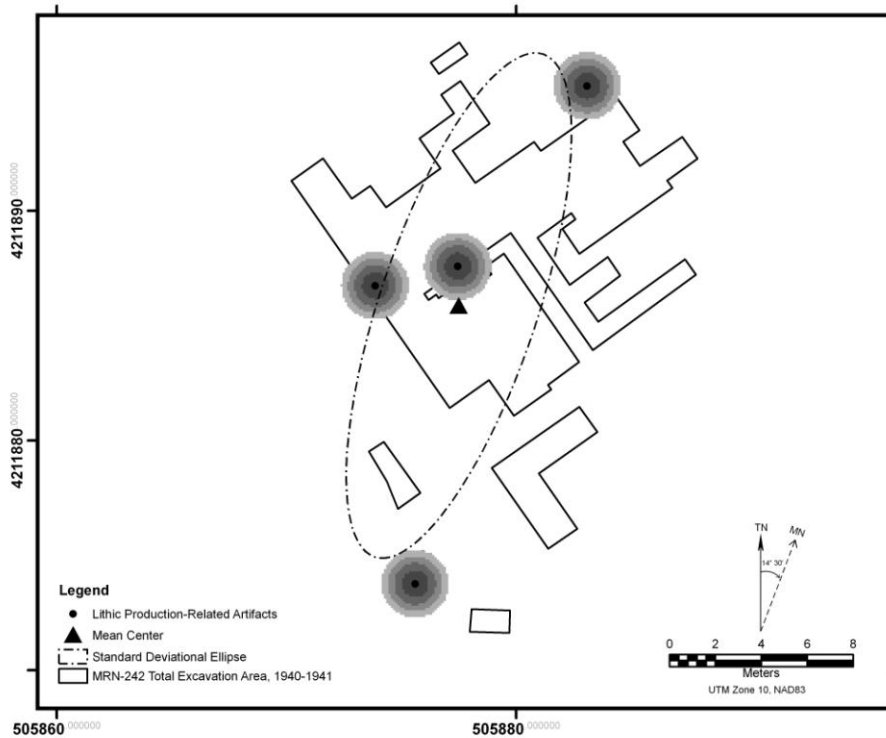


Figure 7.22. Ornementation artifact distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

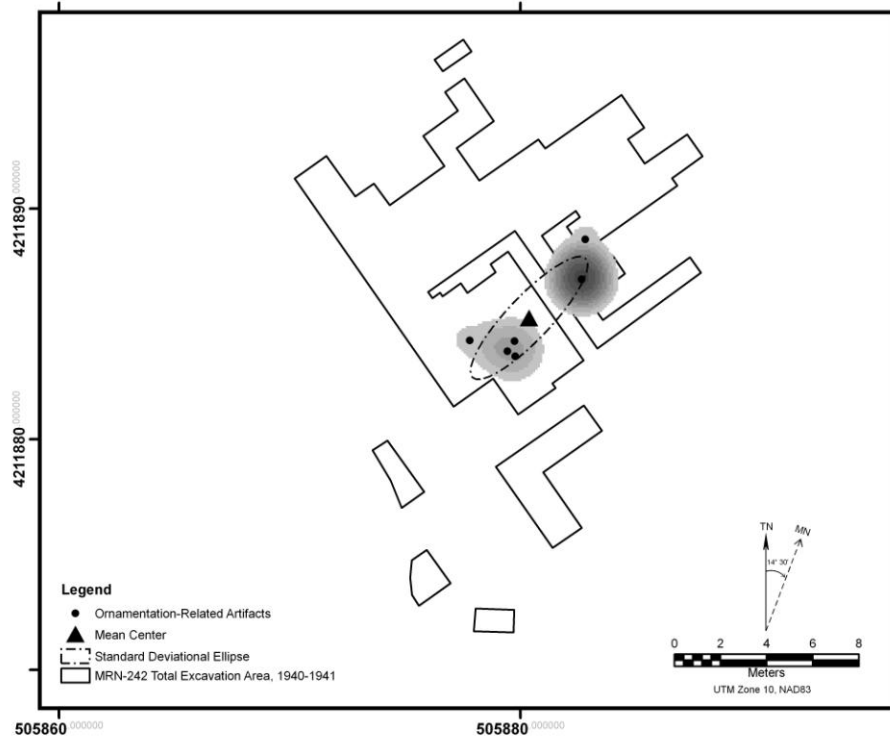
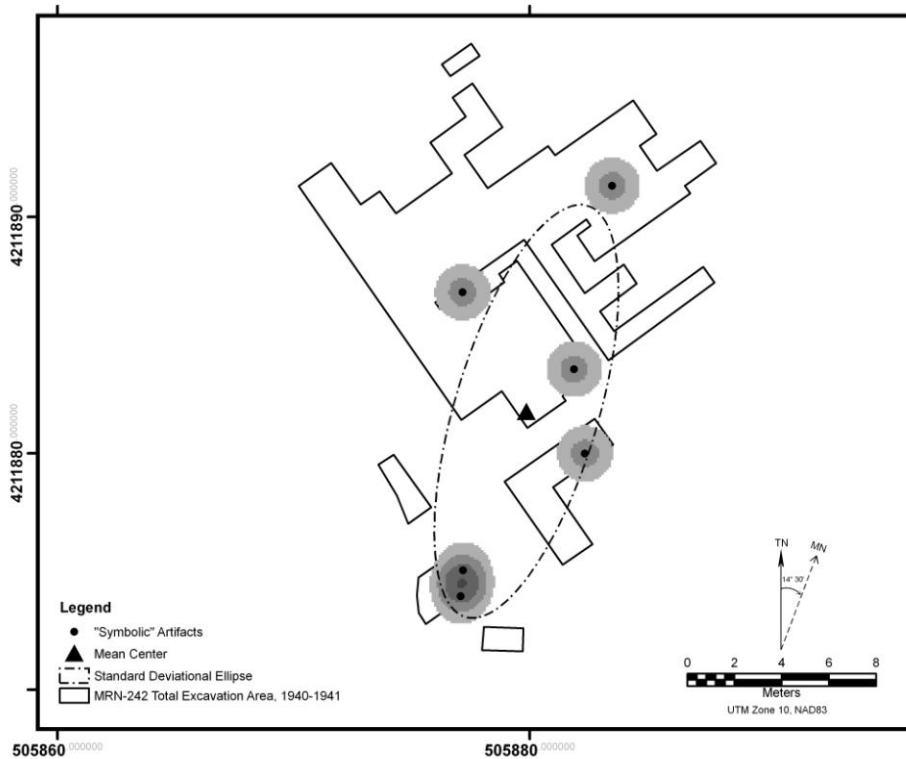


Figure 7.23. “Symbolic” artifact distribution at CA-MRN-242, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



corresponds with a visual examination of artifact density, which shows the ornamentation objects concentrated in the central part of the site (Appendix B).

Ripley's *K*-function analysis gives slightly different results, indicating minor clustering between 1-2 m for the Late Period combined distribution, although the sixteenth-century introduced objects are again identified as a dispersed distribution. Within each category, the porcelain distribution again has too few objects to analyze, while iron fasteners again show no clustering. For the Late Period artifact distributions, hunting and fishing objects demonstrate minor clustering between 1-3 m, while food processing, craft production, lithic production, ornamentation and symbolic object distributions all show no clustering. In general, these results correspond to visual observation of artifact densities, mean centers, and standard deviational ellipses, and statistical examination of potential clustering (see Appendix B).

Nearest neighbor hierarchical clustering indicates statistically-significant clusters of ornamentation, hunting and fishing, and food processing artifacts overlapping in the center of the site, while the hunting and fishing artifact distribution also shows a strong cluster in the southwest part of the site (corresponding to the peak density measurement). No clusters of sixteenth-century introduced objects were indicated (Figure 7.24).

To compare artifact distributions, I combined mean center points for each individual artifact category distribution, and examined the combined distribution using nearest neighbor statistics, Ripley's *K*-function analysis, and nearest neighbor hierarchical clustering. Nearest neighbor statistics indicate the distribution of mean center points is random, while Ripley's *K*-function analysis indicates some statistically-significant clustering between 4-5 m, but otherwise no clustering. Nearest neighbor hierarchical clustering indicates that lithic production, hunting and fishing, ornamentation, food processing, and craft production artifact distributions are statistically-clustered in the center of the site, while the symbolic objects mean center point is situated to the south of this cluster and mean center points for both sixteenth-century introduced object categories (porcelain and iron fasteners) are located to the northeast and northwest of the central cluster, respectively (Figure 7.25). It is important to keep in mind, however, that the porcelain "distribution" is based on just a single point (that includes two porcelain fragments), the iron fasteners distribution is based on three points, and the symbolic objects mean center point is based on six widely-dispersed points. The results showing distinct separation of mean center points for sixteenth-century introduced objects and symbolic objects from the rest of the artifact distribution's mean center points is likely a result of these very small sample sizes.

Examining artifact distributions in three dimensions offered little additional information about associations between Late Period indigenous objects and sixteenth-century introduced objects. I observed only one clear vertical and horizontal association between objects, which was an iron fastener and a net weight in the northwest portion of the site that are both part of the cluster mentioned above.

Excavators recovered nineteen Late Period inhumations and seven cremations from CA-MRN-242 (Figure 7.26). The cremations are grouped at the eastern margin of the site, while the inhumations are distributed over the whole site area. With the exception of the cremations, there does not appear to be strong spatial segregation of burials from other activity areas on the site—a pattern that was also observed at CA-MRN-232. Like at CA-MRN-232, there is no strong association of artifacts in use-related contexts with any of the burials. No other feature locations were recorded at CA-MRN-242.

Figure 7.24: Nearest neighbor hierarchical clusters for all artifact distributions at CA-MRN-242.

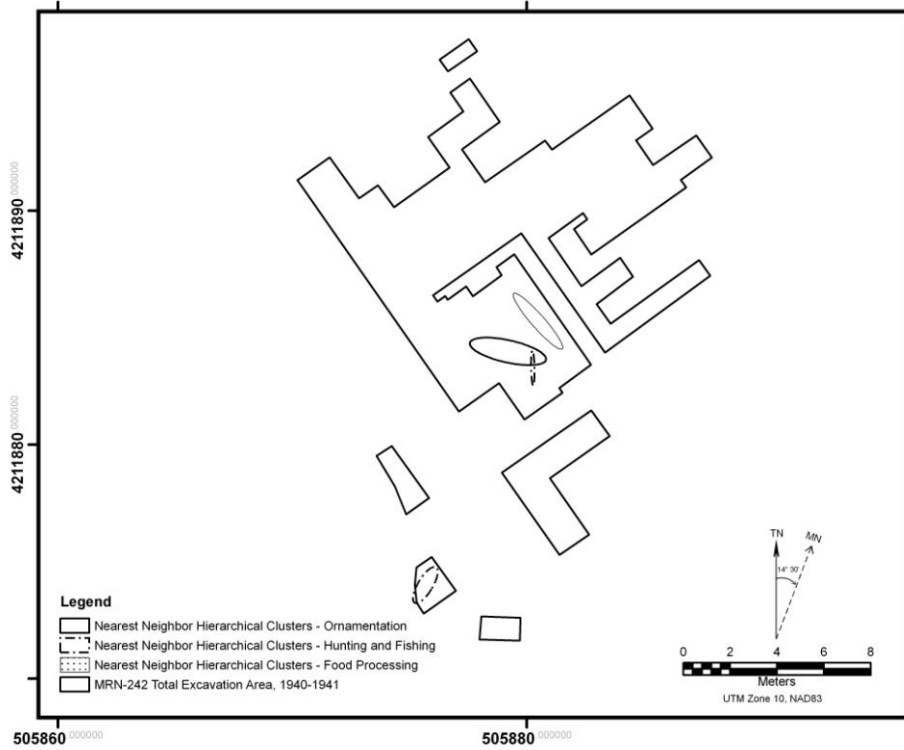


Figure 7.25. Mean centers for each artifact distribution at CA-MRN-242, with nearest neighbor hierarchical clusters indicated.

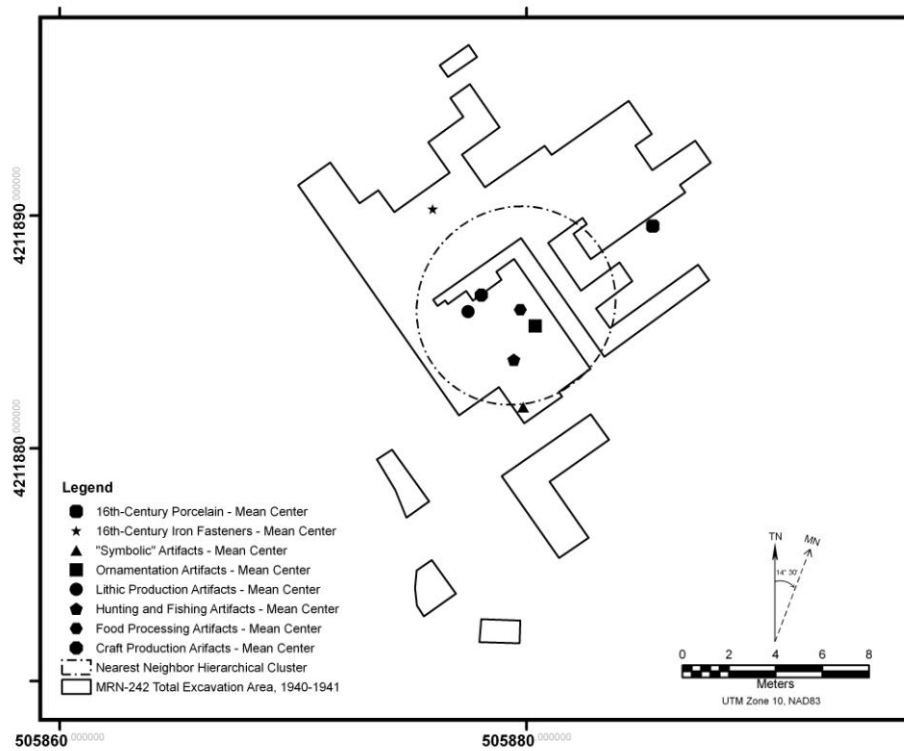
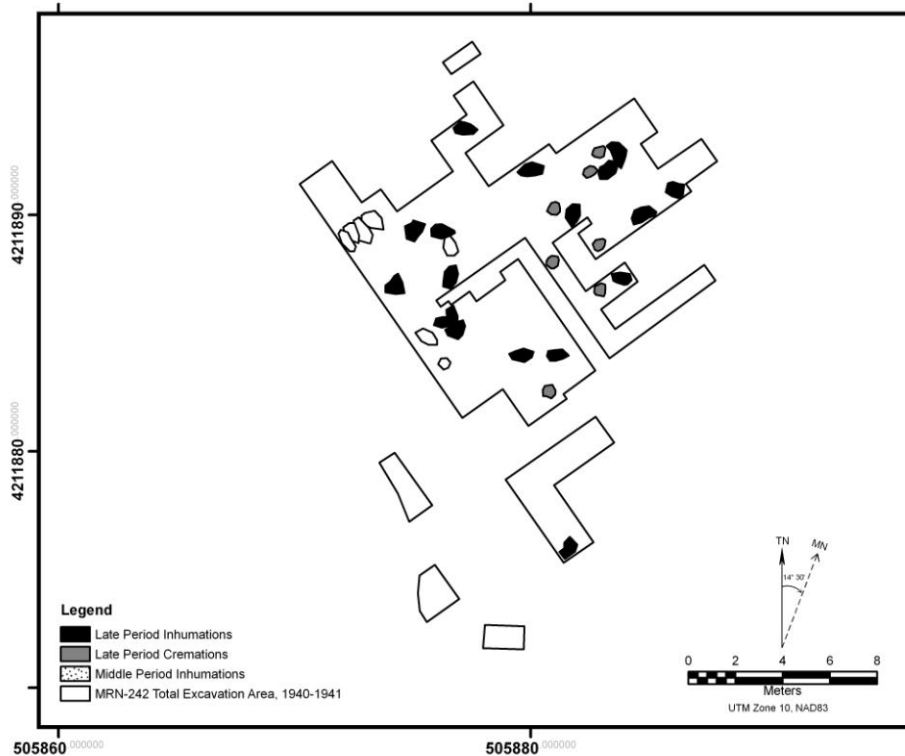


Figure 7.26. Burial locations at CA-MRN-242.



Overall, point pattern analysis of artifact distributions at CA-MRN-242 and comparing the sixteenth-century introduced objects to indigenous artifact categories is difficult because of the very small distribution of porcelain and iron fasteners, making it challenging to determine valid associations (or non-associations) with contemporary indigenously-manufactured Late Period artifacts. Despite this, one interesting observation includes the fact that two of the three iron spikes from the *San Agustín* are located very near a peak in craft production objects (thin-point and broad-point worked bone and a slab milling stone), and a small peak in net weights, in the northwest corner of the site. While this may be nothing more than a statistical anomaly, it does suggest the possibility that perhaps iron fasteners were put to use as tools for either the manufacture of ground stone objects (net weights) or were used in a similar way to thin- or broad-point worked bone artifacts, which may have been awls or wedges used during craft production. I also observed this pattern at CA-MRN-232 (see above).

CA-MRN-271

Spatial analysis of artifact distributions for CA-MRN-271 does not indicate any artifact or feature patterning that may help indicate how the Tamal inhabitants of the site incorporated material culture from the *San Agustín* shipwreck into their cultural practices. The overall site area excavated in 1941 (625 sq. ft. [58 sq. m]) and the sample of artifacts with provenience and associated site notes that allow them to be plotted in GIS (n=51; because of uncertainty of the location of Treganza's 1945 excavations, none of those artifacts were included in the analysis) are the smallest of any of the sites analyzed, and with such a small sample size the ambiguous results are not unexpected. Examining mean center, standard deviational ellipses, and density for

each artifact distribution did not reveal any observable patterning—all overlapped with one another to a certain degree (Figures 7.27-7.34). The overall distribution of sixteenth-century introduced artifacts does not show any obvious association with any other artifact category, although their highest concentration is slightly south of the rest of the artifacts density peaks. This is likely due to the fact that nearest neighbor statistics and Ripley's *K*-function indicate that none of the artifact distributions, including the introduced objects, were internally clustered. Because no clustering was found by nearest neighbor statistics or Ripley's *K*-function, nearest neighbor hierarchical clustering also had negative results—no clusters were indicated of any artifact distributions (Appendix C).

In addition to evaluating the spatial statistics for each artifact distribution separately, I also combined the mean centers for each distribution (craft production, food processing, hunting and fishing, lithic production, ornamentation, symbolic, and introduced objects) and calculated nearest neighbor statistics and Ripley's *K*-function on the distribution of the mean center point. Both indicate statistically-significant clustering within the excavated area of the site—the highest concentration of artifacts (not only Late Period and Protohistoric Period objects, but also Historic Period and Middle Period objects) is in the northern section of the excavation. Nearest neighbor hierarchical clustering analysis of the distribution of mean center points indicated statistically-significant clustering between mean center points of craft production, food processing, hunting and fishing, and introduced objects (Figure 7.35). The ornamentation, symbolic, and lithic production objects were not included in the identified cluster. It is unknown how reliable this analysis is, because ornamentation and symbolic objects are each represented by just a single artifact, and there are only two lithic production artifacts. Because of the extremely low sample size and small excavation area, however, these results should be viewed with caution.

A three-dimensional examination of artifact distributions does not add significantly to understanding artifact patterning on the site, although I observed several direct associations between Chinese porcelain fragments and other artifacts. A porcelain fragment, two mortars, and an obsidian biface fragment are in close proximity in the southern part of the site. Nearby (less than 1 m away) a porcelain fragment and biface fragment were also recovered within 40 cm of each other, and at the same depth level. In addition, in the north-central part of the excavation, there is one porcelain fragment associated with anvil stone (also within 40 cm and at same level). Interestingly, these associations are all with food processing-related objects, a pattern not observed on any other site. Again, however, any possible conclusions should be viewed with caution because of the small excavation area and sample size from CA-MRN-271.

The peak density measurement for the Late Period, indigenously-manufactured objects occur in the same area as the single burial and the one feature with the location recorded at the site (Figure 7.36). Again, because of the small area excavated and the small sample size of artifacts, there are no obvious conclusions that can be drawn about this association. If the pattern at CA-MRN-232 and CA-MRN-242 holds here, then Late Period inhumations were intermingled with other activity areas from the site, and not spatially-segregated.

Overall, spatial patterning analysis of the artifact distributions at CA-MRN-271 does not help address questions about how the Tamal inhabitants of the site incorporated introduced material culture from *San Agustín* into their cultural practices in the late-sixteenth and early-seventeenth centuries. Nor does data from the site directly address the question whether the cross-cultural encounters in 1579 and 1595 had any profound change on indigenous social structures. There are serious limitations to the archaeological data based on recovery methods and recording techniques, however, that may potentially obscure broader patterns.

Figure 7.27. Combined indigenously-manufactured artifact distribution at CA-MRN-271, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.28. Sixteenth-century Chinese porcelain distribution at CA-MRN-271, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

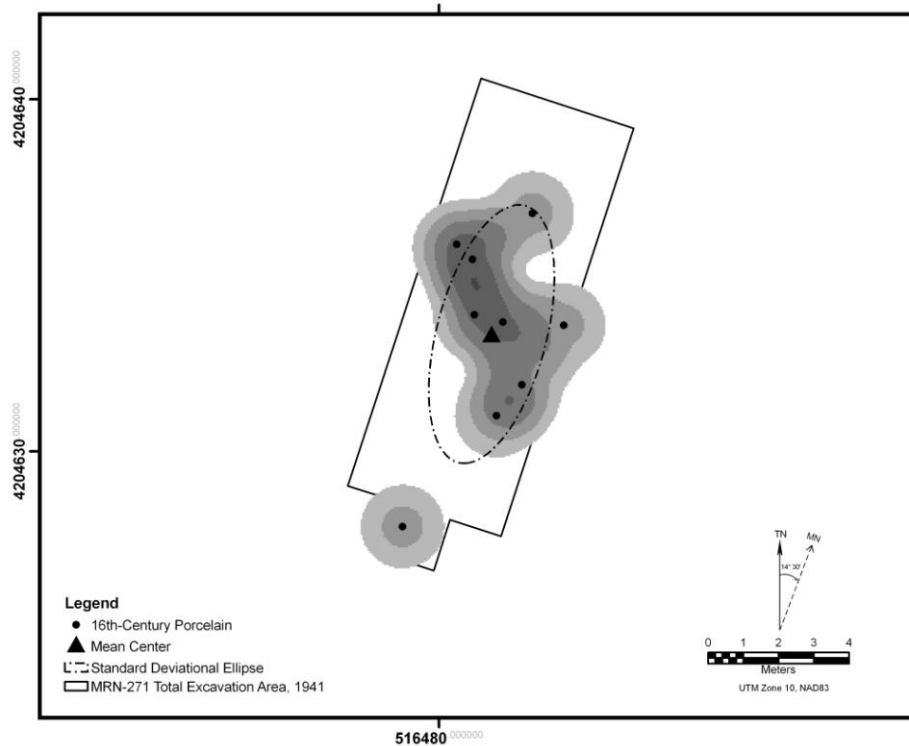


Figure 7.29. Hunting and fishing-related artifact distribution at CA-MRN-271, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

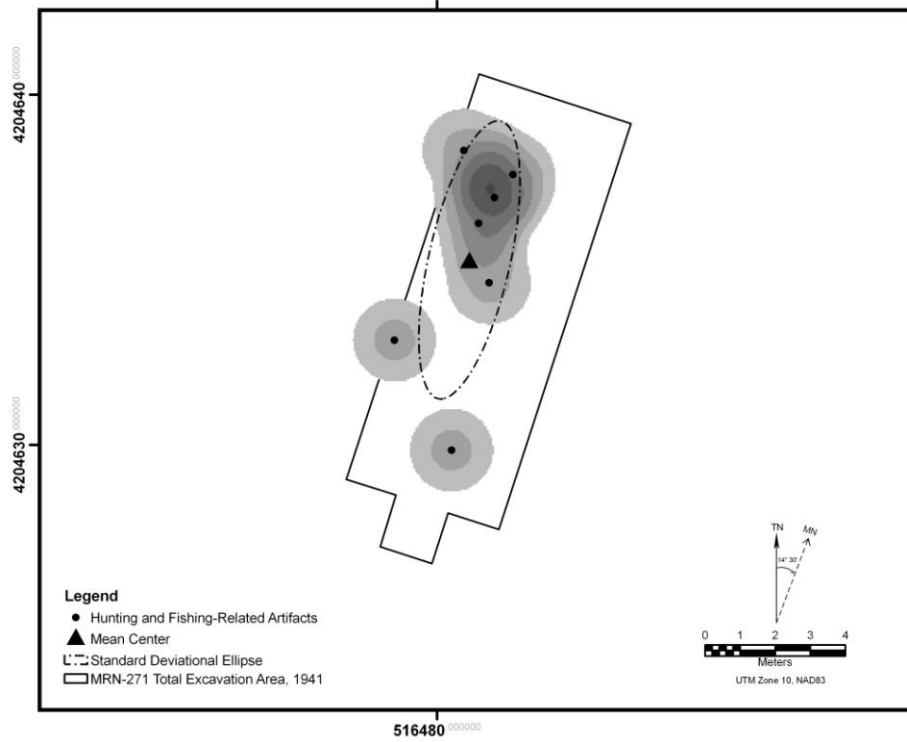


Figure 7.30. Craft production-related artifact distribution at CA-MRN-271, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

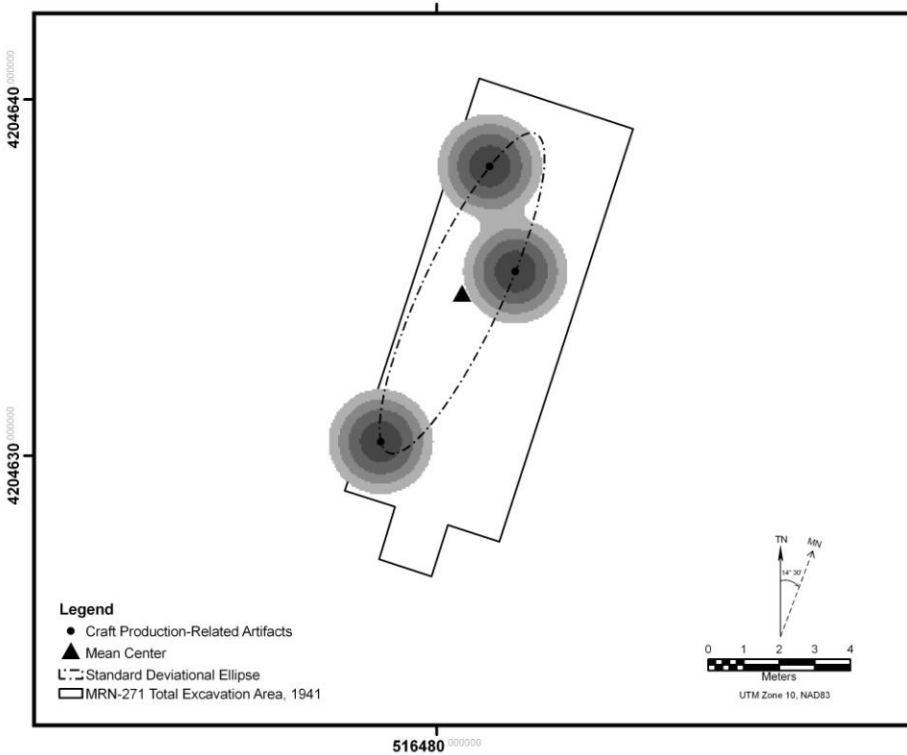


Figure 7.31. Food processing-related artifact distribution at CA-MRN-271, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

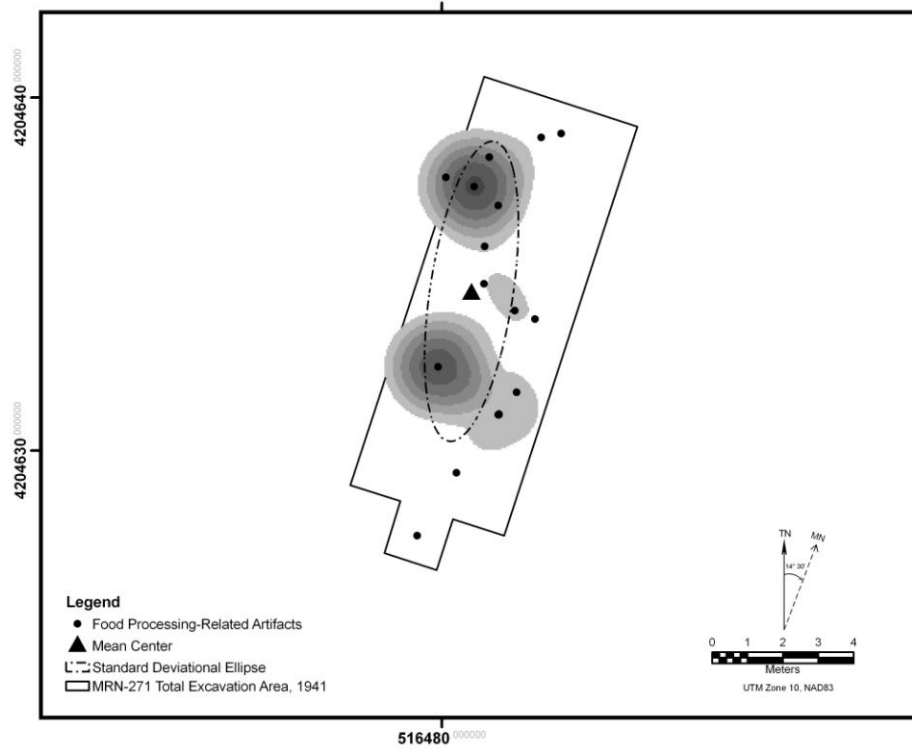


Figure 7.32. Lithic production-related artifact distribution at CA-MRN-271, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

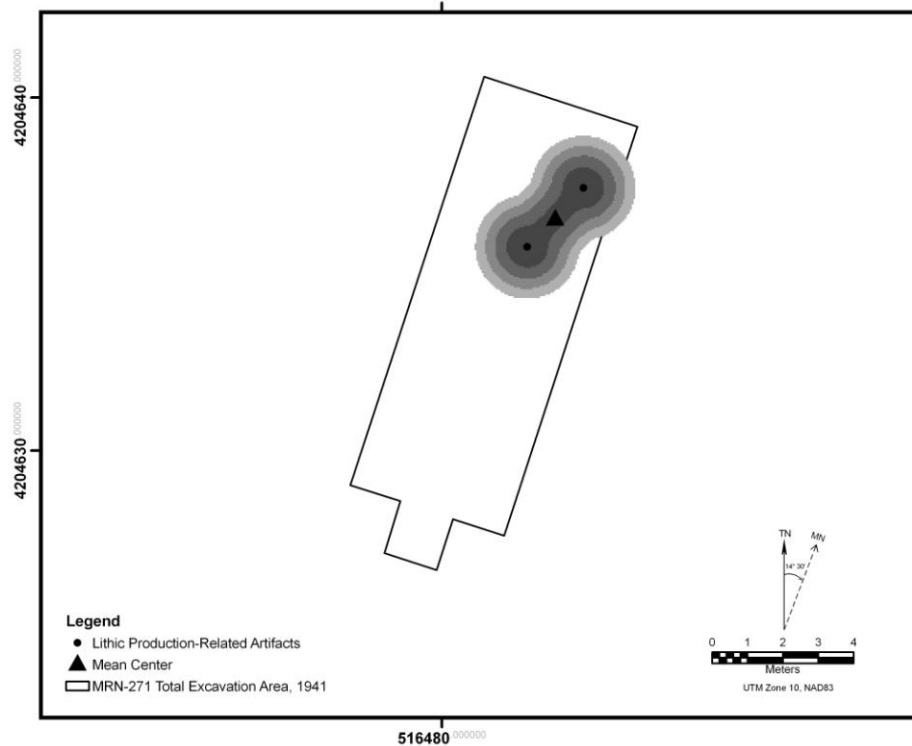


Figure 7.33. Ornammentation artifact distribution at CA-MRN-271, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

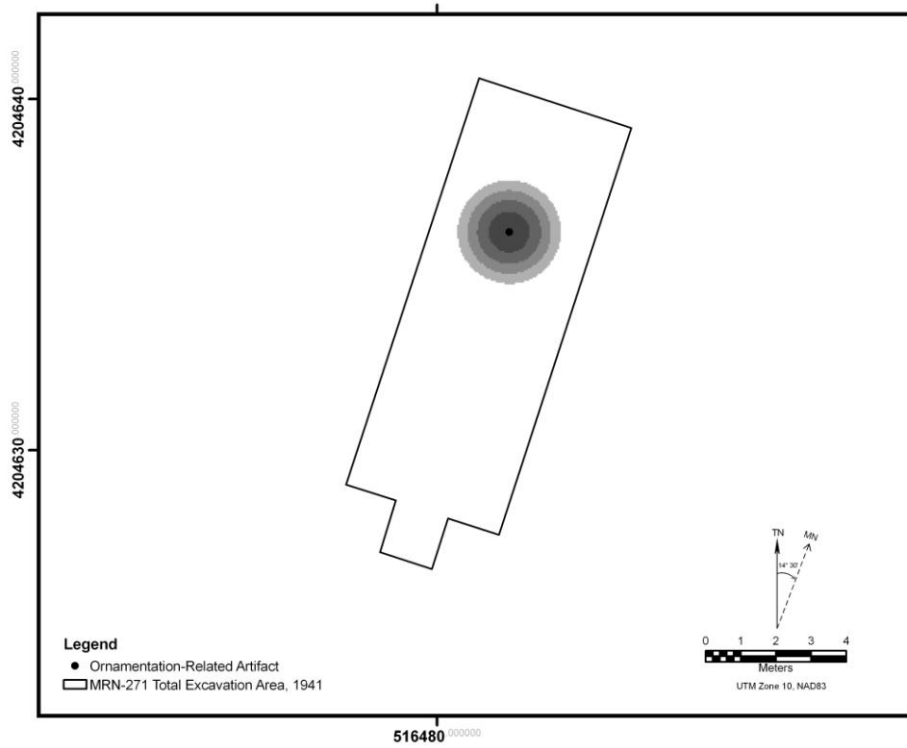


Figure 7.34. "Symbolic" artifact distribution at CA-MRN-271, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

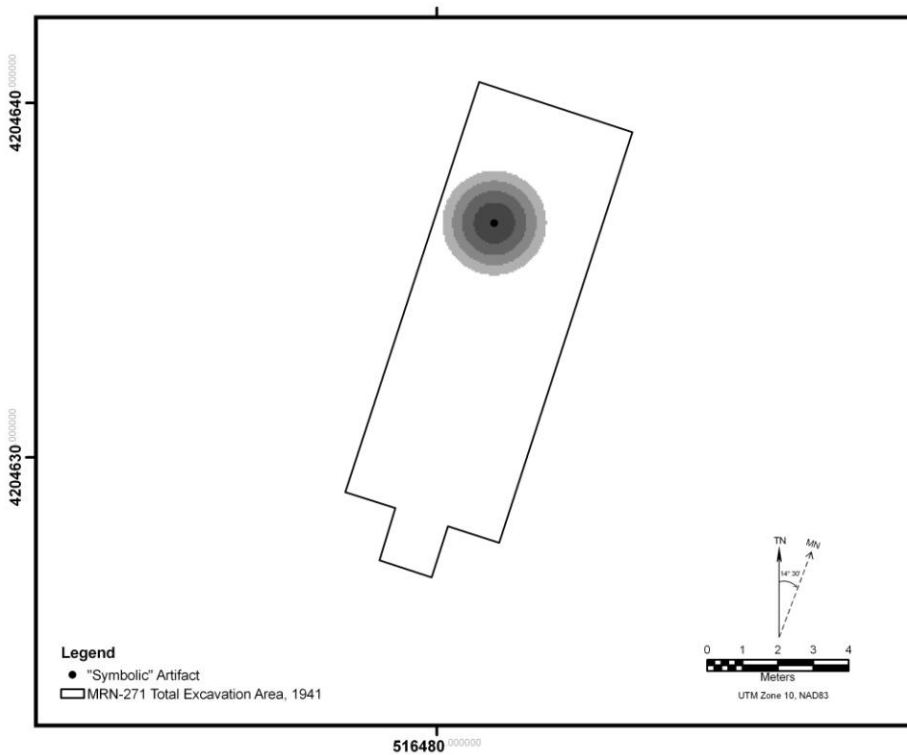


Figure 7.35. Mean centers for each artifact distribution at CA-MRN-271, with nearest neighbor hierarchical cluster indicated.

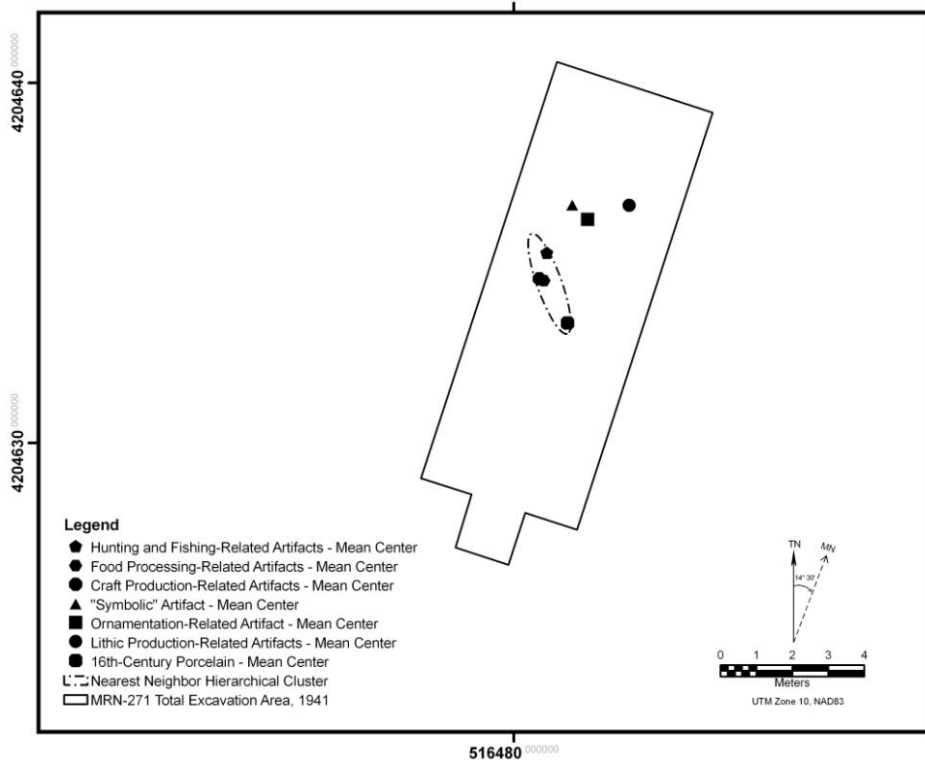
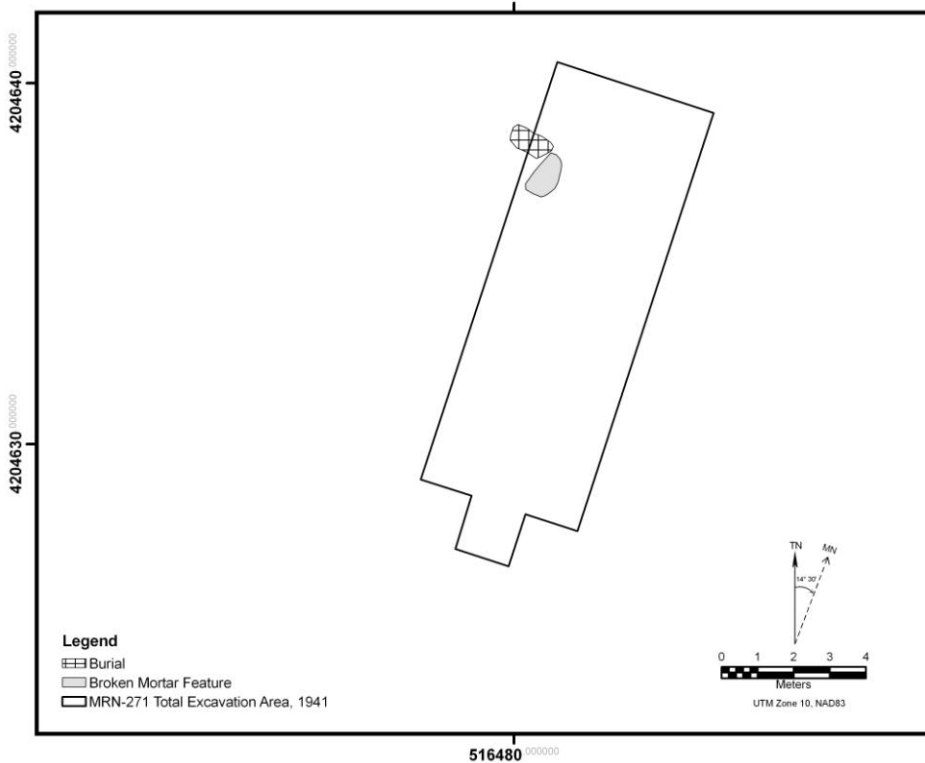


Figure 7.36. Burial and feature location at CA-MRN-271.



CA-MRN-307

Spatial analysis of artifact patterns at CA-MRN-307 does not reveal strong, clear-cut associations between artifact categories, but may offer support for general observations noted on other sites. Mean center points distributions of combined Late Period, indigenously-manufactured objects and sixteenth-century introduced objects are located about 1.5 m apart in the central part of the site, and there is considerable overlap of the standard deviational ellipses. Density measurements indicate that peak concentrations of indigenous objects are to the northwest and east-central parts of the site, while the peaks for sixteenth-century introduced objects are located in the southwest and southeast part of the site—although there is considerable overlap between the two distributions (Figures 7.37 and 7.38). Nearest neighbor statistics and Ripley's *K*-function analysis both indicate the combined Late Period distribution is statistically-clustered, while the sixteenth-century introduced objects are somewhat dispersed (Appendix D).

Examining the distributions of individual artifact categories, mean centers and standard deviational ellipses for most artifact groups overlap in the center of the site, although there is some minor variation in directional trends (Figures 7.39-7.46). The exceptions are the hunting and fishing objects, which are centered in the western part of the site, and the sixteenth-century iron fasteners, which have a strong northwest-southeast directional trend, with the center in the southeastern part of the site. The symbolic objects are centered slightly further east than the other artifact distributions, and they also have a larger standard deviational ellipse.

Density measurements show the craft production objects concentrated in the west-northwest part of the site (which is where the two clusters identified through nearest neighbor hierarchical clustering analysis are located), with a secondary peak in the east-central portion of the site (Figure 7.47). The highest concentrations of food processing artifacts overlap the craft production, with an additional peak in the northeast corner of the site. There are two statistically-significant clusters of food processing items, one in the west and the other in the east-central part of the site—both are adjacent to clusters of craft production objects. The highest density of hunting and fishing objects, as well as the two statistically-significant clusters, is in the southwest corner of the site, distinctly separated from the other peak craft production and food processing concentrations. There are relatively few lithic production artifacts, and they are scattered around the site. The highest concentrations are in the northwest and southeast parts of the site, although no clusters were identified by nearest neighbor hierarchical clustering analysis. The highest concentrations of ornamentation objects are in the western and east-central part of the site. The single statistically-significant cluster of ornamentation objects overlaps with the highest concentration of hunting and fishing objects in the west. The few symbolic objects recovered from the site are concentrated in the southwest and along the eastern margin of the site—no statistically-significant clusters were identified.

Sixteenth-century iron fasteners are scattered from the northwest to southeast corners of the site, with the peak concentration as part of a cache of nineteenth-century iron rods outside the main site boundary to the southeast. No clusters were identified. Finally, sixteenth-century ceramics are concentrated in the southwest and southeast parts of the site, with no identified clusters. Within this category, stoneware and porcelain do not cluster internally, either, but are each scattered throughout the distribution. The sixteenth-century ceramics are most closely associated with peaks in symbolic objects, which include three charmstones and a bird bone whistle; ornamentation objects that includes bird bone tubes and shell beads; and the highest

Figure 7.37. Combined indigenously-manufactured artifact distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

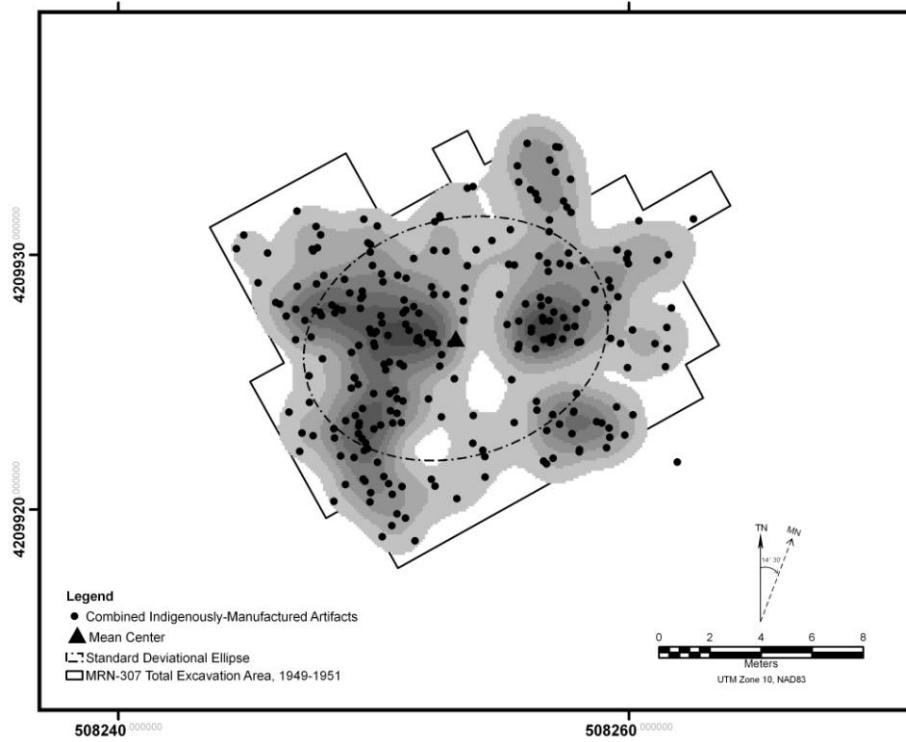


Figure 7.38. Combined sixteenth-century introduced artifact distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

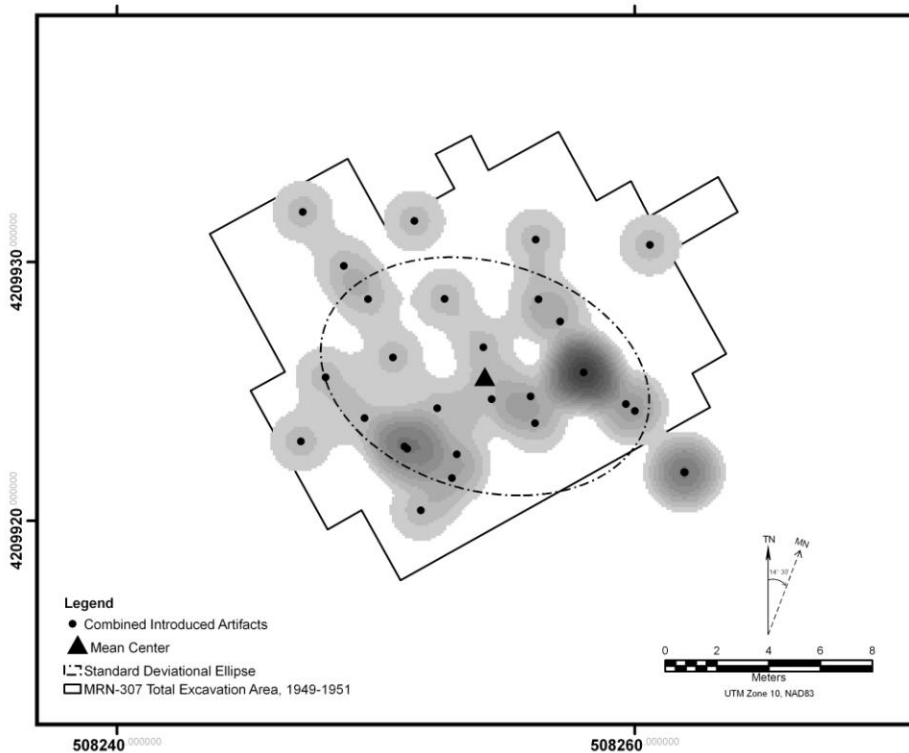


Figure 7.39. Sixteenth-century ceramics distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

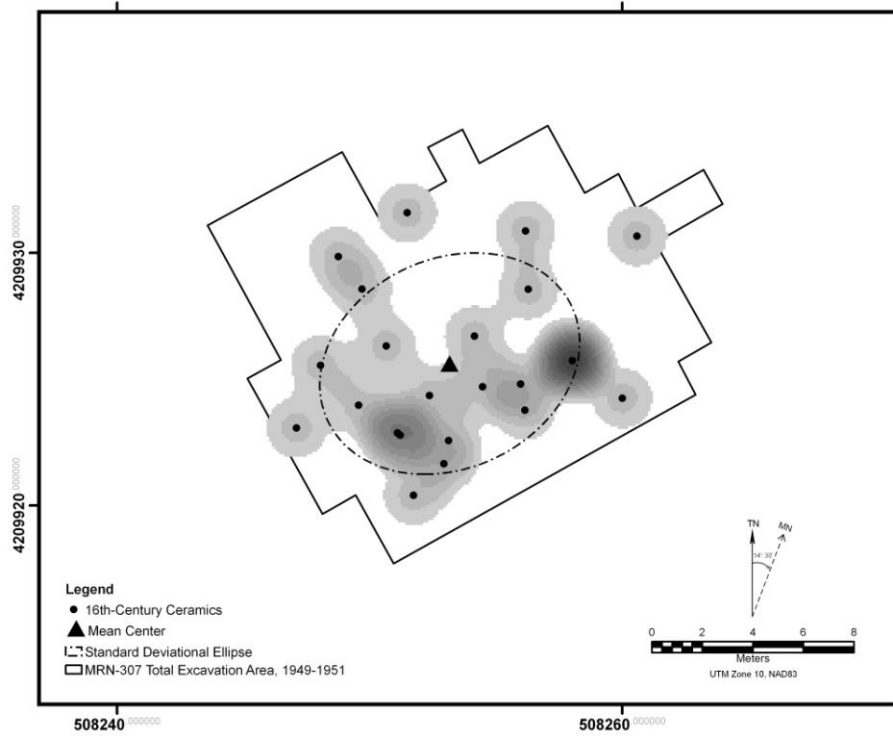


Figure 7.40. Sixteenth-century iron fastener distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

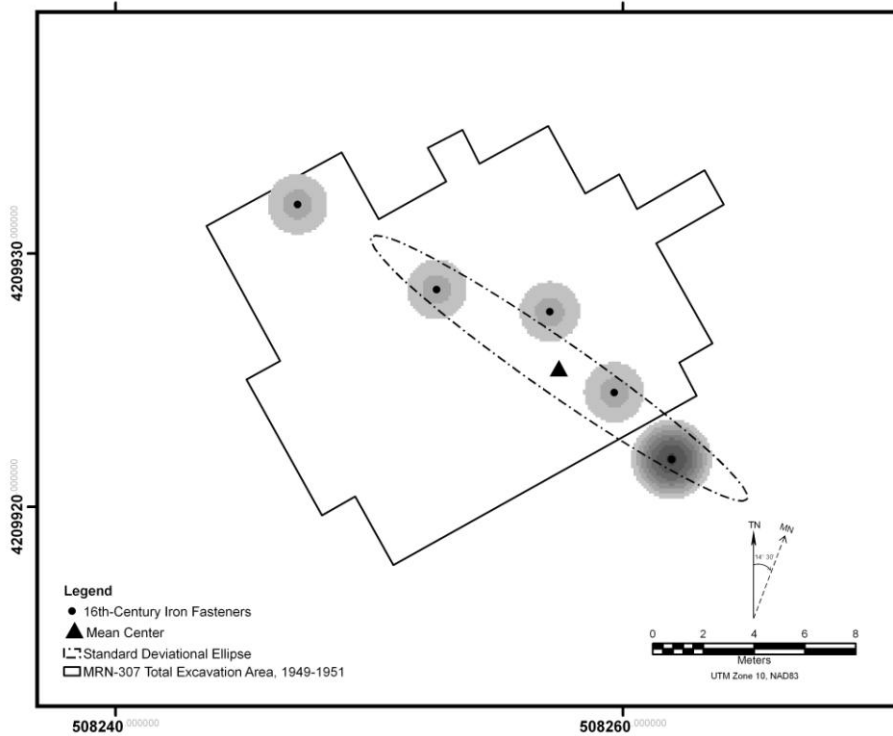


Figure 7.41. Hunting and fishing-related artifact distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.42. Craft production-related artifact distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

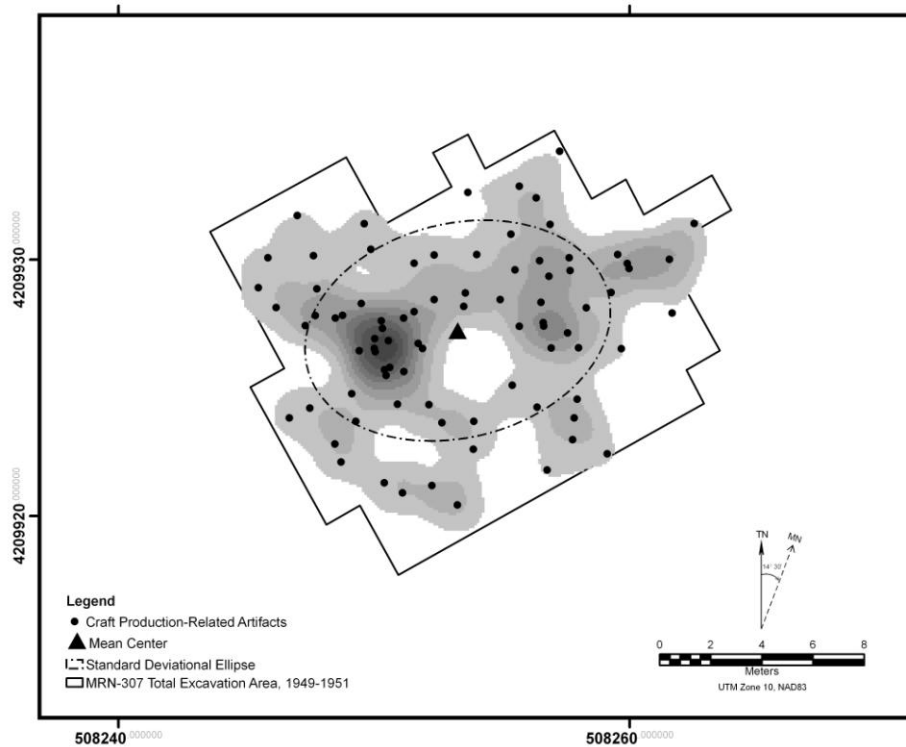


Figure 7.43. Food processing-related artifact distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

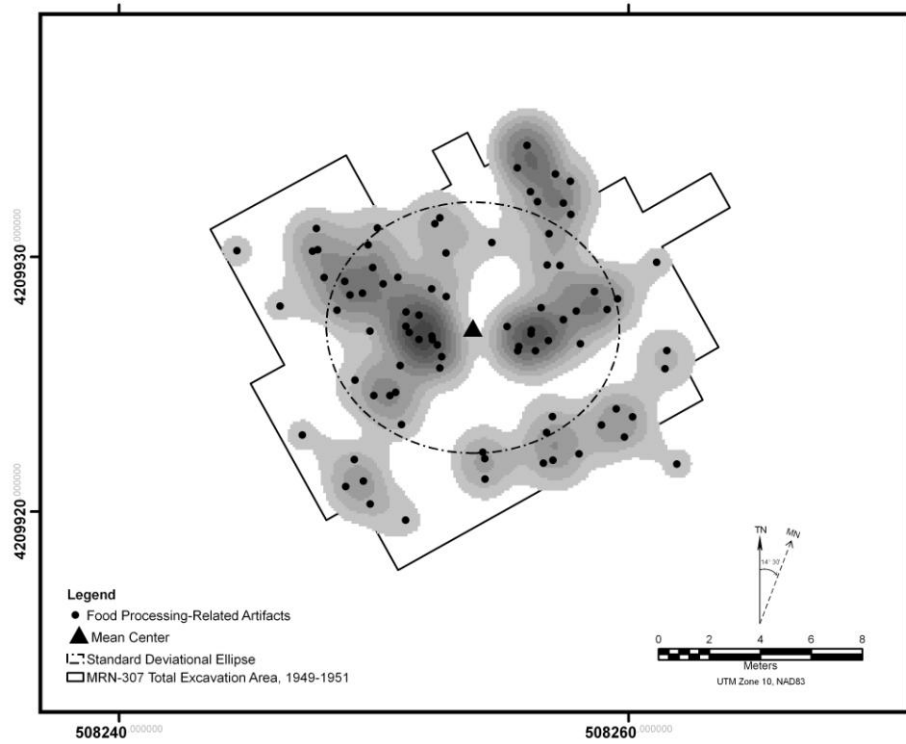


Figure 7.44. Lithic production-related artifact distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

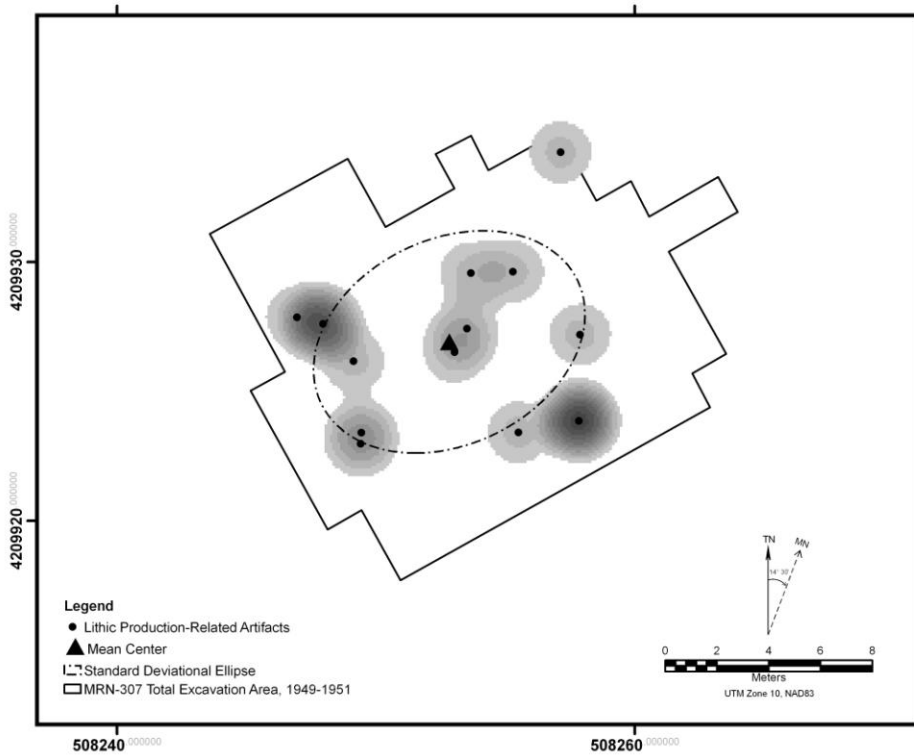


Figure 7.45. Ornementation artifact distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

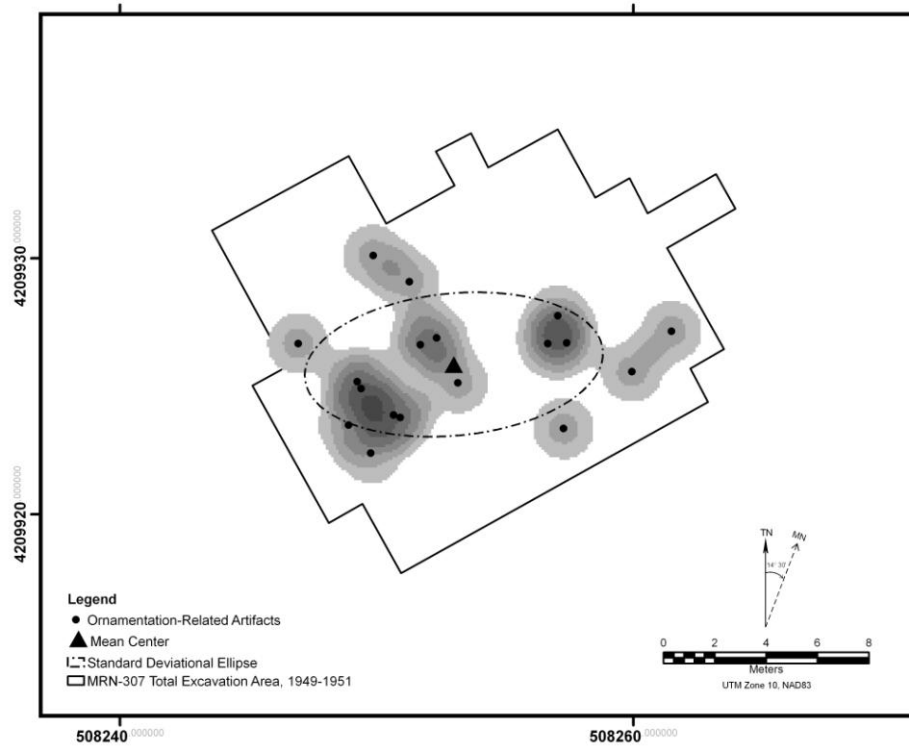


Figure 7.46. "Symbolic" artifact distribution at CA-MRN-307, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

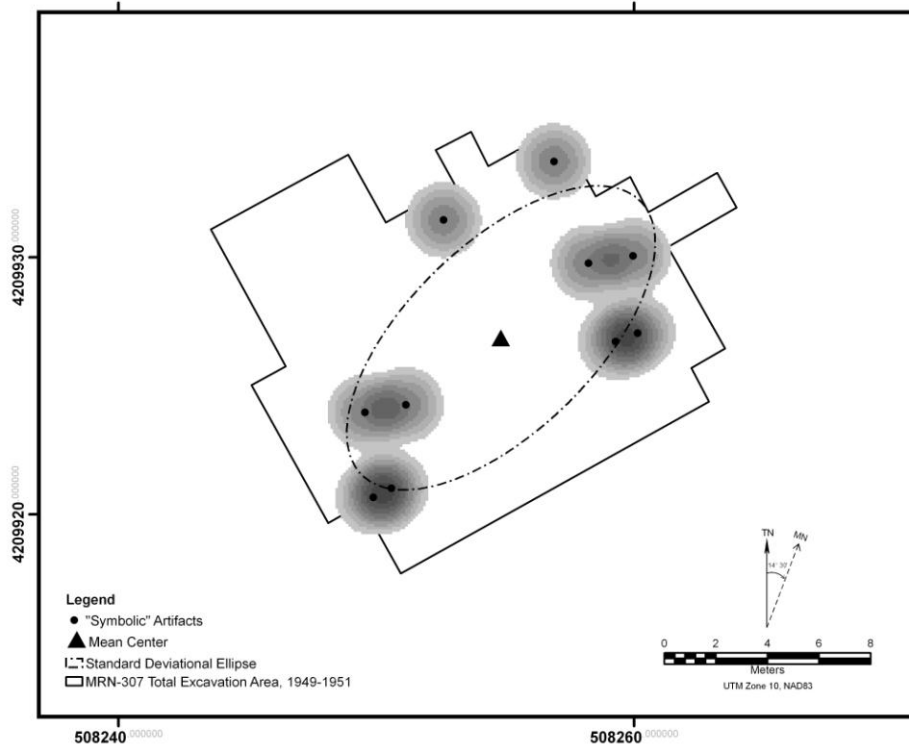
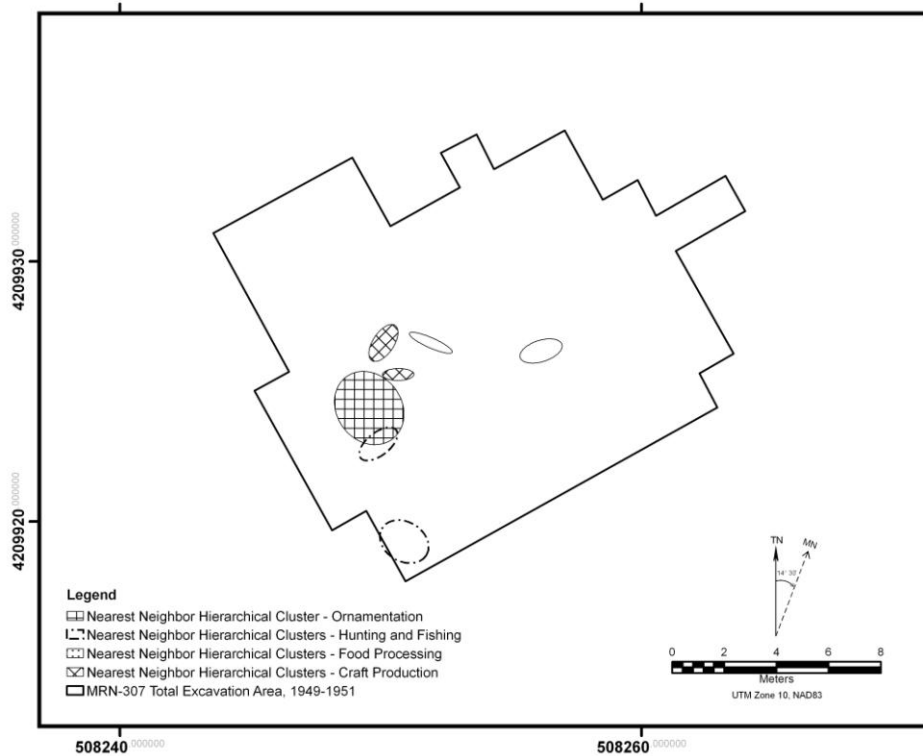


Figure 7.47: Nearest neighbor hierarchical clusters for all artifact distributions at CA-MRN-307.



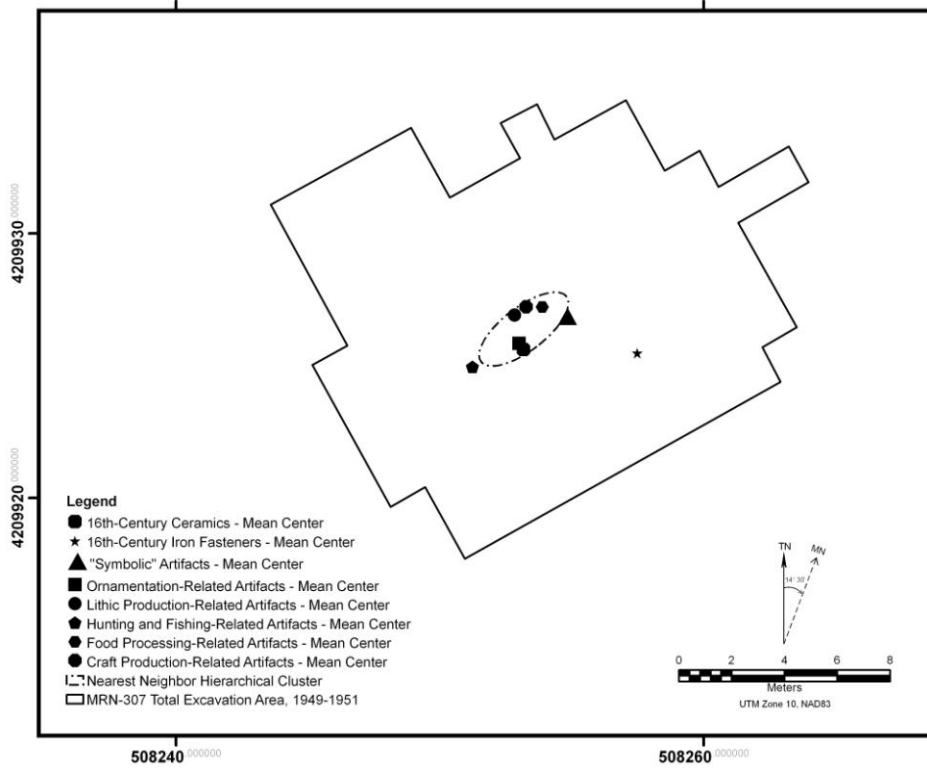
concentration of hunting and fishing objects. None of the correlations, however, are particularly strong.

Nearest neighbor statistics indicate that food processing and ornammentation objects are clustered, symbolic objects are somewhat clustered, while the remainder of the distributions, including both categories of sixteenth-century introduced objects, are either random or dispersed. Ripley's *K*-function analysis, on the other hand, indicates that hunting and fishing and craft production objects are clustered to 4 m, while symbolic, ornammentation, and lithic production artifacts are not statistically clustered. It also indicates that ceramics are clustered between 3-4 m (see Appendix D).

Comparing distributions by combining mean center points of all distributions and calculating nearest neighbor statistics and running Ripley's *K*-function analysis indicate they are clustered in a statistically-significant way near the central portion of the site. Nearest neighbor hierarchical clustering analysis shows that mean center points for the craft production, ornammentation, food processing, lithic production, and sixteenth-century ceramics distributions form a statistically-significant cluster, while the symbolic and hunting and fishing objects, as well as the sixteenth-century iron fasteners distribution mean center points fall outside that cluster (Figure 7.48).

A number of artifact associations were observed during a three dimensional examination of artifact distributions. Sixteenth-century iron fasteners were observed in direct association with broad-point worked bone artifacts (likely wedges) in two locations on the site, and a third iron spike was located near a cluster of craft production objects, mostly thin-point worked bone objects (possibly awls). A spike was also observed in close proximity to a bird bone bead in

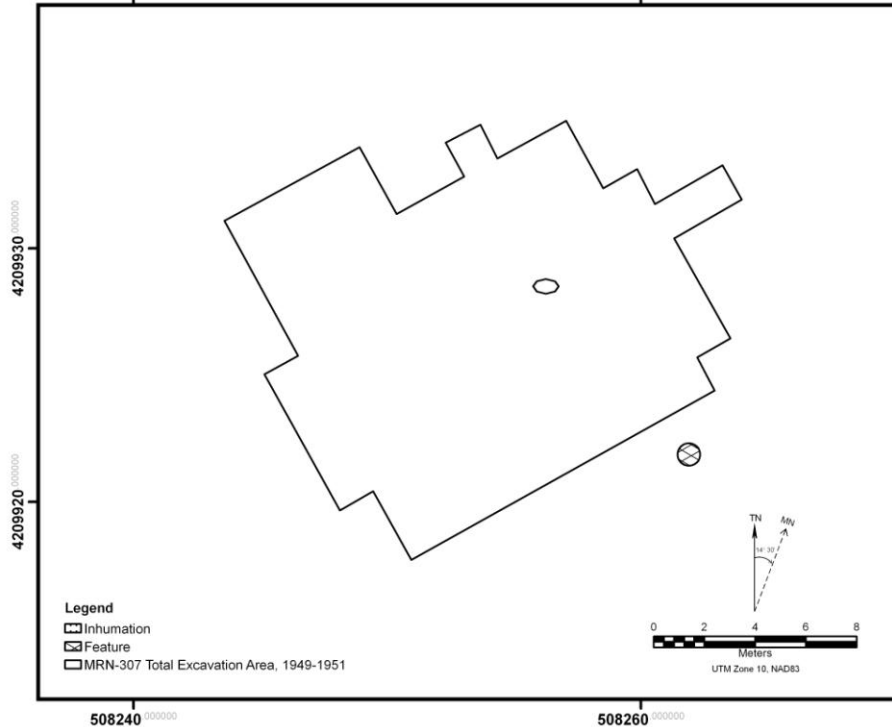
Figure 7.48. Mean centers for each artifact distribution at CA-MRN-307, with nearest neighbor hierarchical clusters indicated.



another part of the site. These observations support a possible association of iron spikes with craft production artifacts observed at other sites. In addition, there is one clear association between a charmstone and a stoneware fragment at the northern edge of the site—both objects were recovered from the same level and much deeper than any surrounding objects. In addition, there are weaker associations between a stoneware fragment and a worked bird bone fragment near the southern part of the site, and a porcelain fragment and pestle fragment in the western part of the site.

No additional information can be gained from CA-MRN-307 by comparing feature and burial locations to artifact distributions (Figure 7.49). Although a number of hearth features were observed during excavation, as noted in Chapter Five the location of only a single feature and the one burial were recorded (and these only to the unit, not the precise location). The feature is a cache of nineteenth-century iron rods, along with three possible sixteenth-century iron fasteners and a single obsidian biface. It is unknown whether this cache of material was collected by Tamal inhabitants of the site in the nineteenth century, or later ranchers or farmers. If the former is the case, it might suggest that the Tamal inhabitants of the site still found a use for iron ship's fasteners into the nineteenth-century. The single burial is located in the central portion of the site, with no distributions of objects in use-related contexts in clear association. As seen at CA-MRN-232, CA-MRN-242, and CA-MRN-271, the burial is not spatially-segregated from other activity areas in the site.

Figure 7.49. Burial and feature location at CA-MRN-307.



CA-MRN-216

Analyzing artifact distributions from CA-MRN-216 reveals clear intra-site spatial patterning among a number of artifact categories. Nearest neighbor statistics and Ripley's *K*-function analysis indicate that all artifact distributions except the symbolic objects and sixteenth-century iron fasteners are clustered within the site in statistically-significant ways. Although the artifact distribution for the combined Late Period, indigenously-manufactured objects are spread across the entire site, the artifacts are clearly concentrated on the western side of the site, while the southeastern quadrant has very few artifacts (Figure 7.50). This is also true of the sixteenth-century introduced objects—very few artifacts were recovered in the southeast part of the site (Figure 7.51). Further examination reveals that the southeastern quadrant of the site is where nearly all burials recorded on the site were located (Figure 7.52). It is evident that at this particular site, the Tamal people spatially-segregated inhumations and cremations to one specific area of their village, and that daily activity took place in other parts of the settlement. This is a different pattern than that seen at CA-MRN-232, CA-MRN-242, CA-MRN-271 or CA-MRN-307.

The highest concentration of Late Period, indigenously-manufactured objects are in the southwest quadrant of the site, although the mean center and standard deviational ellipse are located in the west-central portion of the site. By contrast, the sixteenth-century introduced objects (porcelain, earthenware, and iron fasteners combined) are clearly concentrated in the northwest quadrant of the site, with smaller concentrations in the northeast and southwest quadrants. The mean center and standard deviational ellipse for the introduced objects are located approximately 6.25 m north of the mean center for the contemporary indigenous objects

Figure 7.50. Combined indigenously-manufactured artifact distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

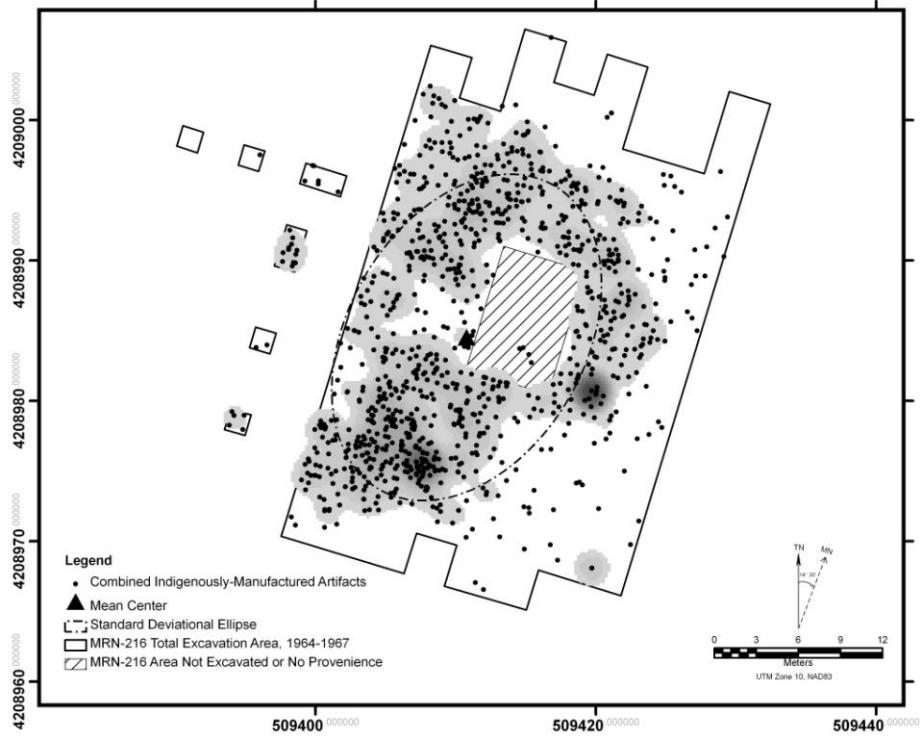


Figure 7.51. Combined sixteenth-century introduced artifact distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

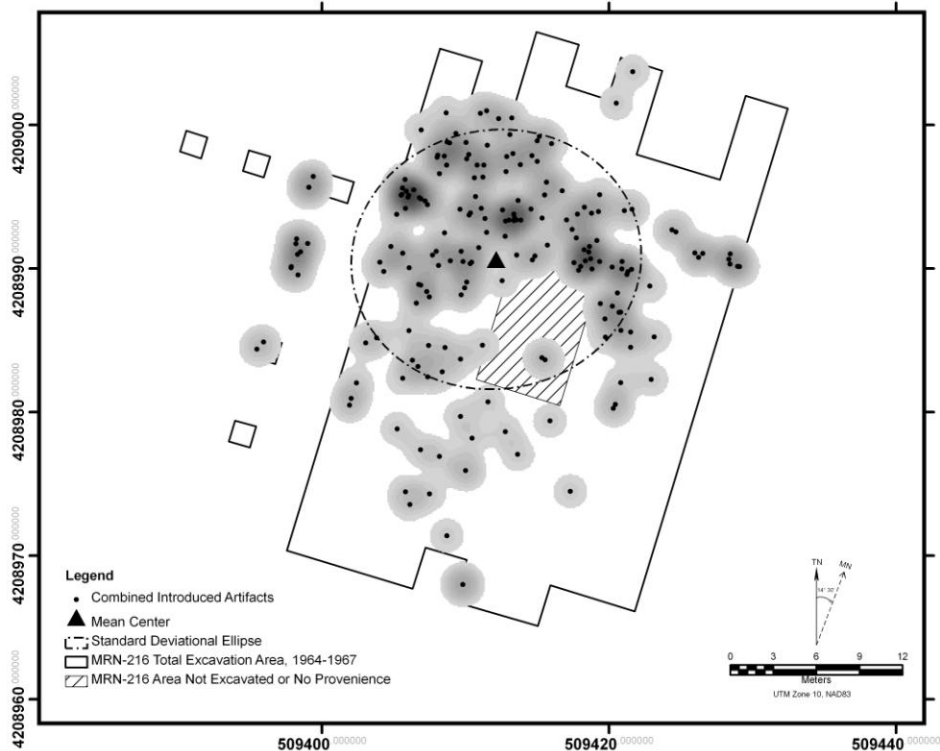
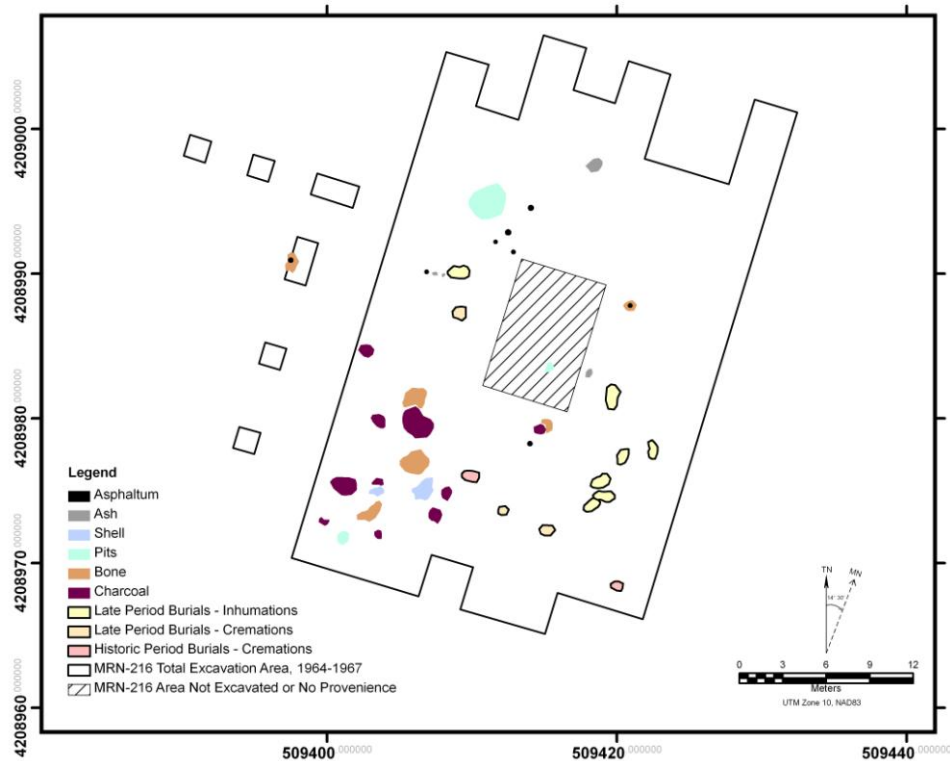


Figure 7.52. Burial and features location at CA-MRN-216.



(see Figures 7.50 and 7.51). Nearest neighbor statistics and Ripley's K -function analysis indicate that both distributions are clustered in a statistically-significant way (Appendix E).

Distributions of individual artifact categories parallel the overall trend for the combined Late Period and introduced object distributions. The craft production objects are heavily concentrated in the southwest quadrant of the site—the mean center and standard deviational ellipse of the craft production distribution is virtually the same as the combined Late Period distribution (Figure 7.53). A total of 30 first order clusters and one second order cluster (i.e., a cluster of clusters) were identified by nearest neighbor hierarchical clustering analysis of the craft production artifact distribution (Figure 7.54). These are concentrated in the southwest portion of the site, but are also scattered across the northern part of the site. Within the craft production category, another pattern that emerges is that shell bead blanks (mostly *Saxidomus* clam shells) and flaked stone drills are heavily concentrated in the southwest part of the site, while the peak densities of thin-point and broad-point worked bone artifacts is heavier in the northern tier of the site (although more scattered, and not as concentrated). This suggests that shell bead production was a specialized activity that was spatially-segregated within the site. Activities that utilized artifacts such as worked bone awls and wedges seem to be concentrated elsewhere.

Food processing objects are more evenly distributed across the site than craft production artifacts, but there is still a concentration in the southwest quadrant—some of these may be related to shell bead production rather than food processing (Figure 7.55). Mean center and standard deviational ellipse of food processing objects are also very similar to Late Period combined and craft production, and nearest neighbor hierarchical clustering analysis identified five statistically-significant clusters around the site (see Figure 7.54).

Figure 7.53. Craft production-related artifact distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

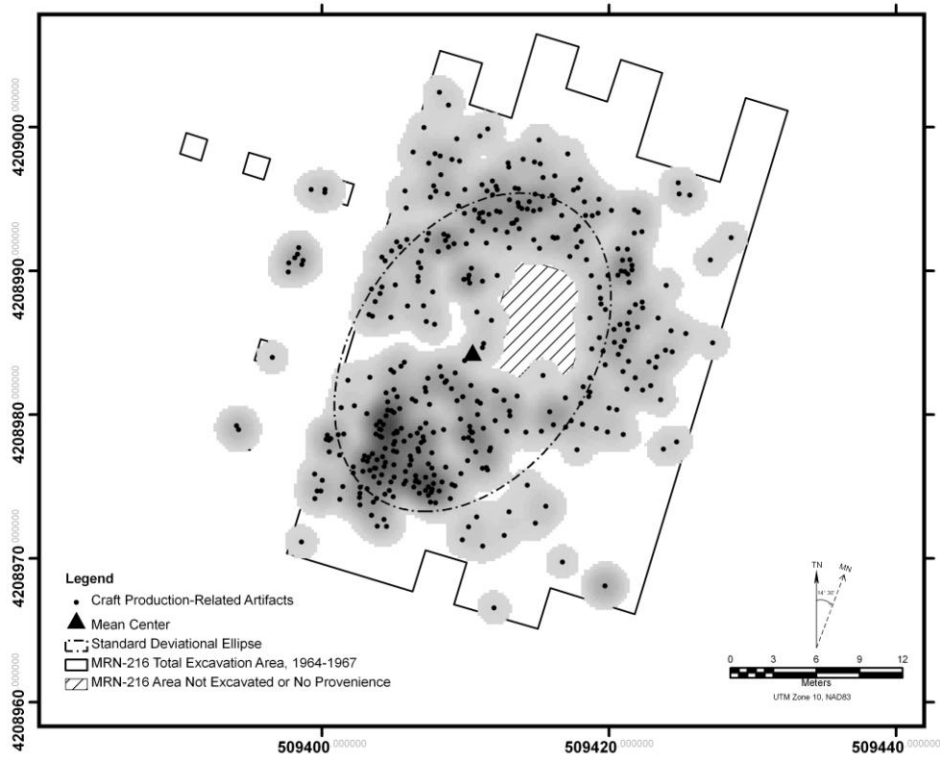


Figure 7.54. Nearest neighbor hierarchical clusters for all artifact distributions at CA-MRN-216.

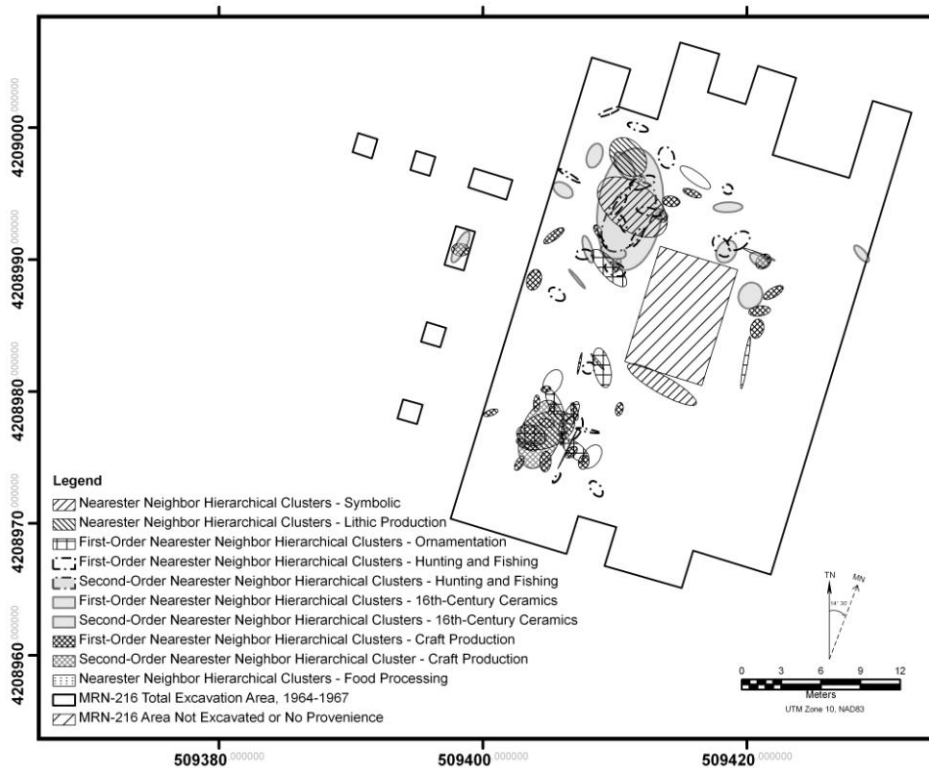
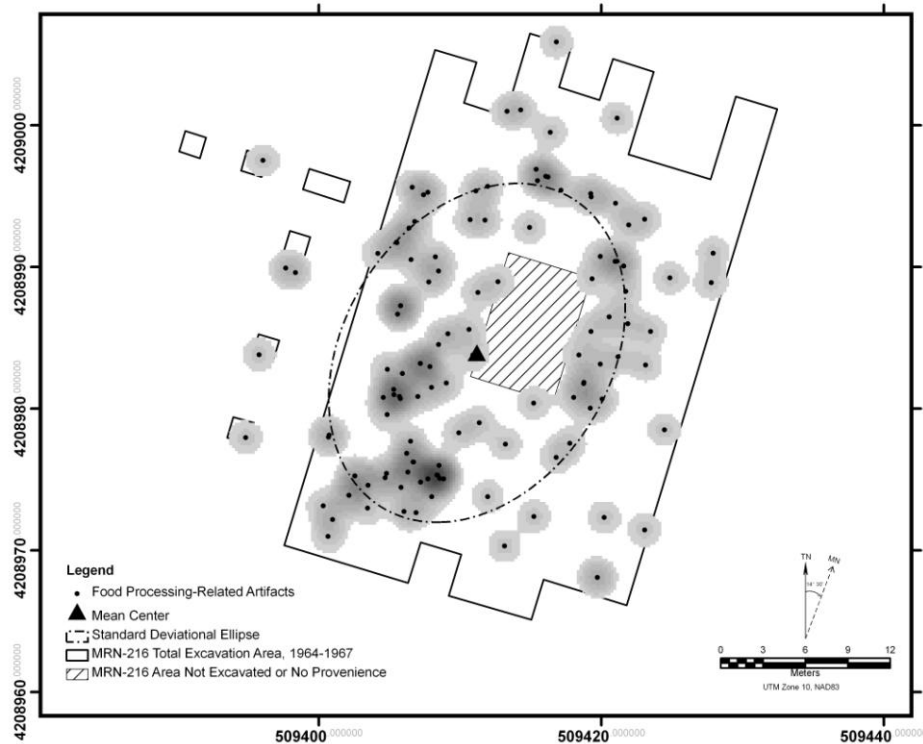


Figure 7.55. Food processing-related artifact distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Hunting and fishing objects are distributed across three-quarters of the site (again, few hunting and fishing related objects were recovered from the southeast corner), but the highest concentration is in the northwest quadrant of the site (Figure 7.56). The mean center and standard deviational ellipse are about 3 m north of the combined Late Period distribution, as well as craft production and food processing artifact distributions. During nearest neighbor hierarchical clustering analysis, 21 first order clusters and one second order cluster of hunting and fishing objects were identified, and these are heavily concentrated in the northwest quadrant of the site (see Figure 7.54).

There are comparatively fewer objects related to lithic production at CA-MRN-216 than other artifact categories, but those recovered are concentrated in both the northwest and southwest quadrants (with slightly higher concentration in the southwest)(Figure 7.57). Two clusters, one in the southwest and one on the northwest, were identified through nearest neighbor hierarchical clustering analysis (see Figure 7.54). The mean center and standard deviational ellipse are west and north from combined, craft production, and food processing distributions, but not as far north as the hunting and fishing artifact distribution. Within the lithic production category, the largest concentration of cores is located in the southwest part of the site, in close association with shell bead production artifacts, including flaked stone drills. This suggests the cores may have been used for producing drills to support shell bead production, although their use for other types of bifaces or projectile points cannot be ruled out.

Density, mean center, and the standard deviational ellipse indicate that ornamentation objects (mostly shell beads) are also concentrated in the southwest quadrant of the site, with a lighter distribution in the northwest and northeast (Figure 7.58). There is also a strong density

Figure 7.56. Hunting and fishing-related artifact distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.57. Lithic production-related artifact distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

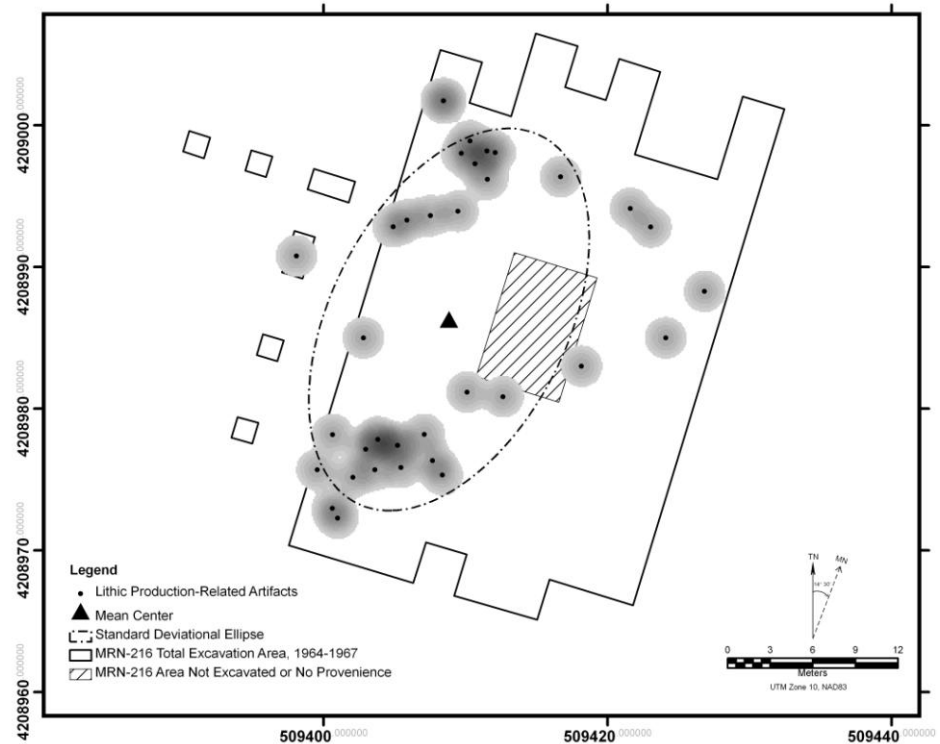
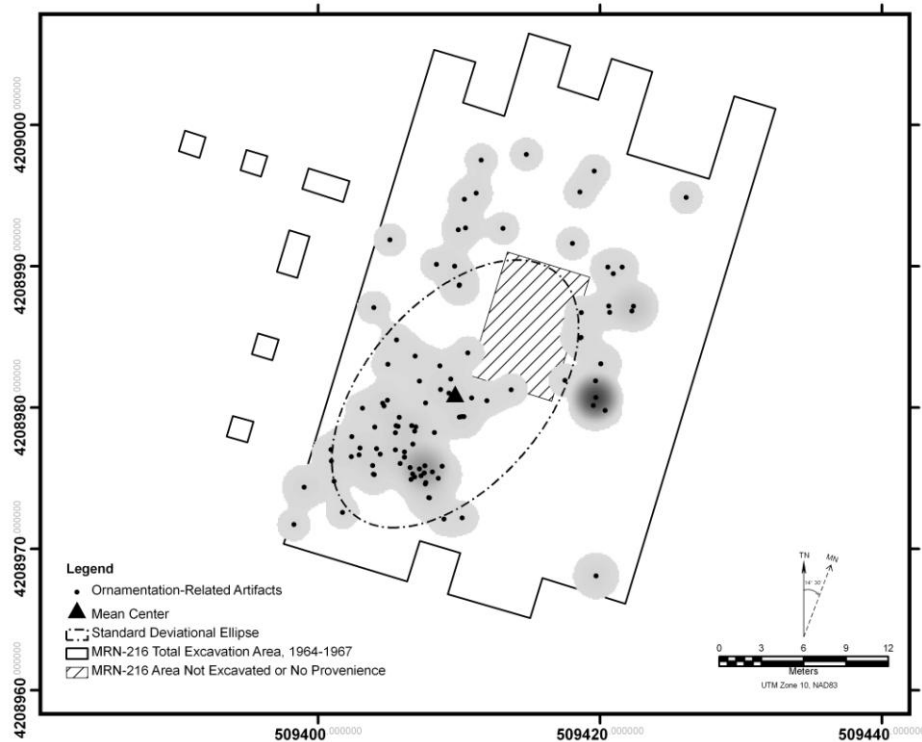


Figure 7.58. Ornamentation artifact distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



peak in the east central portion of the site, where a cache of 76 clam shell disk beads were recovered. Other than this cache, the statistically-significant clusters identified through nearest neighbor hierarchical clustering analysis (seven first order clusters, and one second order cluster) are concentrated in the southwest quadrant of the site and strongly associated with craft production objects related to shell bead production (see Figure 7.54).

Few symbolic objects were recovered from the site, and their distribution indicates a light concentration in all areas of the site except the southeast quadrant of the site, which is devoid of symbolic objects in use-related contexts (although many funerary objects are associated with burials in this part of the site)(Figure 7.59). The mean center and standard deviational ellipse for symbolic objects parallel the craft production and food processing distributions, and two statistically-significant clusters were identified using nearest neighbor hierarchical clustering analysis—one in the northern part of the site, and one in the central part (see Figure 7.54).

Turning to sixteenth-century introduced objects, only nine iron fasteners that can be attributed to the sixteenth century were recovered from the site, and their distribution does not show any pattern or concentration—their mean center and standard deviational ellipse are in the north-central portion of the site, and no clusters were identified (Figure 7.60). Finally, the sixteenth-century ceramics distribution, which includes both earthenware and Chinese porcelain fragments, indicates a heavy concentration of artifacts in the northwest quadrant of the site, and the mean center and standard deviational ellipse are virtually the same as the combined sixteenth-century distribution, centered in the northwest quadrant of the site (Figure 7.61). All statistically-significant clusters of sixteenth-century ceramics identified through nearest neighbor hierarchical clustering (14 first order clusters, and one second order cluster) are located in the northern part of the site (see Figure 7.54).

Figure 7.59. “Symbolic” artifact distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

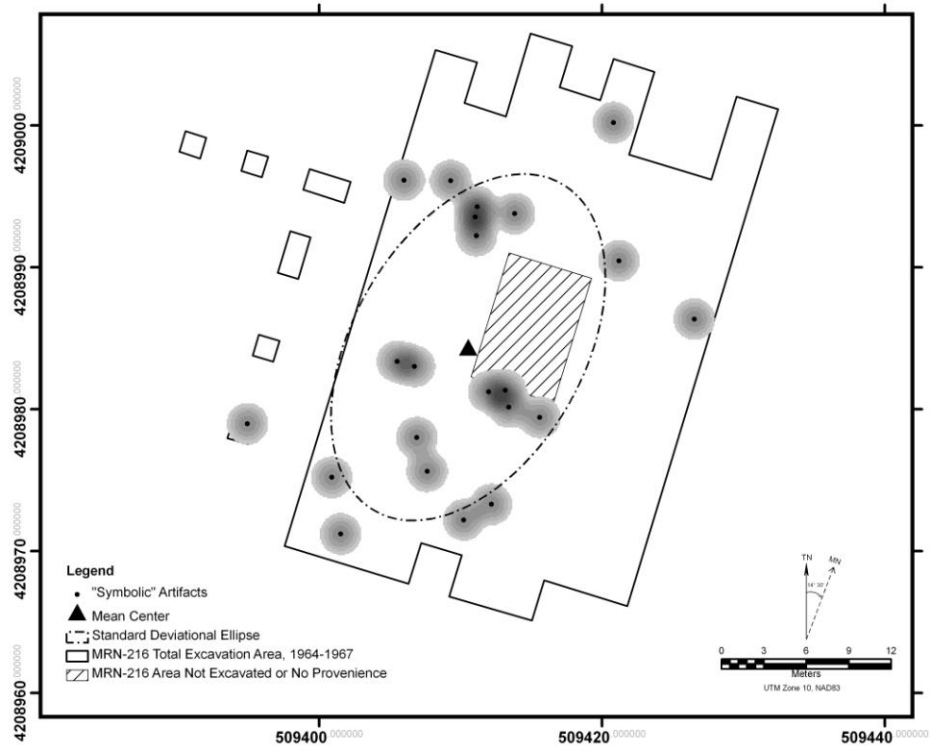
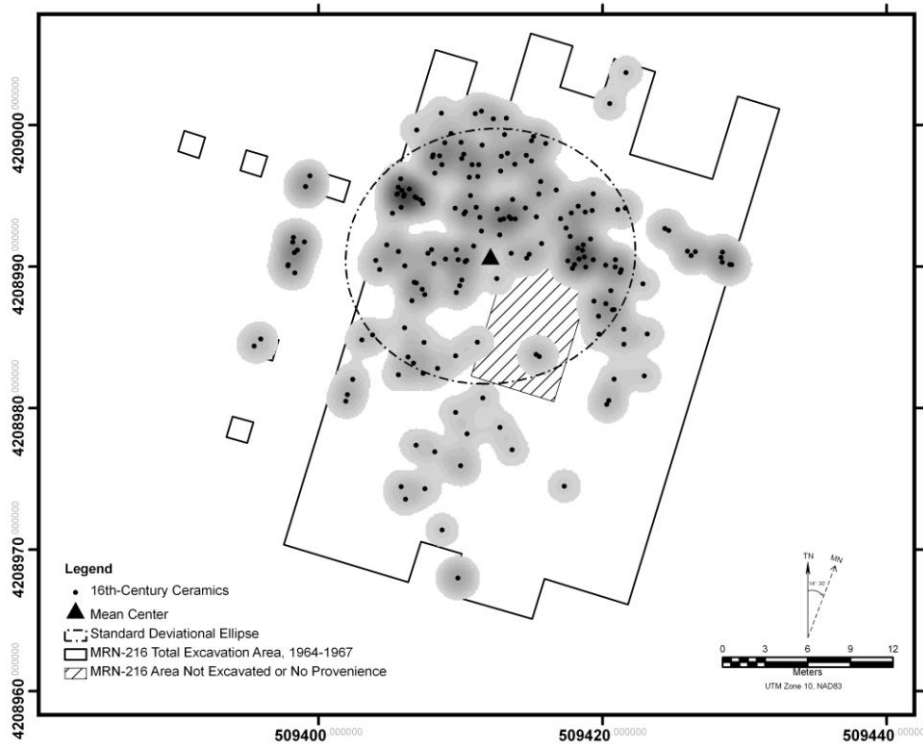


Figure 7.60. Sixteenth-century iron fastener distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



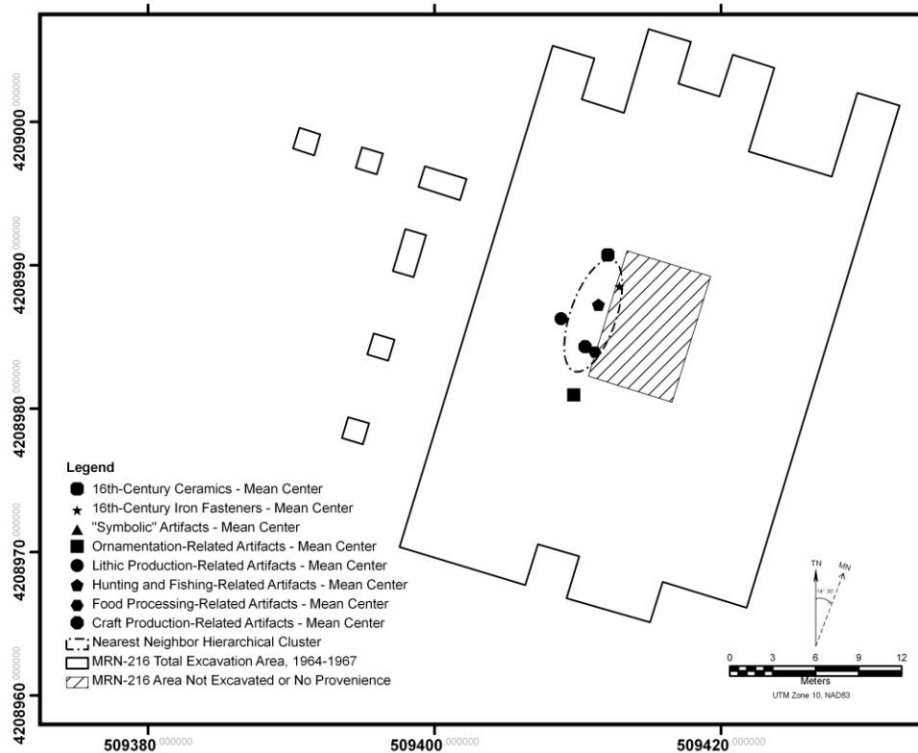
Figure 7.61. Sixteenth-century ceramics distribution at CA-MRN-216, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Comparing distributions of different artifact categories by examining mean center points indicates that the mean centers for all individual artifact categories are located in the central portion of the site, with the sixteenth-century ceramics distribution centered in the north-central part of the site and the ornamentation artifact mean center point in the south-central portion of the site (Figure 7.62). Nearest neighbor statistics and Ripley's *K*-function analysis demonstrate that the mean centers are clustered within the site, and nearest neighbor hierarchical clustering indicates that mean centers for all artifact distributions except for sixteenth-century ceramics, ornamentation objects, and lithic production are part of a single, statistically-significant cluster in the center of the site.

Clusters identified through nearest neighbor hierarchical cluster analysis for individual artifact distributions reveal clear patterns (see Figure 7.54). There are two distinct clusters of different overlapping artifact types, one in the southwest quadrant and one in the northwest quadrant. In the southwest, there are overlapping clusters of ornamentation, lithic production, hunting and fishing, food processing, and craft production objects—although ornamentation and craft production clearly dominate in this area of the site. Since most of the craft production objects at CA-MRN-216 are related to shell bead production, and most of the ornamentation objects are shell beads, this is strong evidence that shell bead production was concentrated in the southwest quadrant of the site. Meanwhile, in the northwest part of the site, the concentration of artifacts is dominated by clusters of sixteenth-century ceramics, primarily Chinese porcelain. There are also, however, associated clusters of symbolic objects (including fragments of fossilized whalebone and charmstones), hunting and fishing objects, craft production artifacts, and individual clusters of food processing and lithic production artifacts.

Figure 7.62. Mean centers for each artifact distribution at CA-MRN-216, with nearest neighbor hierarchical clusters indicated.



Examining and comparing the distributions of different artifact categories in three dimensions reinforces some of the trends observed through point pattern analysis. Because of the large number of artifacts in most categories, there are a large number of individual sixteenth-century introduced artifacts in close proximity to other artifacts. A few stand out, however, because they are closely associated both horizontally and vertically. For example, there are a number of interesting associations between Chinese porcelain fragments and symbolic objects. In the northwest part of the site, there is a very clear association between a porcelain fragment and a chalcedony bivalve fossil, both recovered from a deep pit at the same depth (1.65 m), which is much deeper than any of the surrounding objects. In the same area, there is also close vertical and horizontal associations between individual porcelain fragments and fossil whalebones and charmstones. Another close association between a charmstone and a porcelain fragment was also observed in the northeast part of the site, as well as association between two individual porcelain fragments and hematite and ochre fragments in the central part of the site. While none of the individual associations between porcelain and various “symbolic” objects are compelling, taken as a whole, and compared to broader trends on the site, they may lend some credibility to a larger association or pattern.

I also observed association between porcelain fragments and a variety of other artifacts around the site. In the northeast part of the site, there are a number of projectile points and point fragments in direct association with porcelain fragments. Similarly, because both porcelain distributions and the peak of hunting and fishing related objects are located in the northwest quadrant, there are numerous close associations there. In general, there are few associations

between porcelain and ornamentation objects (their peak densities occur in different parts of the site), but there are a few clear associations between small clusters of porcelain and ornamentation objects. In particular, bird bone tubes seem to be more closely associated with porcelain fragments than shell beads or any other ornamentation objects. There is one particularly interesting association between a porcelain fragment, a magnesite bead, and an obsidian tinkler in the west-central part of the site. There are also few associations between lithic production objects and porcelain, but there are a few noteworthy instances, including a hammerstone and an antler tine in close proximity to porcelain fragments. In the northwest, there is a cluster of lithic production objects associated with a large group of porcelain fragments, including a core, two antler tines, and three thin-pointed worked bone artifacts identified by previous researchers as flakers. There are several instances of food processing artifacts (a biface, mortar fragments, and pestle fragments) associated with individual porcelain fragments, but no clear pattern emerges. Finally, due to the high concentration of craft production objects and porcelain overall on the site, there are numerous associations. There is one particularly noteworthy association in the northwest part of the site of a broad-point worked bone artifact (likely a wedge) and porcelain fragment, both of which are much deeper than any surrounding artifacts.

While not particularly strong, there does appear to be some association between the few sixteenth-century iron fasteners found on the site and craft production objects. In the northeast quarter of the site, there is a spike in very close proximity to a worked bone fragment, a possible biface, and a quartz drill, while in the central part of the site a spike and a single obsidian biface fragment are in close association. Similarly, in the southwest, a spike, a drill and two bead blanks are closely related as part of a large feature of burned charcoal.

Comparing features recorded on CA-MRN-216 to artifact distributions, the sixteenth-century ceramics and iron fasteners, as well as the hunting and fishing objects, are most heavily concentrated in the northwest portion of the site around a large pit feature (see Figures 7.54, 7.56, 7.60, and 7.61). Although symbolic objects do not show any strong concentrations on the site, there is a small peak density measurement also associated with the same pit. Researchers thought this pit might be associated with a structure before beginning excavation, but subsequent investigation did not reveal any crushed shell or packed clay layers that might indicate a floor. It is unknown if this pit was associated with a dwelling or not. Hunting and fishing objects have a peak density surrounding a small deposit of ash and asphaltum in the northwest, while there is a secondary concentration in the southwest part of the site. The southwestern part of the site is a center of several large hearth features, including widespread concentrations of charcoal, fire-cracked rock, and burned bones. This area also has the heaviest concentrations of ornamentation, food processing, and craft production-related artifacts. The latter category, however, also has strong concentrations spanning the northern tier of the site, as well. Lithic production artifacts, while few in number, are concentrated around both sets of features in the northwest and the southwest. The twelve burials at CA-MRN-216 (seven inhumations and five cremations, including two cremations with associated Historic Period funerary objects) are mostly concentrated in the southeast part of the site, and there are no other features located in that quadrant.

Overall, the sixteenth-century ceramics distribution appears to be most closely associated with the distribution of hunting and fishing objects (although the mean center point of the porcelain and earthenware distribution is nearly 3.5 m north of the hunting and fishing artifacts mean center point) and symbolic objects. With the exception of the hunting and fishing and

symbolic objects, the sixteenth-century introduced artifacts are clearly spatially-segregated from the rest of the peak artifact concentrations from the site—this includes a very clear separation from the shell bead production area of the site. Another pattern observed at the site is that craft production objects directly related to shell bead-making activities (flaked stone drills and bead blanks) are separated from worked bone objects used for other crafts (basketry, wood-working, etc.). The latter, more heavily concentrated in the northern part of the site, are more closely associated with large concentrations of sixteenth-century Chinese porcelain. Likewise, there is direct association of a number of lithic production artifacts (antler and bone flakers and hammerstones) with clusters of porcelain in the same sector of the site. This suggests the possibility that some of these lithic and craft production artifacts (awls, wedges, flakers, etc.) may have been used to “process” Ming porcelain vessels, possibly as traditional Tamal artifact types or other objects. I develop this interpretation more fully in Chapters Eight and Nine.

CA-MRN-298

Although different loci of the same site, CA-MRN-298E and CA-MRN-298W have enough spatial separation that each warrants separate analysis for intra-site patterning. I then compare the two loci to see if patterns observed at other sites (especially CA-MRN-216) are repeated at CA-MRN-298E and CA-MRN-298W individually, or if the entire site of CA-MRN-298 needs to be evaluated as a whole when comparing artifact and feature patterning.

CA-MRN-298E

At CA-MRN-298E, combined distributions of Late Period, indigenously-manufactured artifacts and sixteenth-century introduced objects both span the entire site loci, but concentrations do occur in a subtle pattern (though not as strong as the pattern that emerged at CA-MRN-216)(Figures 7.63-7.64). While there is considerable overlap of peak densities in the western part of the site loci, there are also separate concentrations of the artifacts in other parts of the site loci, with introduced objects more heavily concentrated in the southern sector of the site loci. Standard deviational ellipses are approximately the same size for each distribution, with the mean center of the introduced object distribution located just 1.6 m south of the mean center of the contemporary Late Period, indigenously-manufactured objects. Nearest neighbor statistics indicate that the combined Late Period, indigenously-manufactured objects are clustered in a statistically-significant way, and the sixteenth-century introduced objects (in this case almost exclusively Chinese porcelain and earthenware fragments; only one iron fastener was recovered) have a random distribution within the site loci. Ripley’s *K*-function analysis, which gives slightly different results, reveals that the combined Late Period distribution clusters in a significant way from 1-5 m, while the combined introduced objects distribution is also clustered, from 1-6 m (Appendix F).

Examining distributions of individual artifact categories, mean centers and standard deviational ellipses for each of the Late Period, indigenously-manufactured artifact distributions overlap in the central part of the site loci, although the hunting and fishing object distribution ellipse is furthest south and the ellipse for craft production artifacts is located furthest west. Nonetheless, the indigenous artifact distributions overlap to a significant extent, and they all overlap with the sixteenth-century introduced object distribution (Figure 7.65). Within the Late Period artifact category, nearest neighbor statistics indicate that individual distributions of

Figure 7.63. Combined indigenously-manufactured artifact distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

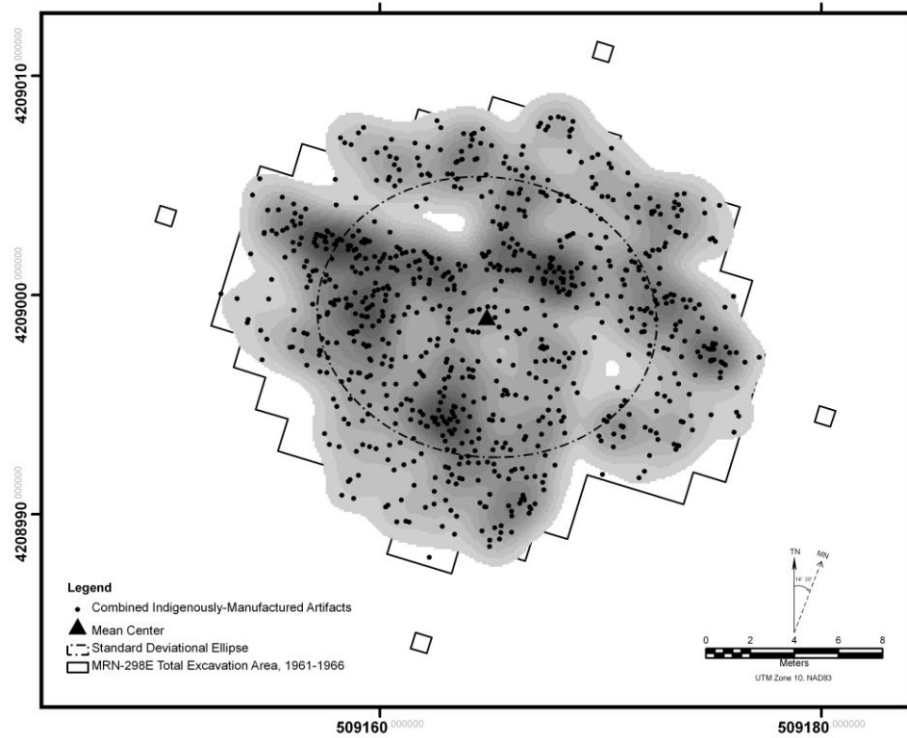


Figure 7.64. Combined sixteenth-century introduced artifact distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

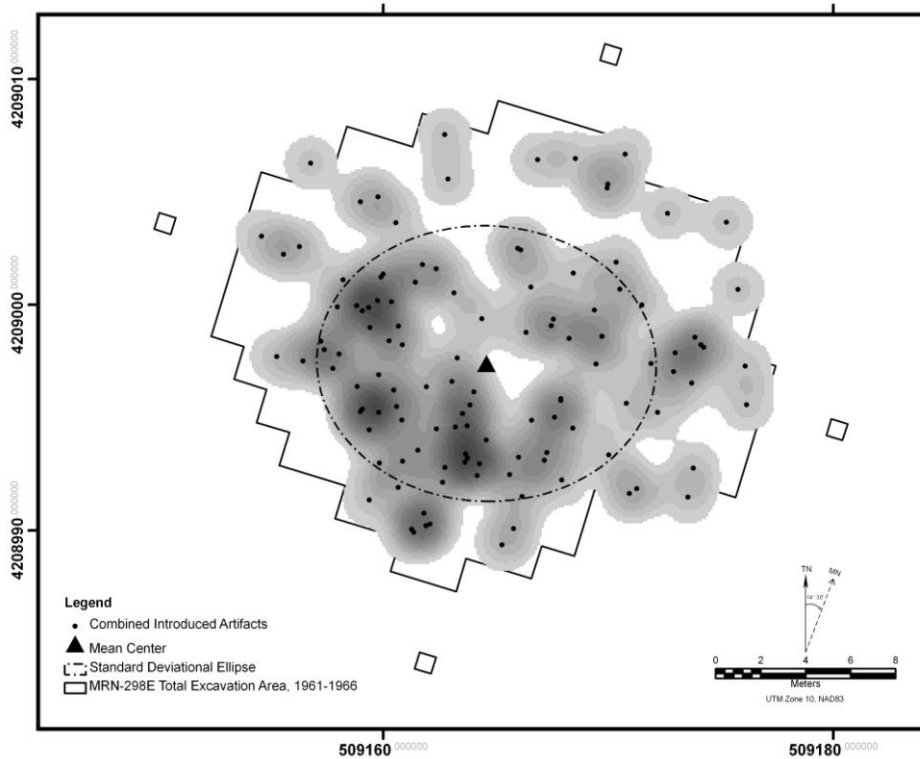
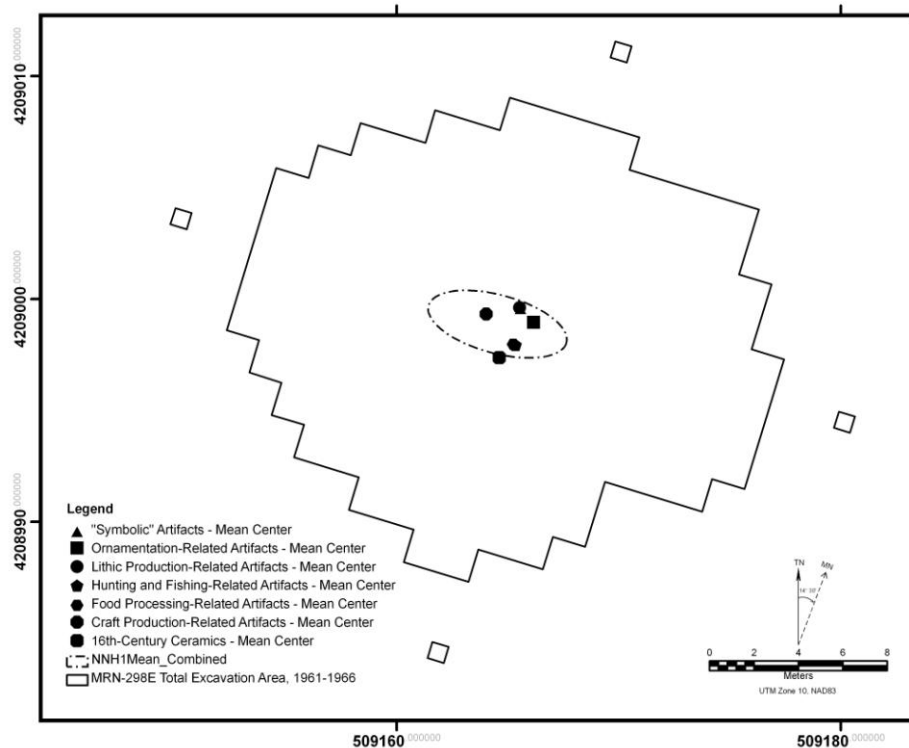


Figure 7.65. Mean centers for each artifact distribution at CA-MRN-298E, with nearest neighbor hierarchical clusters indicated.



hunting and fishing, craft production, symbolic, and ornamentation objects are all clustered, while lithic production-related artifacts may be clustered. Food processing objects have a random distribution. Ripley's *K*-function analysis reveals that, for individual artifact distributions in each category, there is no statistically-significant clustering evident for food processing artifacts, lithic production objects, or symbolic artifacts at any distance. Hunting and fishing objects, on the other hand, are clustered from 1-5 m, while craft production and ornamentation objects are clustered from 1-6 m. Paralleling the combined introduced object distribution, the porcelain and earthenware fragments are also clustered from 1-6 m (see Appendix F). With only one point, the iron fastener "distribution" could not be analyzed.

Density measurements reveal that craft production objects are heavily concentrated in the western part of the site loci, with smaller concentrations in the south and north-central areas of the site loci (Figure 7.66). Nearest neighbor hierarchical clustering analysis also identified significant clusters (25 first order clusters and two second order clusters) of craft production objects on the west side, with numerous small clusters scattered around the site loci (Figure 7.67). Food processing objects are concentrated in the southern part of the site loci, with a lighter distribution around the rest of the site loci (Figure 7.68)—the single statistically-significant cluster of food processing objects is located in the south. Hunting and fishing objects also have their heaviest concentration in the south and southwest part of the site loci (Figure 7.69), and nearest neighbor hierarchical clusters are located in that quadrant of the site loci, although there are several other small, scattered clusters for a total of six in all. Although represented by comparatively fewer objects, artifacts related to lithic production are more heavily concentrated in the northern part of the site loci (Figure 7.70). Significant clusters of

Figure 7.66. Craft production-related artifact distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

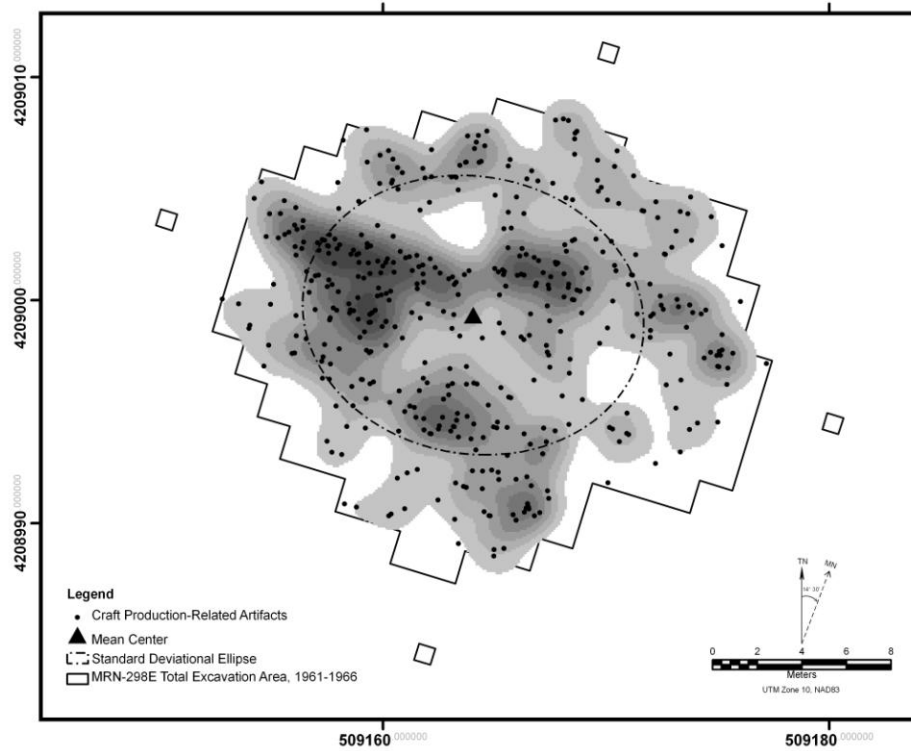


Figure 7.67. Nearest neighbor hierarchical clusters for all artifact distributions at CA-MRN-298E.

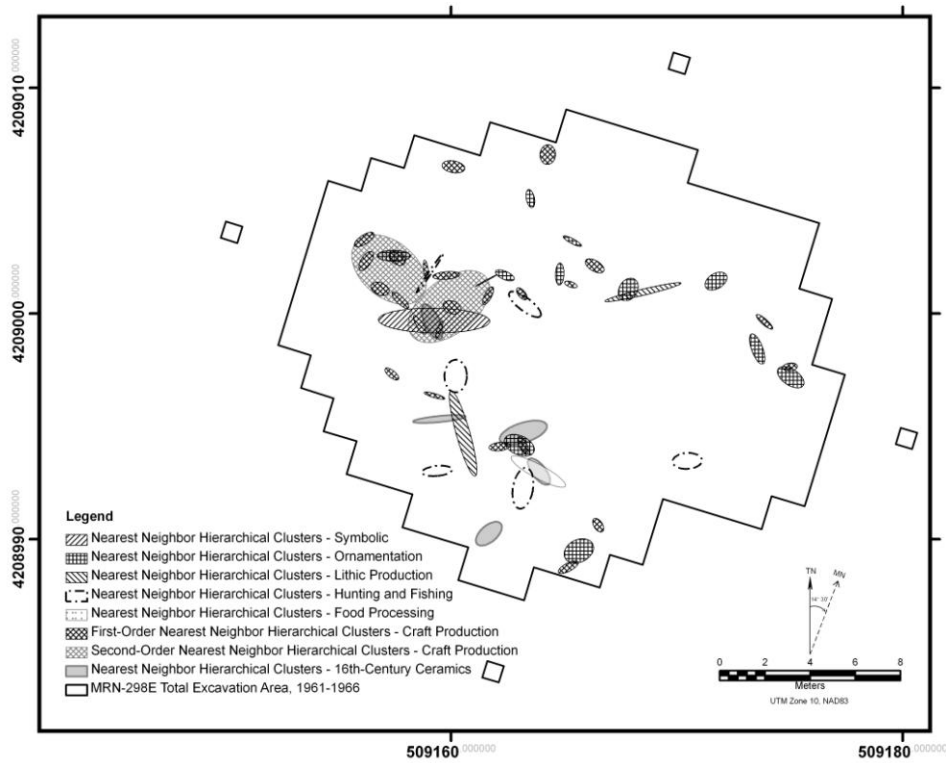


Figure 7.68. Food processing-related artifact distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

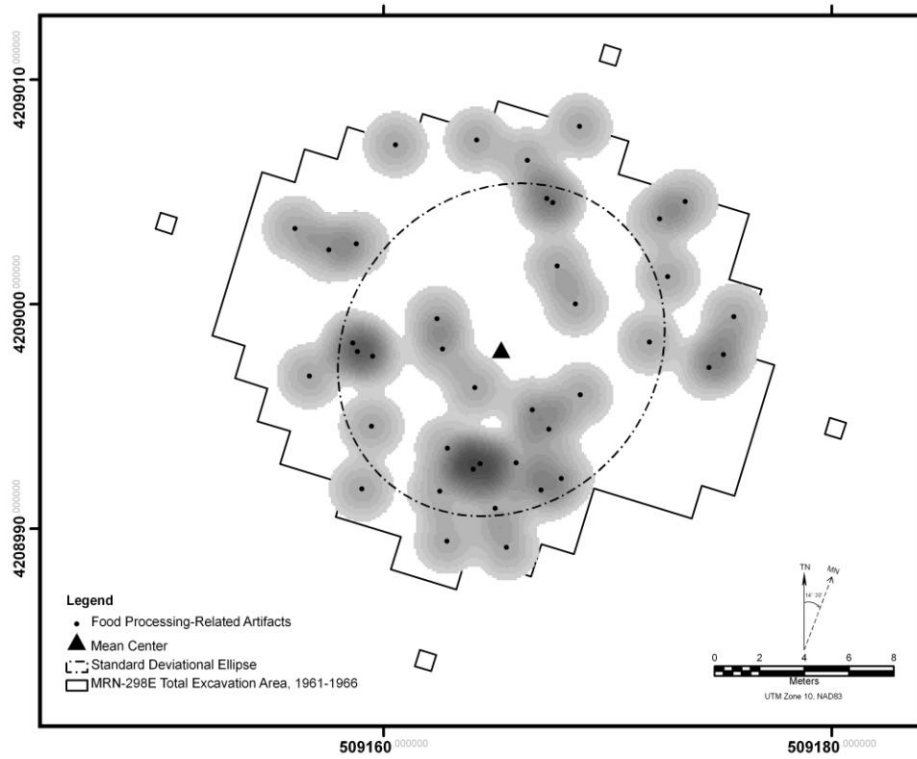


Figure 7.69. Hunting and fishing-related artifact distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

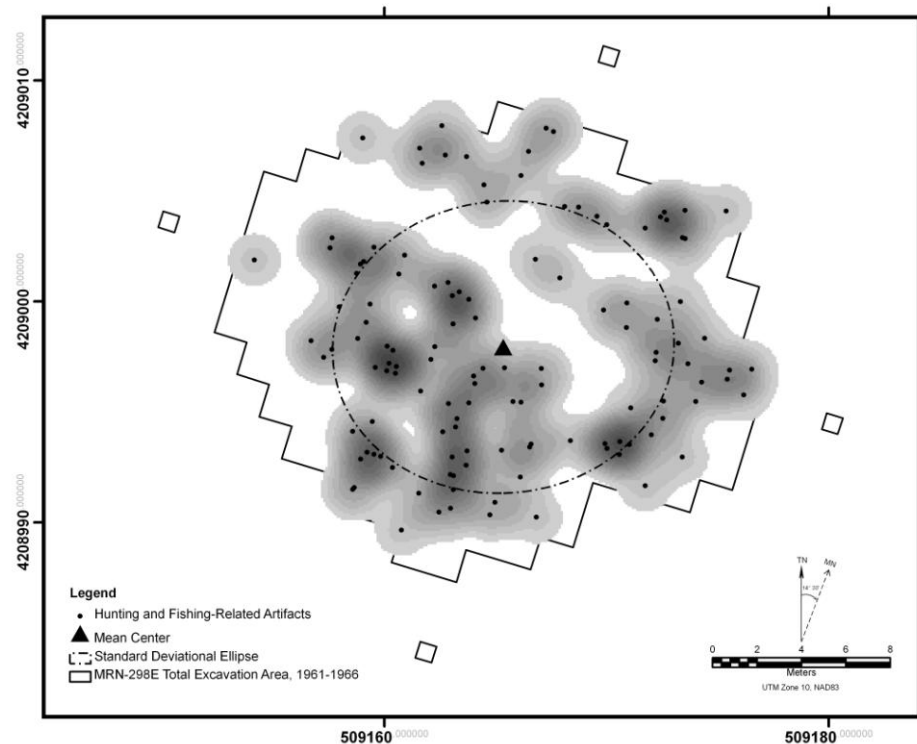
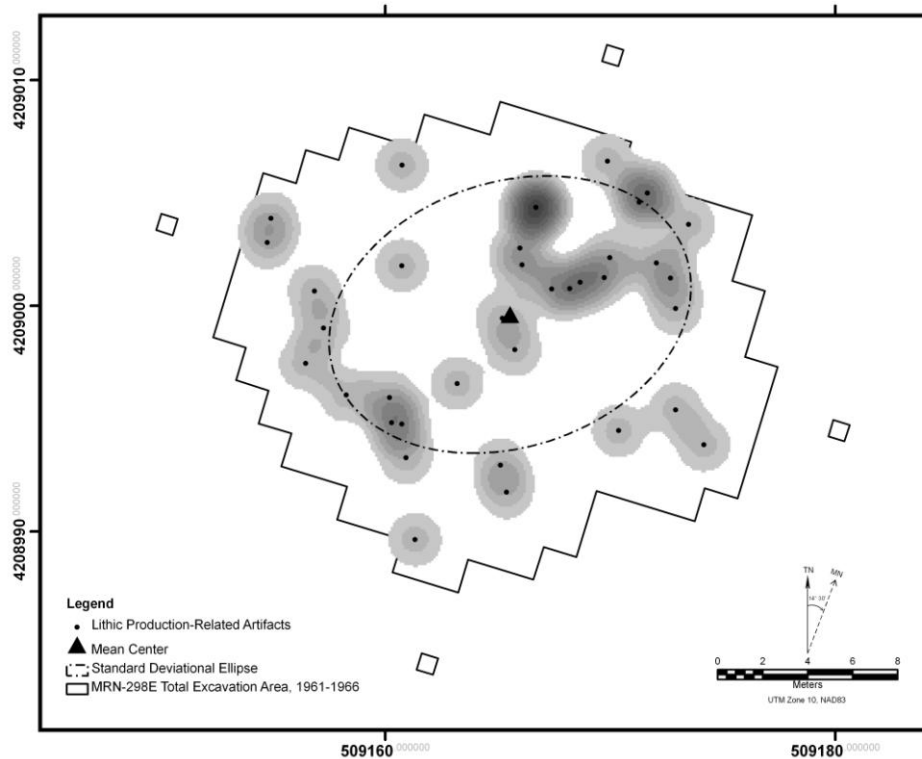


Figure 7.70. Lithic production-related artifact distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



lithic production objects are located not only in the north, however, but also in the southwest portion of the site loci. Ornamentation objects are also concentrated in the northern part of the site loci, but there is a strong peak in the south, as well (Figure 7.71). Nearest neighbor hierarchical clustering analysis identified nine clusters of ornamentation objects spread across the northern portion of the site loci, with two isolated clusters in the south. Symbolic objects are scattered in isolated concentrations across the site loci, but the heaviest concentration is in the west (Figure 7.72), and that is where the single nearest neighbor hierarchical cluster is located. Density measurements indicate the sixteenth-century ceramics have their greatest concentration in the south, southwestern, and western portion of the site loci (Figure 7.73), and that is where the five statistically-significant clusters of ceramics identified by nearest neighbor hierarchical clustering analysis are located.

Comparing artifact clusters identified through nearest neighbor hierarchical clustering analysis, in the western portion of the site loci there is significant overlap of craft production, ornamentation, symbolic, and sixteenth-century ceramic clusters (see Figure 7.65). There is a particularly strong association of Chinese porcelain fragments and ochre (included in the symbolic category because of its common presence in burials, but also likely used as a pigment for body paints during dances and other ritual performances) found in this area. In the southern part of the site loci, porcelain, ornamentation artifacts, hunting and fishing objects, food processing tools, and craft production-related material culture all co-occur, but the peak concentrations of sixteenth-century ceramics and hunting and fishing objects are closest.

Comparing artifact distributions by spatially analyzing the combined mean centers for each distribution, nearest neighbor statistics indicate that the combined mean centers are

Figure 7.71. Ornementation artifact distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

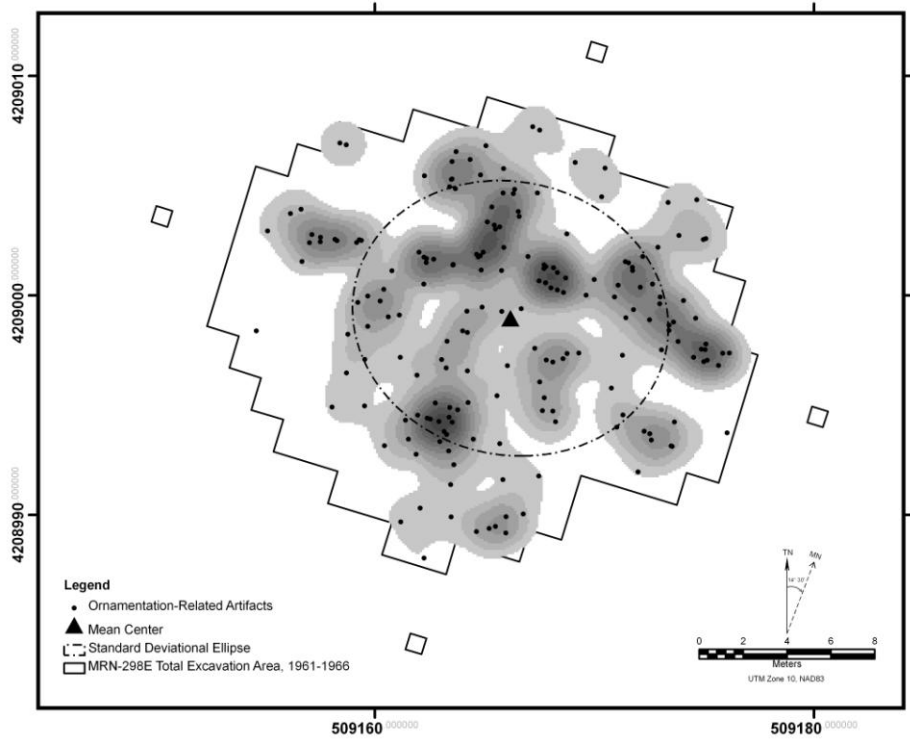


Figure 7.72. "Symbolic" artifact distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

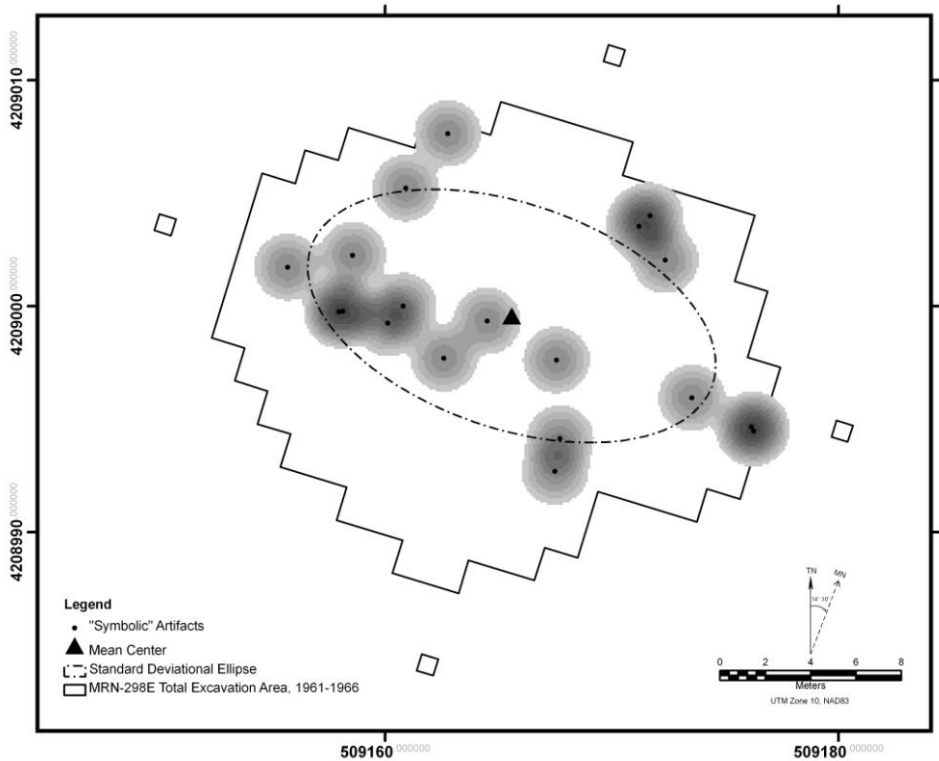
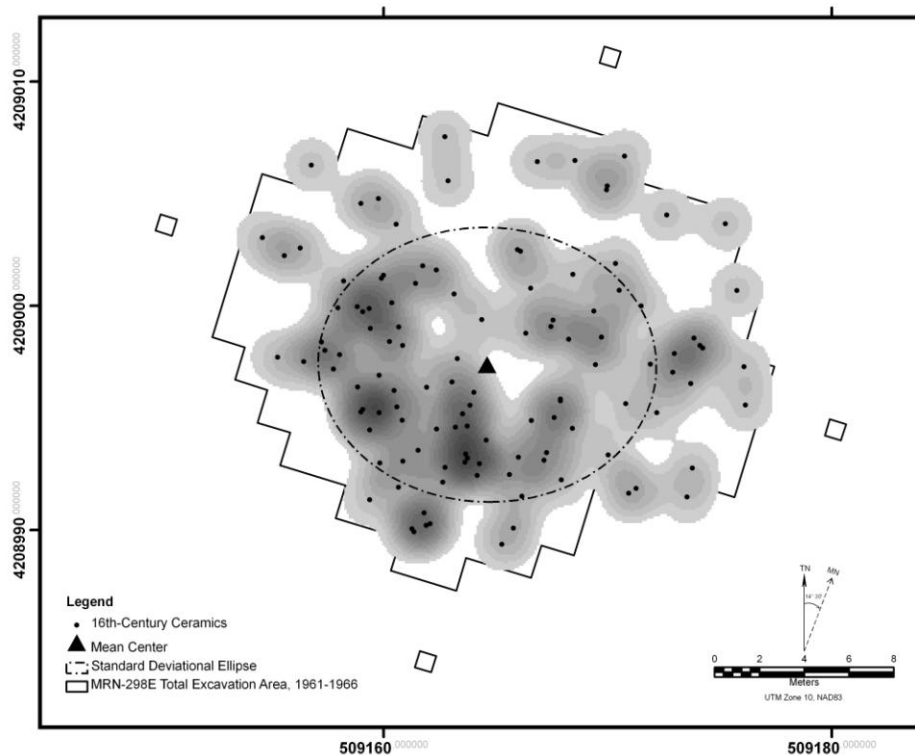


Figure 7.73. Sixteenth-century Chinese porcelain distribution at CA-MRN-298E, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



clustered near the center of the site loci, although Ripley's K -function analysis suggests that clustering is not statistically significant at any distance (see Appendix F). With the exception of the single iron fastener, which is an outlier located approximately 5 m west of the other mean center points, the other mean center points are located within a 2 m radius of each, although the mean center point of the sixteenth-century ceramics is located the furthest south of the cluster. Nearest neighbor hierarchical clustering analysis of the combined center points reveals that the mean center point of the sixteenth-century porcelain and earthenware is the only point (other than the iron fastener) not part of statistically-significant cluster that includes all other artifact categories (hunting and fishing, craft production, food processing, ornamentation, symbolic objects, and lithic production objects)(see Figure 7.65). While subtle, this indicates some spatial separation of the sixteenth-century introduced objects from the rest of the contemporary indigenously-manufactured artifacts. The mean center point for the sixteenth-century ceramics is located closest to the mean center points for food processing and hunting and fishing artifacts.

Examining and comparing artifact distributions at CA-MRN-298E in three dimensions revealed a number of individual artifact associations with sixteenth-century Chinese porcelain fragments, but no strong patterns emerged. Several porcelain fragments are vertically and horizontally associated with a small cluster of ochre fragments in the west and the northwest parts of the site loci, but there are no other noteworthy associations with symbolic objects. I observed a few instances of porcelain fragments being closely associated with ornamentation objects, mostly clam shell disk beads. In addition, there are numerous associations with craft production objects, specifically flaked stone drills, and several associations with broad-point

worked bone implements. There are two particularly noteworthy instances of associations with craft production objects—two adjacent examples of porcelain fragments being associated with a flaked stone drill and clam shell disk bead blanks that are noticeably deeper than surrounding objects. Examining associations with lithic production objects, there are five instances of porcelain being closely associated with cores, one instance of an association with a hammerstone. There are also at least a half dozen instances of association between porcelain and hunting and fishing-related artifacts, specifically projectile points and point fragments. There are relatively few associations between porcelain and food processing objects, but there are two associations with mortar fragments and one association with a pestle fragment. The single iron spike from the site loci is in close three-dimensional proximity to an *Olivella* shell bead and a cluster of flaked stone drills, and within the highest concentration of craft production objects. Overall, porcelain does not cluster strongly with any particular artifact class, and no single pattern has emerged at CA-MRN-298E.

Examining associations between artifact distributions and features at CA-MRN-298E is difficult. Artifacts generally have such a wide distribution around the site loci, and the most prominent features—crushed shell layers that may represent floors—are also distributed around the site loci, that to a certain degree all artifacts and features can be seen to be in association with one another (Figure 7.74). The peak densities of sixteenth-century ceramics and hunting and fishing objects are possibly associated with crushed shell layers in both the west-central and southwest portions of the site loci, and to a lesser degree in the northeast corner. The highest concentration of symbolic objects may also be associated with one of the same crushed shell layers in the northeast. Ornamentation artifacts and craft production objects are concentrated across the central portion of the site loci, with the highest concentrations in the west, and it is difficult to determine if they are associated with crushed shell layers, although they do occur nearby. Similarly, lithic production and food processing objects have no definite associations, but they may be linked to certain crushed shell layers. There are no strong associations between any artifact categories and the pit or hearth features. In addition, no burials were excavated at CA-MRN-298E.

Overall, although not as strong as at CA-MRN-216, at CA-MRN-298E there is some broad spatial segregation of sixteenth-century ceramics from other categories of Late Period, indigenously-manufactured artifacts—although there is still significant overlap between all the artifact distributions. The largest concentration of shell bead production artifacts is located in the western part of CA-MRN-298E—this likely represents a key bead production area within the site loci. Notably, as observed at CA-MRN-216, this bead production area seems to be spatially separated from the highest concentrations of porcelain recovered from the loci, which is in the south-central part of the site.

CA-MRN-298W

At CA-MRN-298W, density measurements indicate that the distribution of Late Period, indigenously-manufactured objects has its highest concentration on the west side of the site loci, while the sixteenth-century introduced objects (in this case only Chinese porcelain and earthenware fragments—no iron fasteners were located at this site loci) are concentrated in the eastern portion of the site loci. The mean center points and standard deviational ellipses for each distribution parallel the density data, with the combined Late Period artifact distribution located about 2 m west of sixteenth-century introduced objects mean center point, and ellipses for both

Figure 7.74. Features at CA-MRN-298E.



distributions extending linearly across the whole excavated area of the site loci (Figures 7.75 and 7.76).

Examining density measurements, mean center points, and standard deviational ellipses for each distribution of artifact types reveals clear patterning. The craft production and ornamentation objects, which are likely associated in a shell bead production area, are heavily concentrated on the west side of the site loci (Figures 7.77 and 7.78). Mean center points and standard deviational ellipses for each of these distributions also trend towards the western end of the site loci—the mean center point for craft production objects is virtually the same as the combined Late Period artifact distribution mean center, as are the standard deviational ellipses for both craft production and ornamentation objects. The mean center point for the ornamentation objects is actually located much further west, nearly 2.5 m west of Late Period combined and craft production center points.

The food processing artifact distribution is concentrated in the center of the site loci, with some density peaks also overlapping with both craft production objects and sixteenth-century ceramics. The food processing distribution mean center point is very close to the combined Late Period distributions mean center point, although the standard deviational ellipse for food processing objects is more centralized (Figure 7.79).

The highest density of hunting and fishing-related artifacts is located in the central and eastern portion of the site loci, and the density peaks for hunting and fishing objects heavily overlap with density peaks of sixteenth-century ceramics (Figure 7.80). Lithic production artifacts are concentrated in the center of the site loci, and are most closely associated with food processing objects than any other distributions (Figure 7.81). The symbolic objects category (in this case, mostly ochre fragments) is also concentrated in the central and eastern part of the site

Figure 7.75. Combined indigenously-manufactured artifact distribution at CA-MRN-298W, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

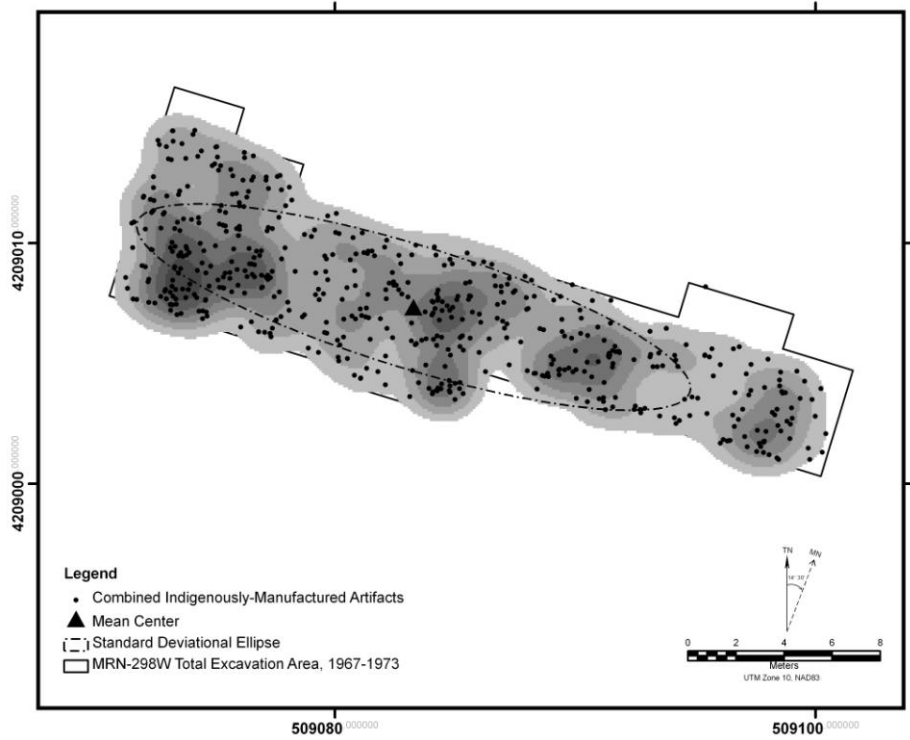


Figure 7.76. Sixteenth-century ceramics distribution at CA-MRN-298W, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.77. Craft production-related artifact distribution at CA-MRN-298W, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

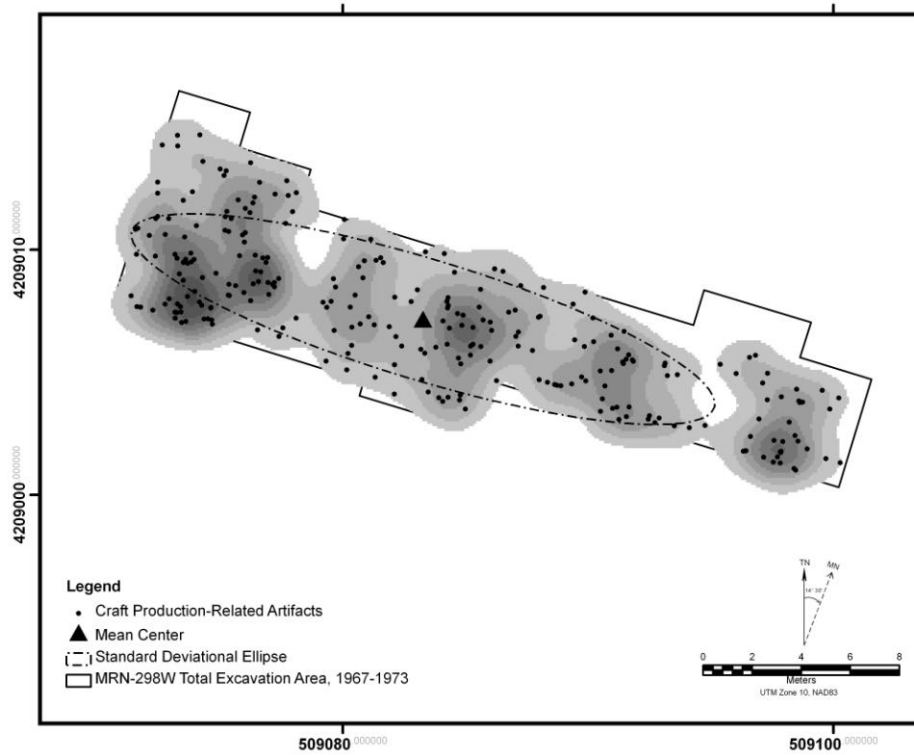


Figure 7.78. Ornamentation artifact distribution at CA-MRN-298W, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

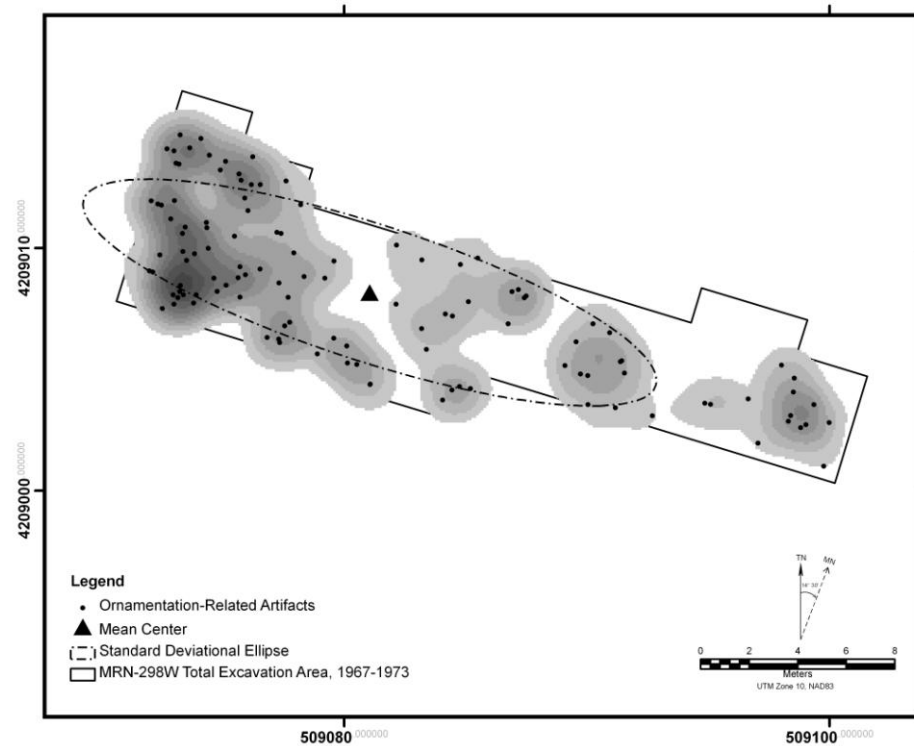


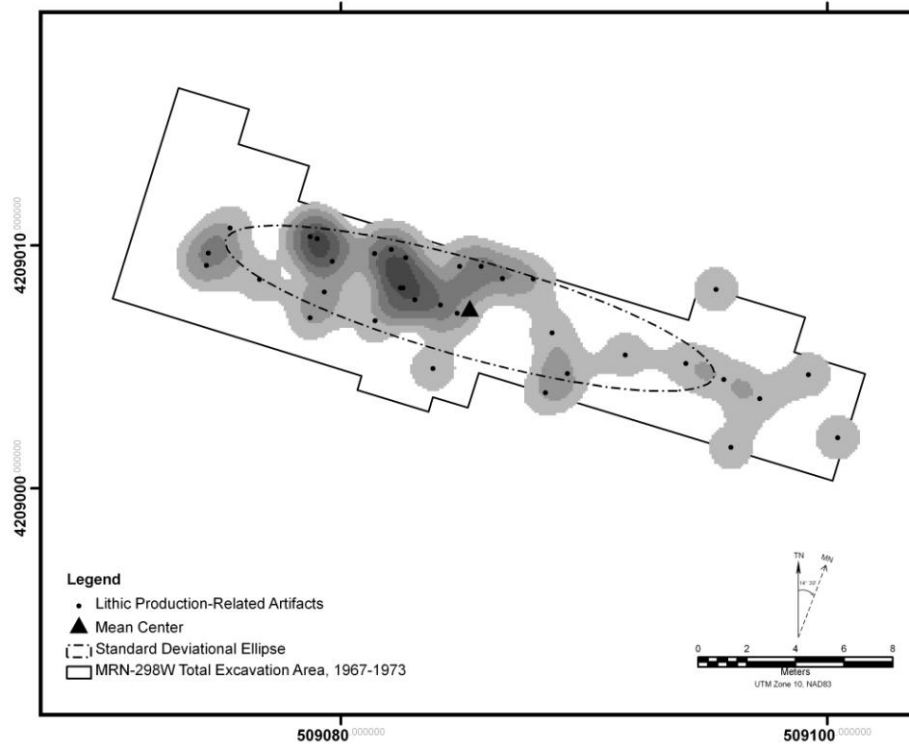
Figure 7.79. Food processing-related artifact distribution at CA-MRN-298W showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.80. Hunting and fishing-related artifact distribution at CA-MRN-298W, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



Figure 7.81. Lithic production-related artifact distribution at CA-MRN-298W, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.



loci, and like hunting and fishing objects, are closely associated with sixteenth-century ceramics (Figure 7.82). This is a pattern I also observed at CA-MRN-298E. The mean center points for hunting and fishing artifacts and lithic production objects are very close to the mean center point for the sixteenth-century ceramics mean center point; the symbolic objects mean center point is located even further east. Standard deviational ellipses for hunting and fishing objects, lithic production tools, and symbolic artifacts all parallel the standard deviational ellipse for sixteenth-century ceramics.

Nearest neighbor statistics indicate that both the combined Late Period, indigenously – manufactured objects distribution and the sixteenth-century introduced objects are clustered in a statistically-significant way. Examining individual artifact distributions, craft production, ornamentation, and hunting and fishing objects are all strongly clustered, while food processing artifacts may be clustered, but not strongly so. Symbolic and lithic production objects both have a random distribution. Ripley’s *K*-function analysis gives similar results: the overall Late Period combined distribution, along with hunting and fishing, craft production, ornamentation, food processing objects and sixteenth-century ceramics all cluster to 2 m, and then the clustering drops off. This finding is likely because of the long and narrow nature of the excavation. Symbolic and lithic production artifacts again show no clustering (Appendix G).

Nearest neighbor hierarchical clustering analysis indicates a number of overlapping, statistically-significant clusters of different artifact types (Figure 7.83). There are six clusters of sixteenth-century ceramics, located in the central and eastern portion of the site loci. My analysis identified 14 clusters of craft production objects, with the majority of clusters located on the extreme western margin of the site loci, although two craft production object clusters overlap or are located very close to porcelain clusters in the central part of the site loci and three craft

Figure 7.82. "Symbolic" artifact distribution at CA-MRN-298W, showing individual artifacts, density, arithmetic mean center, and standard deviational ellipse.

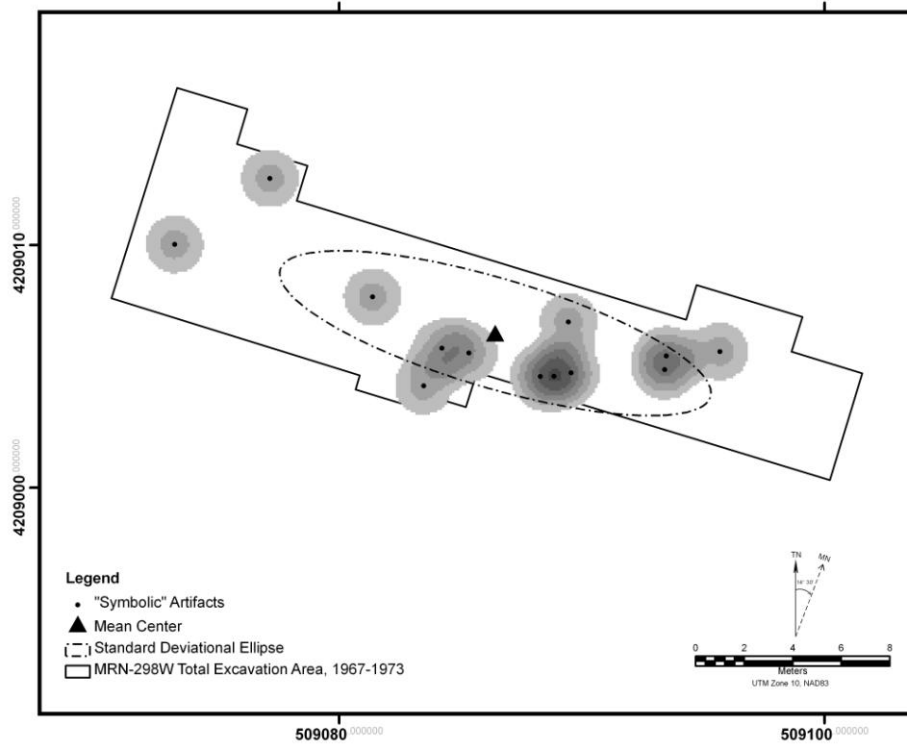
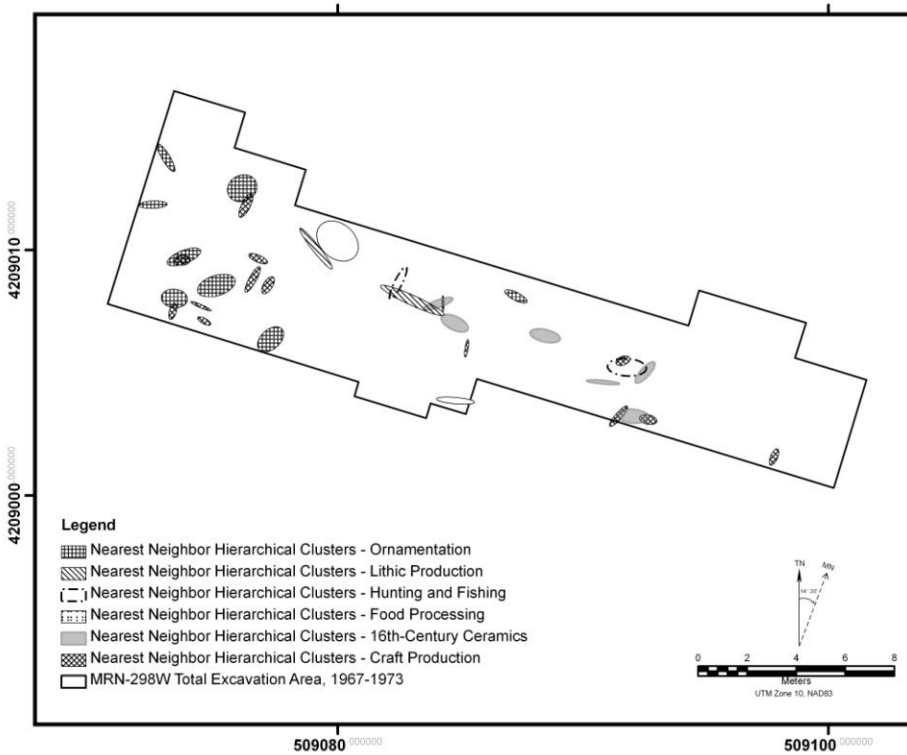


Figure 7.83. Nearest neighbor hierarchical clusters for all artifact distributions at CA-MRN-298W.



production clusters overlap porcelain clusters on the eastern side of the site loci. There are eight clusters of ornamentation objects, seven overlapping craft production objects in the western end of the site loci, and one located in the center of the site loci (but not overlapping with porcelain). Two clusters each of hunting and fishing artifacts, lithic production tools, and food processing objects were identified, all in the central or eastern portions of the site loci. Both of the hunting and fishing clusters overlap with sixteenth-century ceramic clusters, as does one of the lithic production clusters. Nearest neighbor hierarchical clustering analysis did not identify any statistically-significant clusters of symbolic objects.

Analyzing the combined mean centers for each distribution of artifact types, nearest neighbor statistics indicate they are clustered within the site loci, but Ripley's *K*-function analysis does not indicate the cluster is statistically-significant. Nearest neighbor hierarchical clustering analysis indicates that craft production artifacts, food processing tools, hunting and fishing objects, and sixteenth-century ceramics mean center points are all part of a statistically-significant cluster, while the other mean center points are outside the identified cluster (Figure 7.84).

A three-dimensional examination of artifact distributions at CA-MRN-298W reveals a number of possible associations between porcelain fragments and other artifacts, and these associations reinforce other observations from the site rather than presenting any new patterns. A few instances of association between symbolic objects and porcelain were observed, including three instances of close proximity of porcelain and ochre. There are also a number of associations between porcelain fragments and ornamentation objects (including five *Olivella* shell beads, a bird bone tube and a clamshell tube) hunting and fishing-related objects (projectile points and point fragments), food processing artifacts (biface and biface fragments, and one mortar fragment), and lithic production tools (including hammerstones and cores). Finally, there is a strong association between a cluster of porcelain fragments and a cluster of craft production objects, including both broad- and thin-point worked bone objects and asphaltum. Overall, due to the high-level of disturbance at this site, as at all the others, it is hard to place too much significance on individual artifact associations. In many cases, these associations reinforce overall trends observed by examining and comparing broad artifact distributions. In a few instances, however, such as the association of porcelain with specific types of craft production tools (awls and wedges), the patterns may suggest interpretations not previously considered.

Examining artifact distribution association with features recorded at CA-MRN-298W reveals some interesting observations. As discussed in Chapter Five, features at the site loci include numerous hearths (ash and charcoal concentrations), at least two caches of whole shellfish valves, a large lens of whole *Saxidomus* valves, a floor of packed clay and crushed shell, and another crushed shell concentration (which is a possible floor)(Figure 7.85). The two highest concentrations of sixteenth-century ceramics and hunting and fishing objects are associated with the floor feature in the center of the site loci, and the whole shell lens towards the eastern end of the site loci; the smaller peaks of these two artifact categories are not associated with other features. The symbolic objects are also concentrated around the whole shell lens in the east. Objects representative of lithic production and food processing are strongly concentrated in the central part of the site loci, adjacent to the floor feature and the second, possible partial floor feature. The ornamentation and craft production objects, on the other hand, are concentrated in the western part of the site loci and are not associated with any features. With regards to burials, the single inhumation recovered by Treganza in 1958 was located within the site loci (although the location is unknown), while the single cremation excavated in 1967

Figure 7.84. Mean centers for each artifact distribution at CA-MRN-298W, with nearest neighbor hierarchical clusters indicated.

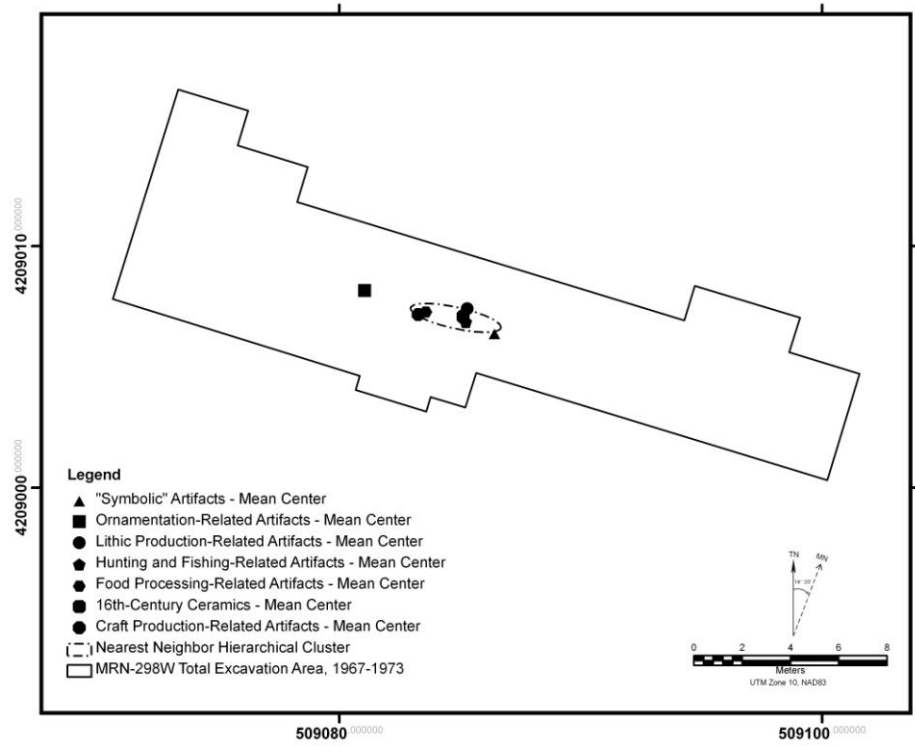


Figure 7.85. Burials and features at CA-MRN-298W.



was located to the south outside the main site loci boundary. This pattern is similar to those seen on CA-MRN-232 and CA-MRN-242, with the inhumations found within the daily activity areas of the site, but the cremations spatially separated from the site.

Overall, while there is a wide distribution of all artifact-types across the whole site loci, the analysis reveals that clear patterning is present at CA-MRN-298W. Most significantly, point pattern analysis indicates that, like at CA-MRN-216 and CA-MRN-298E, the sixteenth-century introduced ceramics appear to be spatially-segregated from the bead production area of the site loci. In this case, they seem to be most closely associated with both hunting and fishing objects, and symbolic artifacts. Finally, it appears that patterns within the individual loci of CA-MRN-298 are similar to each other, and both are similar to those patterns observed on CA-MRN-216. In other words, each site loci has patterns that seem to be similar to separate sites, rather than the patterns being revealed only when considering both loci together. The two loci of CA-MRN-298 should be more accurately considered as two separate sites, which may be related to separate settlements or family groups.

CONCLUSION

Reconstructing the excavations at six sites around the Point Reyes Peninsula and conducting spatial analysis of the sites using GIS has identified a number of interesting patterns regarding the use of artifacts within each site. The trends observed at each site can be compared to the other sites to see if broad patterns emerge for how the Tamal people incorporated sixteenth-century material culture from the *San Agustín* shipwreck into their cultural practices.

At CA-MRN-232, there was evidence for the spatial segregation of iron fasteners on the site, but not porcelain fragments. The iron spikes were more heavily concentrated in the southern portion of the site, while all the other artifact categories (including the Late Period, indigenously manufactured objects and the Chinese porcelain) were distributed throughout the site. Detailed examination of artifact associations, in both plan view and three-dimensionally, revealed that porcelain fragments were found in close association with projectile points and point fragments in several instances. In addition, a number of iron spikes were found in close proximity to worked bone tools (awls, wedges, and flakers), suggesting that iron spikes may have been utilized at CA-MRN-232 in ways similar to those of contemporary, indigenously-manufactured bone tools for craft or lithic production.

Comparing the distribution of artifacts at CA-MRN-242 was hampered by the fact that a very small number of sixteenth-century introduced objects were recovered from the site. These few objects were located in the northern tier of the site, while the remainder of the artifacts were distributed throughout the site. No associations between the two porcelain fragments recovered from the site were observed, but two iron spikes were found to be in close proximity to worked bone craft production tools. This observation reinforces the pattern seen at CA-MRN-232, but the small sample of artifacts at CA-MRN-242 means that any conclusions should be viewed with caution.

The small excavation area and small total number of artifacts with provenience at CA-MRN-271 made spatial analysis difficult and the results suspect. The distribution of Chinese porcelain recovered from the site was found to be slightly separated from the other artifact categories, but there was still significant overlap of distributions. The few associations of artifacts observed through both two- and three-dimensional observation of distributions revealed that porcelain fragments were most commonly associated with food processing artifacts. This

pattern was not observed on any other site, and should be viewed with caution. No iron fasteners were recovered from CA-MRN-271.

At CA-MRN-307, located just a few hundred meters from CA-MRN-232, comparison of both broad artifact distributions and individual associations revealed that sixteenth-century porcelain and stoneware fragments were more closely related to symbolic, hunting and fishing, and ornamentation artifacts than to other categories. In particular, a broad distributional analysis revealed close association between sixteenth-century ceramics and hunting and fishing objects, while a detailed look at individual associations identified some compelling instances of ceramics being associated with symbolic objects. In addition, while the few iron fasteners were not distributed in any observable pattern, a number of interesting associations with craft production tools, especially worked bone artifacts, were observed during a detailed examination of distributions in a three-dimensional environment. This further reinforces a pattern observed at both CA-MRN-232 and CA-MRN-242.

The two sites (three site loci) on Limantour Spit are very closely related not only in proximity, but also in the make-up of artifact assemblages and the spatial structure of the artifact and feature distributions. Spatial analysis of artifact distributions at CA-MRN-216, CA-MRN-298E, and CA-MRN-298W are consistent with the findings of previous researchers (King and Upson 1970; Treganza and King 1968). My results suggest that lithic production and food processing, while present at the sites, were not a focus of activities. Instead, activities centered on craft production, primarily shell bead production. Hunting and fishing equipment was also present in large quantities, suggesting the inhabitants regularly engaged in hunting in the hinterlands around the spit. The most interesting pattern that emerged is that the large amount of sixteenth-century ceramics recovered from the three site loci were clearly segregated from the shell bead production areas at each of the sites. In addition, the shell bead production areas of the site were separated from the living structures represented by possible house floors, while ceramic distributions seemed to be more closely associated with these structures. Associations between ceramics and a number of other artifact categories were observed at all three site loci, but the most consistent broad pattern was an association between porcelain and projectile points and symbolic objects (similar to the pattern observed at CA-MRN-307). In addition, at each site loci the craft production artifacts were dominated by flaked stone drills and shell bead blanks, but the worked bone tools (both thin-point and broad-point) within the craft production category seemed to be more closely related to the ceramic distributions than the shell bead production areas. Finally, although the data are few, associations between iron spikes and craft production objects were also noted. This is consistent with patterns observed at the other sites.

Indications are that CA-MRN-232, CA-MRN-242, CA-MRN-271, CA-MRN-307, CA-MRN-216, and CA-MRN-298 were possibly permanent, semi-permanent, or seasonal settlements that were occupied either continuously or periodically for many hundreds of years before the sixteenth-century interactions at *tamál-húye*, and that occupation likely continued after that time, possibly into the eighteenth-century. The artifact assemblages indicates that the Tamal residents at the sites were involved in a variety of daily activities, including hunting and fishing; plant and animal food processing; some flaked stone tool production; craft production, including shell bead production and possibly basket-making; that they used worked shell objects as ornamentation and possessed symbolic objects, such as charmstones; and that sometime after 1595 they brought a number of Chinese blue-and-white export porcelain vessels from the *San Agustín* shipwreck back to their villages for an unknown purpose. While my analysis of the spatial patterning of artifacts within the sites does not offer any firm conclusions to the latter

question, it does suggest a number of possibilities. The spatial analysis suggest a relationship between sixteenth-century ceramics, especially porcelain, and both symbolic objects and hunting and fishing-related artifacts, in particular obsidian projectile points. In addition, this is a discrete separation of the introduced sixteenth-century artifacts and the shell bead production areas of the sites on Limantour Spit. On the other hand, iron spikes seemed to be most closely associated with craft production artifacts, especially worked bone tools. These possibilities can be further evaluated by comparing to the results of a detailed examination of the sixteenth-century introduced objects from each of the sites (Chapter Eight) and by bringing together additional lines of evidence from historical, ethnographic, and oral sources (Chapter Nine).

CHAPTER EIGHT

SIXTEENTH-CENTURY INTRODUCED ARTIFACT ANALYSIS

INTRODUCTION

Following my Geographic Information System (GIS) spatial analysis of six sites in *tamál-húye* presented in Chapter Seven, I next conducted a detailed analysis of materials from the *San Agustín* from all 15 sites (see Figure 4.1). I evaluated a number of test implications about how the Tamal may have recontextualized the introduced material culture based on characteristics of the objects and assemblages themselves. The majority of introduced objects from *San Agustín* recovered from Tamal sites are fragments of Chinese blue-and-white export porcelain from the Wan Li period, but there are also a large number of iron ship's fasteners (spikes), a smaller quantity of earthenware and stoneware ceramic fragments, and possibly additional miscellaneous objects. These artifacts are all curated in the Phoebe A. Hearst Museum of Anthropology (PAHMA) and at the Point Reyes National Seashore Museum (PRNSM).

In addition to the archaeologically recovered artifacts, porcelain fragments also wash ashore seasonally onto Drakes Bay beaches from an offshore source, probably from either the shipwreck site itself or a large concentration of its cargo, and the PRNSM curates an extensive collection of beach-combed porcelain sherds gathered by seashore visitors from the 1960s to the present. For this study, I use the beach-collected assemblage for comparative purposes and as a control for analyzing the archaeological porcelain assemblage.

Shangraw and Von der Porten (1981) conducted a detailed study of the archaeologically-recovered sixteenth-century porcelain fragments in the PAHMA and PRNSM (then held at San Francisco State University's Treganza Museum) collections in order to hypothetically separate ceramics associated with Sir Francis Drake's 1579 California landfall from those introduced by the 1595 *San Agustín* shipwreck. Their study was the first comprehensive analysis of the entire sixteenth-century porcelain assemblage from sites now in Point Reyes National Seashore. Shangraw and Von der Porten's detailed study developed ware-type and vessel-form typologies for the collections that laid the foundation for a number of subsequent studies, including this one. Their conclusions, which differentiate porcelain sherds from the 1579 Drake visit from sherds deposited by the 1595 *San Agustín* shipwreck (Shangraw and Von der Porten 1981:73-74), however, remain controversial. My findings, based on a detailed examination and analysis of all porcelain fragments recovered from the Point Reyes Peninsula in both the PAHMA and PRNSM collections, suggest that the entire collection of sixteenth-century Chinese porcelain can be attributed to a single source. For the purposes of the present study, therefore, I assume that all sixteenth-century introduced objects found at *tamál-húye* are from the 1595 *San Agustín* shipwreck.

In this chapter I present an analysis of the introduced sixteenth-century artifacts from the *San Agustín* shipwreck recovered from archaeological contexts at *tamál-húye*. I examine both individual artifacts as well as characteristics of the broader assemblages. For each porcelain fragment, my analysis focuses on identifying ware-type, vessel form, and minimum number of vessels (MNV), as well as refit analysis, decorative motif analysis, and modification analysis. I also briefly consider other introduced sixteenth-century artifacts, including iron ship's fasteners,

other ceramic types, and other objects. I examine the collections within the framework of the test implications I outlined in Chapter One, and which I review below.

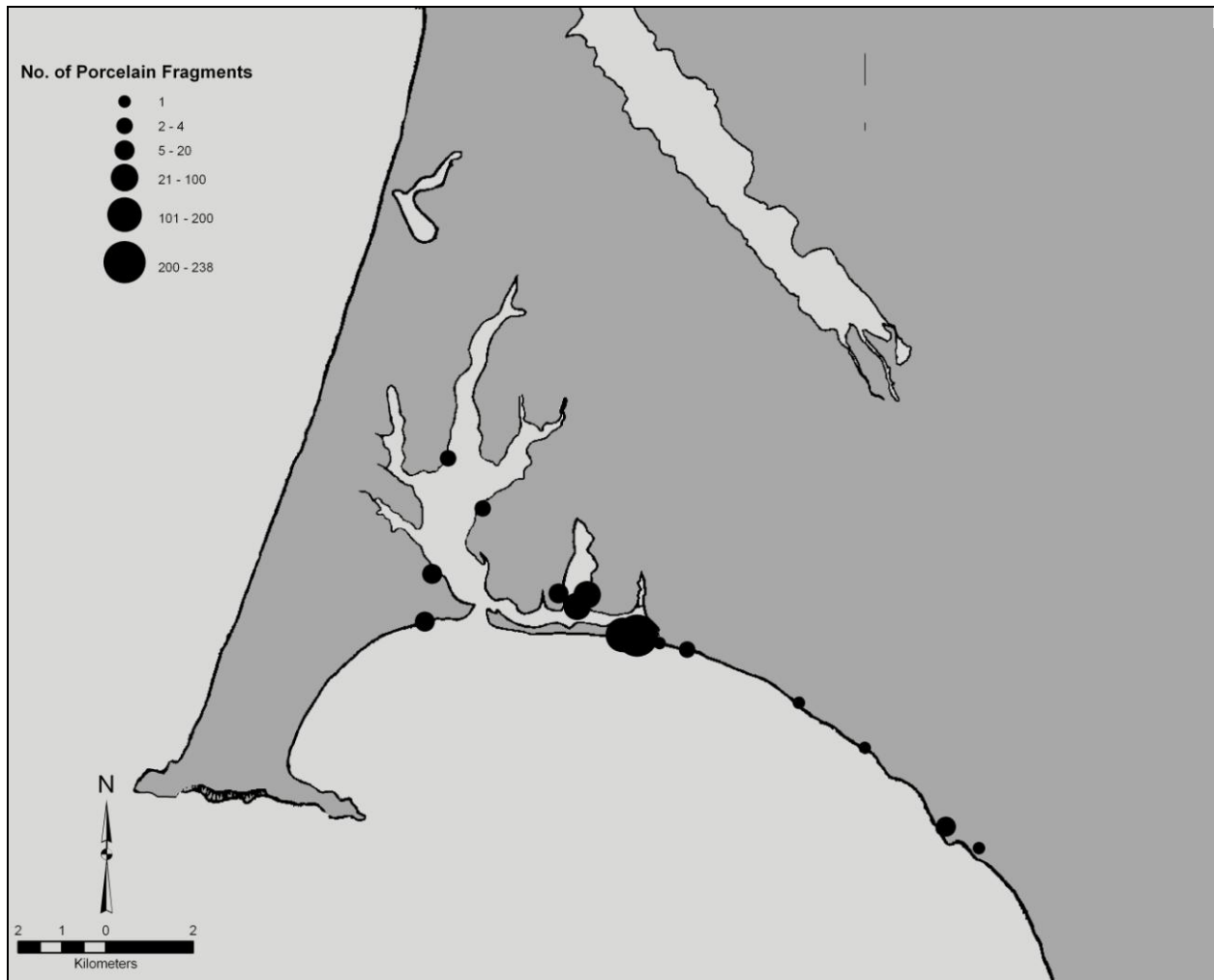
METHODOLOGY

I conducted detailed examination of introduced sixteenth-century objects from all sites on the Point Reyes Peninsula to look for signs of indigenous recontextualization. The first step was to define a study universe by compiling an inventory of sixteenth-century introduced artifacts excavated, surface-collected, and beach-collected from present-day Point Reyes National Seashore and now in museum collections. After creating an inventory by examining museum collection databases and archival records, as well as published sources, I began by analyzing the porcelain assemblages from each of 15 archaeological sites by recording basic metric data for each sherd; verifying origin, date, and ceramic-type represented by each sherd by visually examining paste, glaze, and decoration to separate sixteenth-century ceramics from later, historic-period ceramics; and entering all information into a Filemaker Pro relational database (Figure 8.1). Since the porcelain fragments are the single largest component of the sixteenth-century introduced artifact assemblage, the majority of my analyses focused on those artifacts.

My analytical methodology fell into three broad categories. First, I closely examined each ceramic fragment to verify ware-type identification of previous researchers, to estimate minimum number of vessels (MNV) represented by the assemblages, and to identify possible vessel forms represented by each sherd or refit group of sherds. I also evaluated the extent of refit groups present at each site. Second, I evaluated decorative motifs from each porcelain sherd or refit group of sherds to assess whether the Tamal people selected particular designs more frequently than others. Third, I examined individual sherds both macro- and microscopically for signs of indigenous modification and reuse. I used each of these lines of inquiry to evaluate specific test implications about how the Tamal incorporated sixteenth-century introduced objects into their cultural practices.

As I discussed in Chapter One, I evaluated a number of test implications about the introduced sixteenth-century objects, each of which may support different interpretations for how the Tamal people incorporated the goods into their cultural practices. One way that Tamal individuals may have used introduced artifacts is for pragmatic or utilitarian purposes. For example, as suggested by Heizer (1941), the Tamal may have used porcelain plates and bowls from the shipwreck as food preparation, serving, and storage containers, which they discarded as they broke. There are several archaeological findings that might support this premise. If ceramic vessels were prized for their value in food storage or preparation, for example, then the Tamal people would likely only have salvaged whole ceramic vessels from the shipwreck for reuse. As these vessels broke and were discarded this would result in multiple fragments of each ceramic vessel present at each archaeological site. One way to evaluate the degree to which multiple fragments from the same vessel are present at each site is through a refit analysis of sherds from the site. I examined each site assemblage to investigate the number of porcelain fragments that can be directly refit to other sherds from the same vessel (I call this a “hard” refit), as well as to identify sherds associated with other porcelain fragments based on analysis of vessel form and decoration (a “soft” refit). I graphically plot the results of the refit analysis in GIS to examine the distribution of refit groups. By looking at the number of artifacts that can be refit at each site, I hope to learn whether the Tamal had a strong preference for transporting whole vessels to their villages, or if the presence of large numbers of fragments that cannot be

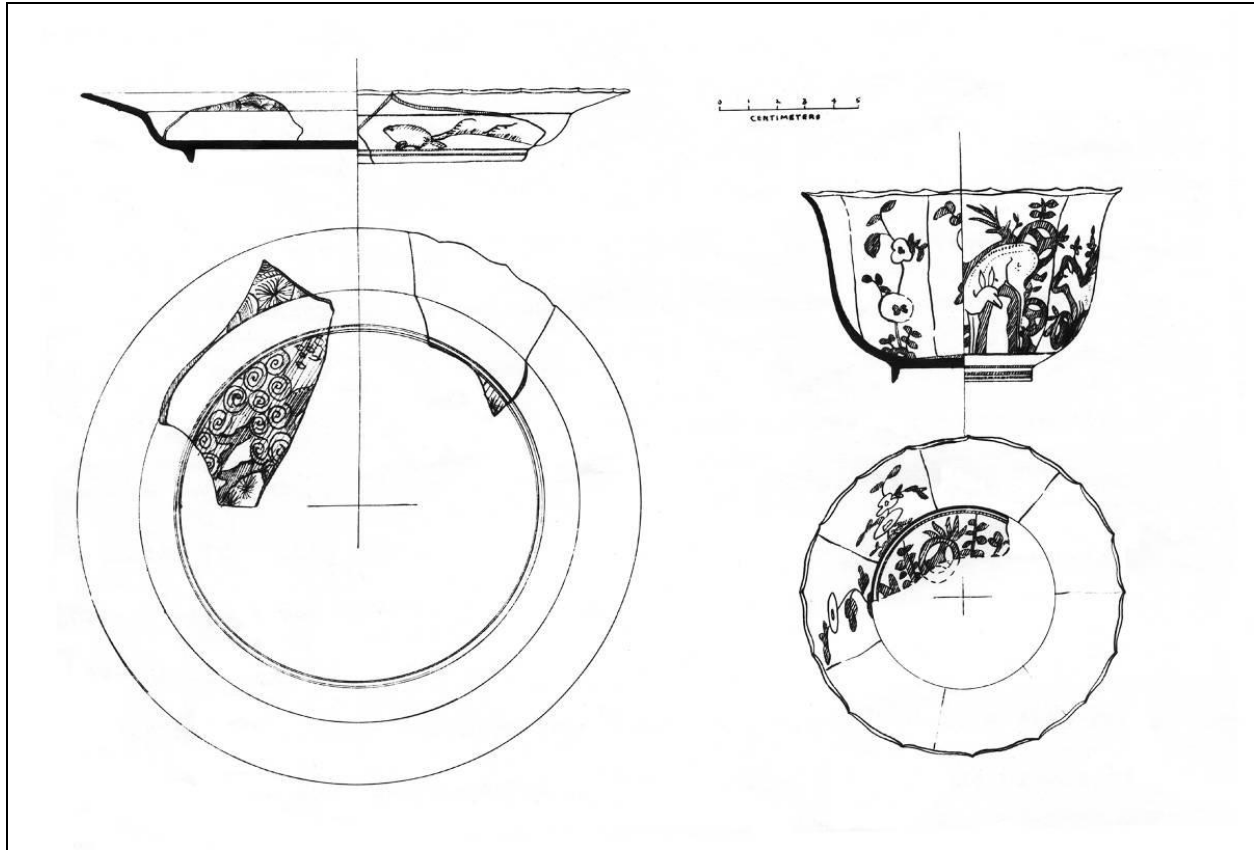
Figure 8.1. Approximate locations of 15 sites on the Point Reyes Peninsula with artifacts from the *San Agustín* shipwreck, shown as a function of the number of recovered sixteenth-century Chinese porcelain fragments.



refitted may indicate that individual, broken fragments of porcelain were selected as frequently as whole vessels, possibly because the porcelain fragments were valued for their own sake, and not for the utilitarian value of the whole vessels.

I also evaluate whether particular vessel forms may have been selected more frequently than others. Through a detailed examination of each ceramic fragment, I identified the MNV represented at each site. Based on the ceramic assemblage's descriptive data and by comparison to published assemblages of sixteenth-century Asian ceramics from Spanish contexts, I also identified ceramic vessel forms represented by each sherd or refit group of sherds, including open versus closed vessels (plates and bowls versus bottles and vases), and flatware versus hollowware (that is, plates versus bowls)(Figure 8.2). I then used minimum vessel counts from each site to determine if Tamal villagers selected particular vessel forms more frequently than others. A preference for selecting hollowware versus flatware vessels (bowls versus plates), for example, may indicate utilitarian incorporation of porcelain ceramics into existing native foodways that favored stews, porridges, and gruels (Cabak and Loring 2000; Farnsworth 1996;

Figure 8.2. Examples of flatware versus hollowware porcelain vessels recovered at Point Reyes (Beardsley 1947:114).



Voss 2008). As a control for evaluating a preference for different vessel forms, I compared percentages of vessel forms from each site to the percentages of available vessel forms on the shipwreck. As a proxy for data from the shipwreck, I reconstructed ceramic types available to the Tamal people from the *San Agustín* from a collection of more than 420 beach-collected porcelain fragments in the PRNSM that have been recovered from around Drakes Bay over many decades and that continue to wash ashore seasonally due to natural processes, presumably from either the offshore shipwreck site itself or a large cache of its cargo. This beach-collected porcelain assemblage represents a hypothetical random sample of vessels available on the *San Agustín* shipwreck, which I compared to culturally-selected vessel forms carried to Tamal village sites and recovered during archaeological excavations.

Introduced objects, including broken fragments of porcelain, may also have had inherent meaning by themselves, which might have led Tamal individuals to collect and distribute individual ceramic fragments from the shipwreck or the beach. Although not as easily tested archaeologically, this model may be reflected in the presence of ceramic sherds from many different vessels at each site, indicating there was no preference for intact versus broken vessels. The presence of beach-collected porcelain fragments, which Tamal individuals may have collected from the beach years or even decades after the shipwreck, may also support the notion that they inherently valued individual sherds. These sherds can be recognized by their extreme edge-rounding and glaze and decoration wear indicating they washed ashore from Drakes Bay,

much like beach-collected porcelain found by visitors to Drakes Bay beaches today. In addition, sherds from the same vessels may be found at different sites, indicating some level of exchange of the sherds themselves, and there may also be evidence for regionally sharing or exchange of individual, unmodified ceramic fragments. An analysis of refit patterns from each site and between sites can be used to evaluate these premises.

If porcelain fragments were valued for their symbolic association, then decorative elements may have played an important role in selecting individual fragments. In addition to vessel form and refit patterns, I critically examined and carefully recorded decorative motifs present on individual porcelain fragment, and I compared the frequency of decorated fragments from each site and between all sites to identify patterns. I also compared percentages of different designs on sherds recovered from an archaeological context to the beach-collected porcelain assemblage, as a control, to determine if Tamal individuals selected certain designs more frequently than others. Finally, I compared designs present on the porcelain fragments to ethnographic literature and oral traditions to help determine if salvage and selection of particular objects was dictated by cultural values (Wilkie 2000; Wilkie and Farnsworth 1999, 2005).

Finally, Tamal peoples may have used porcelain and other ceramic fragments as raw material for utilitarian objects such as bifacial tools and projectile points, or as raw materials for objects such beads and pendants that had symbolic value. If this is true, villagers may have collected broken ceramics from the ship or beach, and a significant percentage of individual (non-refit) sherds may be present at each archaeological site. Not only should spatial patterning indicate association with stone tool workshops or other raw materials, such as obsidian, or indicate they were primarily incorporated into workshop areas used for producing clam disc beads or abalone shell ornaments (see Chapter Seven), but a careful examination of the ceramic assemblage should reveal evidence of modification and functional reuse. While Heizer (1941:322-323) noted that early excavations did not reveal any culturally-modified sixteenth-century porcelain, later excavations by Meighan, Treganza, and Von der Porten did uncover some evidence of modification (King and Upson 1970; Meighan 1950b; Treganza and King 1968; Von der Porten 1968). For this project, I carefully examined each artifact to look for evidence of flaking, grinding or other reduction techniques or reuse, including modification into traditional artifact classes such as unifaces, bifaces, beads, and pendants. Evaluating how extensive such modification is within the assemblage may give an indication whether the Tamal people viewed porcelain primarily as a raw material, similar to shell or obsidian. In addition, if transformed into trade items such as beads, porcelain artifacts may also have been traded within established exchange networks to surrounding areas, and may be found in regional contexts outside *tamál-húye*. I address this issue more fully in my conclusion (Chapter Nine).

Although I examined iron spikes from the *San Agustín* shipwreck, which are the second most abundant introduced objects recovered from archaeological sites at *tamál-húye*, the physical characteristics of the iron fasteners did not reveal any new data about how they were recontextualized by the Tamal people. The majority of the iron fasteners today are in very poor condition, and many have largely disintegrated since their excavation beginning in the 1940s. Those that are still intact show no obvious signs of wear that would give any clue to how they were reused. The majority of evidence, therefore, for how the Tamal people recontextualized the iron fasteners comes from their context and associations within the archaeological sites. While I summarize my observations of iron fasteners below, the results of the spatial patterning analysis with regards to the iron fasteners are discussed in Chapter Seven, and conclusions are synthesized in Chapter Nine.

Similarly, I examined each of the other ceramic fragments and other objects that can be attributed to the sixteenth-century encounters at *tamál-húye*, but because they show no signs of modification and they are undecorated, there is little they can add to my present research questions. When possible, I included them in my spatial analysis presented in Chapter Seven, and I summarize them below.

RESULTS

Porcelain Analysis

Porcelain Ware-Type, Vessel Forms, and Minimum Number of Vessels (MNV)

I began the porcelain analysis by visually examining paste, glaze, and decoration of each fragment in the assemblage to verify origin, date, and ceramic ware-type and to separate them from later, historic-period ceramics in the collection. I next identified the vessel form represented by each sherd or refit group of sherds, based on each sherd's physical characteristics and comparison to historical sources, museum catalogs, and other references (Deagan 1978, 1987; Garner 1954; Harrison-Hall 2001; Jorg 1997; Krahl and Ayers 1986a; Kuwayama 1997; Li 1996; Marken 1994; Martin 1979; Pope 1956; Rinaldi 1989; Shangraw and Von der Porten 1981, 1997). Finally, based on actual refitting, as well as on visual cues such as decoration, color, and form, I next estimated the (MNV) count for each ware-type at each site. In addition, I recorded each sherd's maximum length, width, and thickness to the nearest 0.1 mm using plastic sliding calipers, and entered these data along with my observations into a FileMaker Pro (v. 8.5) database.

In total, published articles, excavation records, museum databases and accession files, and a visual examination revealed a porcelain assemblage of 119 sherds excavated from six Point Reyes Peninsula sites by the University of California Archaeological Survey (UCAS) from 1940–1951 (Heizer 1941; Meighan 1950a; Meighan and Heizer 1952) that are curated in the PAHMA. In addition, similar sources and methods identified a porcelain assemblage of 578 sherds excavated or surface collected from 13 sites by San Francisco State College (now University), Santa Rosa Junior College, and the Drakes Navigators Guild during the 1950s, 1960s, and early-1970s—this includes overlap of several of the UCAS sites (Shangraw and Von der Porten 1981, 1997; Treganza 1959; Von der Porten 1963, 1965, 1968, 1972; Von der Porten and Peron 1973). There are also 423 porcelain fragments that have been collected by visitors from beaches surrounding Drakes Bay from the 1960s to the present in the collection of the PRNSM (Jones 2000). There is also a single sixteenth-century porcelain fragment recovered by California State Parks archaeologists in 1957 from CA-MRN-308 and curated by the State of California that I include here.

Initially, my examination of publications, archival records, and museum repositories uncovered a total of 17 archaeological sites within present-day Point Reyes National Seashore that have yielded sixteenth-century porcelain fragments through either excavation or surface collection. However, a single sherd recovered from site CA-MRN-233 could not be located in the collections for this study, nor is its association with an actual archaeological site certain. In addition, a single porcelain fragment is listed in the PRNSM catalog from site CA-MRN-272, but upon further examination I determined this was a beach-collected sherd found near the site, and

therefore should actually have been included in the beach-collected assemblage, not the archaeological assemblage.

For my study, I combined the porcelain assemblages from all excavations into a single analytical assemblage. A number of sites are represented in both the PAHMA collection and the PRNSM collection, and I combined these to reflect the total number of artifacts recovered from each site, regardless of who excavated the site and when, or in which repository the artifact is held. After combining all the assemblages, I identified 698 sixteenth-century porcelain fragments archaeologically recovered from 15 separate sites around *tamál-húye*, as well as 423 beach-collected porcelain fragments, for a total of 1,121 porcelain sherds (Table 8.1).

Ware-Type Identification

After an initial assessment, I identified the specific porcelain ware-type of each porcelain fragment and categorized each as Kraak porcelain, late-Ming provincial ware, Zhangzhou (Swatow) ware, or unknown. In the late sixteenth century, Chinese merchants commonly exported at least three types of blue-and-white underglaze porcelain for European consumption. The first is a fine ware-type that came to be known as *kraaksporcelein* (a Dutch term referring to the type of ship engaged in the Asian trade), or, more commonly, Kraak porcelain. This type of ware was produced in China's porcelain center of Jingdezhen (also known as Ching-teh-Chen) for export to the west, and is characterized by pale blue designs on a white body. Kraak decorations are most often arranged in panels around a vessel's rim and cavettos, with a central design medallion depicting flowers, peaches, birds, Taoist designs, deer, or landscapes. Common vessel forms include plates (dishes), saucers, bowls, bottles, vases, and ewers (pitchers) (Rinaldi 1989:70). As a distinctive characteristic, Kraak porcelain's glaze often forms pinholes or chips at the rim, and grains of sand often adhere to the footrims—this is one way Kraak porcelain from archaeological contexts can be quickly recognized (Deagan 1987:98).

In addition to Kraak porcelain, a second type of common late-sixteenth-century Chinese export porcelain was a late-Ming-period provincial ware. This provincial ware was also produced at Jingdezhen as well as other provincial kilns in Fujian province, and is commonly found in western contexts (Kuwayama 1997:18; Shangraw and Von der Porten 1981). Late-Ming provincial-ware porcelain is characterized by a grayish glaze with dark blue underglaze decorations. Small bowls are a common vessel type of this ware. Provincial-ware porcelain is not as finely produced as Kraak porcelain, but not as crude as the third common type of late-sixteenth-century Chinese export porcelain, Zhangzhou, or Swatow, ware (Jan-Erik Nilsson, personal communication 2006).

Zhangzhou (Swatow) ware is a distinctive type of porcelain that was produced at provincial kilns in Fujian province, primarily for export to Japan and Southeast Asia (Adhyatman 1999). Although Swatow ware is actually an erroneous Western term referring to the port of Swatow, or Shantou, in Guangdong, which did not actually export porcelain during the sixteenth and seventeenth centuries (Li 1996:213), the term is commonly used in western porcelain studies. Chinese scholars, however, prefer the term Zhangzhou ceramics, named for their place of production (Adhyatman 1999:17). In contrast to Kraak porcelain, Zhangzhou ware is heavily potted and roughly finished with large amounts of sand adhering to the footrim and base, the result of using sand supports instead of saggers or clay spurs during firing in an effort to maximize kiln space (Kuwayama 1997:18; Li 1996:214). Jorg (1997:54) describes Zhangzhou ware as "...a rather heavy, non-translucent porcellaneous stoneware, firing grayish white to a

Table 8.1. Total number of porcelain fragments collected from all sites on the Point Reyes Peninsula since 1940, plus beach-collected porcelain fragments in the Point Reyes National Seashore Museum collection.

Site	Sherds (n)
CA-MRN-216	239
CA-MRN-230	2
CA-MRN-232	74
CA-MRN-235	4
CA-MRN-236	1
CA-MRN-242	4
CA-MRN-271	19
CA-MRN-274	1
CA-MRN-280	1
CA-MRN-298	308
CA-MRN-307	22
CA-MRN-308	9
CA-MRN-389	1
CA-MRN-392	1
CA-MRN-394	12
Subtotal	698
Beach-Collected	423
Total	1121

reddish-brown....The transparent glaze is often thick and uneven and can be rather milky....Sometimes it is coarsely crackled....” In addition, the glaze is often not completely vitrified, so that in cross-section the thick, gray glaze stands in stark contrast to the gray or reddish paste of the ceramic body, unlike other high-fired, vitrified porcelain (such as Kraak) in which the paste and glaze are indistinguishable. Also unlike Kraak porcelain, the decoration on Zhangzhou ware vessels generally lacks formal panels, is painted in a dark blue or indigo, and is freely and boldly drawn (Deagan 1987:99; Kuwayama 1997:18).

For this study, based on visual observations and comparison to published references, I identified each sherd as Kraak porcelain, late-Ming provincial ware, or Zhangzhou ware whenever possible. For many smaller fragments, however, the three types of porcelain could not be distinguished and I simply recorded them as “unknown.” Ceramic ware-types from each site are summarized in Figures 8.3 and 8.4 and Tables 8.2 and 8.3.

Vessel Form Identification

After assessing ceramic ware-type, I next examined each porcelain fragment to identify possible vessel forms. I based vessel form identification on physical characteristics of individual and refit groups of sherds, as well as decoration, ware-type identification, and comparing the ceramics to other sixteenth-century Chinese porcelain assemblages from Spanish and other European contexts (i.e. Deagan 1987; Desroches 1998; Kuwayama 1997; L'Hour, et al. 1990; Marken 1994; Martin 1979; McEwan 1991) and to museum collections and other porcelain references (i.e. Garner 1954; Harrison-Hall 2001; Jorg 1997; Krahl and Ayers 1986a, 1986b; Li 1996; Litzenburg 2003; Pope 1956; Rinaldi 1989). Rinaldi (1989:70) classifies Kraak porcelain

Figure 8.3. Porcelain ware-types from archaeological contexts.

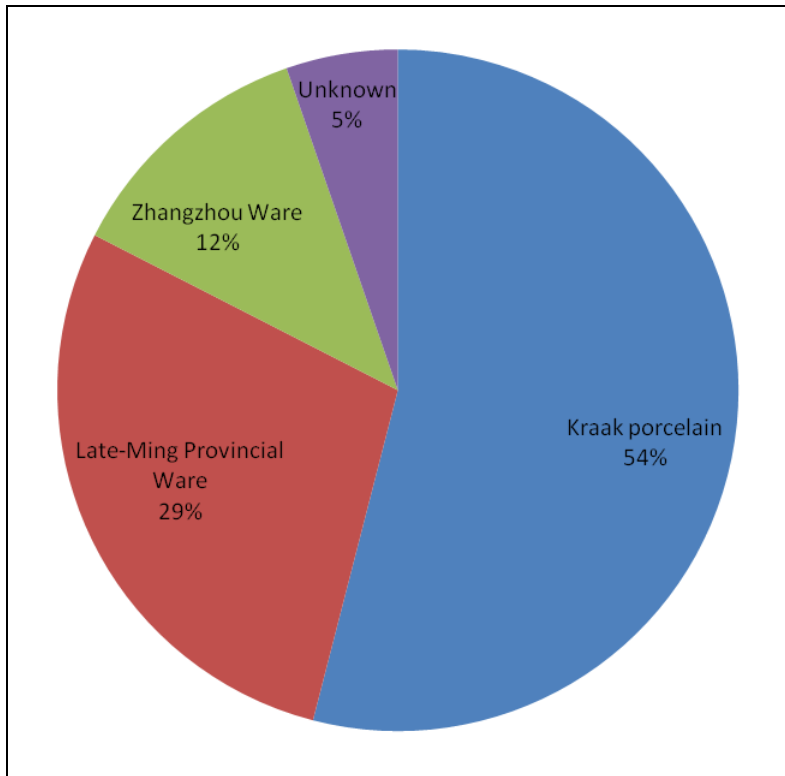


Figure 8.4. Porcelain ware-types from the beach-collected assemblage.

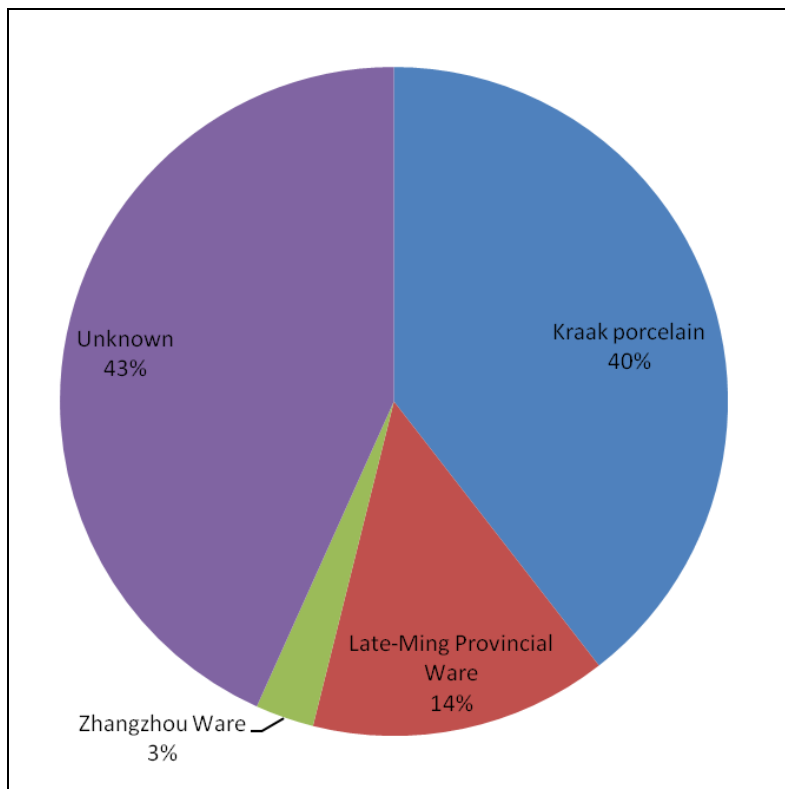


Table 8.2. Porcelain ware-types from both archaeological and beach-collected contexts.

<u>Site</u>	<u>Ware Type</u>	<u>No. of Sherds</u>	<u>MNV</u>
CA-MRN-216	Kraak porcelain	125	27
	Late-Ming Provincial Ware	73	26
	Zhangzhou Ware	23	7
	Unknown	18	8
CA-MRN-230	Kraak porcelain	1	1
	Late-Ming Provincial Ware	1	1
CA-MRN-232	Kraak porcelain	65	13
	Late-Ming Provincial Ware	1	1
	Zhangzhou Ware	4	2
	Unknown	4	1
CA-MRN-235	Late-Ming Provincial Ware	2	2
	Zhangzhou Ware	1	1
	Unknown	1	1
CA-MRN-236	Kraak porcelain	1	1
CA-MRN-242	Kraak porcelain	2	2
	Late-Ming Provincial Ware	2	1
CA-MRN-271	Kraak porcelain	18	8
	Late-Ming Provincial Ware	1	1
CA-MRN-274	Late-Ming Provincial Ware	1	1
CA-MRN-280	Late-Ming Provincial Ware	1	1
CA-MRN-298	Kraak porcelain	135	34
	Late-Ming Provincial Ware	104	30
	Zhangzhou Ware	57	10
	Unknown	12	3
CA-MRN-307	Kraak porcelain	13	4
	Late-Ming Provincial Ware	9	6
CA-MRN-308	Kraak porcelain	9	4
CA-MRN-389	Kraak porcelain	1	1
CA-MRN-392	Kraak porcelain	1	1
CA-MRN-394	Kraak porcelain	6	5
	Late-Ming Provincial Ware	4	3
	Unknown	2	1
Archaeological Sites Subtotals	Kraak porcelain	377	101
	Late-Ming Provincial Ware	199	73
	Zhangzhou Ware	85	20
	Unknown	37	14
Beach-Collected	Kraak porcelain	167	59
	Late-Ming Provincial Ware	61	27
	Zhangzhou Ware	12	8
	Unknown	183	11
Grand Totals	Kraak porcelain	544	160
	Late-Ming Provincial Ware	260	100
	Zhangzhou Ware	97	28
	Unknown	220	25

Table 8.3. Percentage of porcelain ware-types from each archaeological site.

<u>Site</u>	<u>Kraak</u>		<u>Provincial Ware</u>		<u>Zhangzhou</u>		<u>Unknown</u>	
	n	%	n	%	n	%	n	%
CA-MRN-216	125	52.3	73	30.5	23	9.6	18	7.6
CA-MRN-230	1	50.0	1	50.0	0	0.0	0	0.0
CA-MRN-232	65	87.8	1	1.4	4	5.4	4	5.4
CA-MRN-235	0	0.0	2	50.0	1	25.0	1	25.0
CA-MRN-236	1	100.0	0	0.0	0	0.0	0	0.0
CA-MRN-242	2	50.0	2	50.0	0	0.0	0	0.0
CA-MRN-271	18	94.7	1	5.3	0	0.0	0	0.0
CA-MRN-274	0	0.0	1	100.0	0	0.0	0	0.0
CA-MRN-280	0	0.0	1	100.0	0	0.0	0	0.0
CA-MRN-298	135	43.8	104	33.7	57	18.5	12	4.0
CA-MRN-307	13	59.1	9	40.9	0	0.0	0	0.0
CA-MRN-308	9	100.0	0	0.0	0	0.0	0	0.0
CA-MRN-389	1	100.0	0	0.0	0	0.0	0	0.0
CA-MRN-392	1	100.0	0	0.0	0	0.0	0	0.0
CA-MRN-394	6	50.0	4	33.3	0	0.0	2	16.7
Totals	377	54.0	199	28.5	85	12.2	37	5.3

into four major vessel forms: dishes, klapmutsen (a deep dish or shallow bowl), bowls, and closed forms (such as bottles or vases). Rinaldi’s dish category includes dishes (plates) and saucers, which she distinguishes by size: dishes are greater than 20 cm in diameter and saucers are less than 15 cm in diameter (Rinaldi 1989:73). For this project, I used a classification system that identified vessels first as open (dishes, saucers, and bowls) or closed (bottles) forms. Next, I further divided open vessels into flatwares (dishes or saucers) and hollowares (bowls). My classification is based on a common ceramic vessel-form division used in historical archaeology that allows archaeologists to potentially interpret different styles of food preparation. For example, solid food, such as various cuts of meat, might be prepared and served on flatwares, while liquid-based foods such as soups, gruels, and porridges might be prepared and served primarily in hollowares. Finally, I classified flatwares as dishes or saucers based on estimated vessel diameter, while hollowares I automatically classified as bowls. If I could only identify a sherd or group of refit sherds as an open vessel, without being more specific, it was classified as “open – unknown.” Similarly, I identified closed vessels as either bottles or as “closed – unknown.” Sherds that I that could not differentiate into open or closed forms I simply classified as “unknown.” Vessel form identification is summarized in Figures 8.5 and 8.6 and Tables 8.4 and 8.5.

Minimum Number of Vessels (MNV)

After identifying ceramic ware-type and vessel form for each sherd or group of refit sherds, I used these data to help calculate MNV, the minimum number of individual ceramic vessels that can be represented by the given ceramic assemblage, to determine the overall size of the original porcelain collection. I derived the MNV from an assessment of individual and refit sherd characteristics, including ware type, vessel form, and decoration. During MNV analysis, I grouped together only unique or clearly-identifiable sherds as part of the same vessel. I did not

Figure 8.5. Porcelain vessel forms from archaeological contexts.

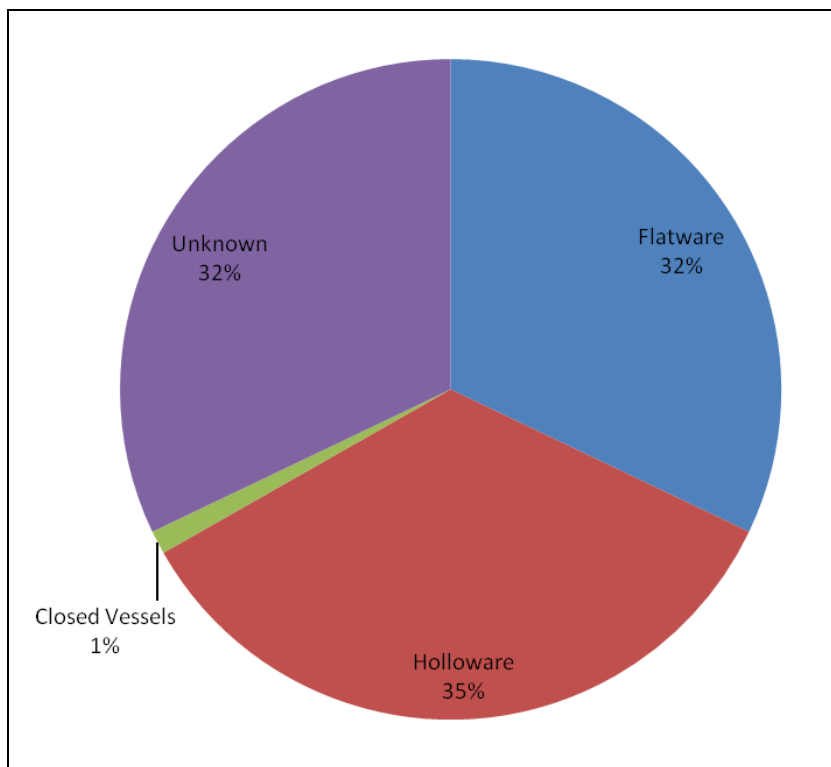


Figure 8.6. Porcelain vessel forms from the beach-collected assemblage.

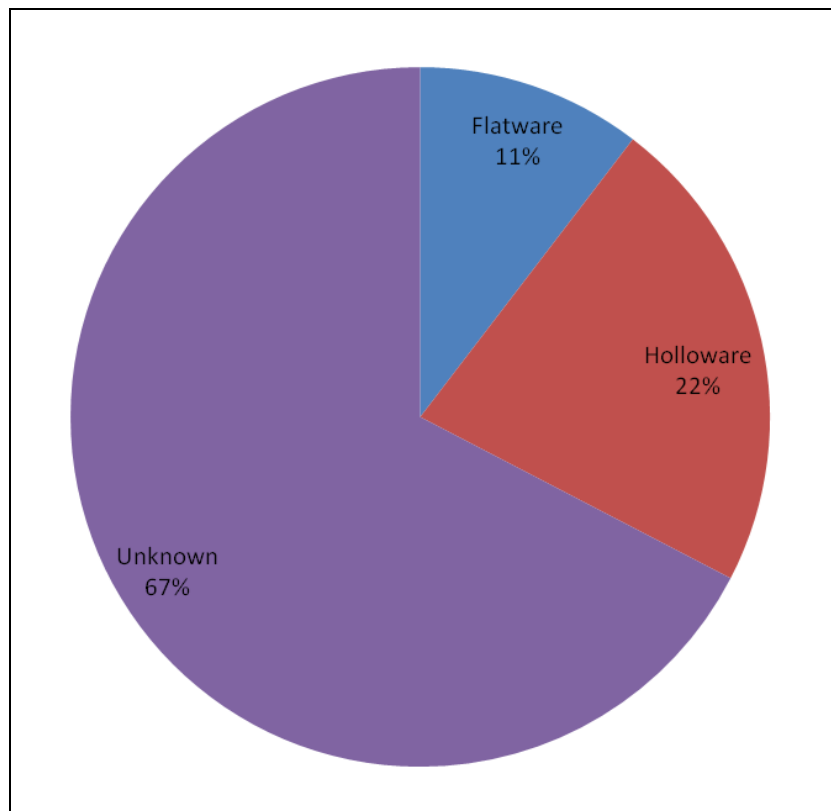


Table 8.4. Porcelain ware-types and vessel forms from both archaeological and beach-collected contexts.

<u>Site</u>	<u>Ware Type</u>	<u>Vessel Forms</u>	<u>Sherds (n)</u>	<u>MNV</u>
CA-MRN-216	Kraak porcelain	Open Vessel -- Flatware -- Dish	58	15
		Open Vessel -- Flatware -- Saucer	20	2
		Open Vessel -- Holloware -- Bowl	6	4
		Open Vessel -- Unknown	40	6
		Unknown Vessel	1	0
	Late-Ming Provincial Ware	Open Vessel -- Flatware -- Dish	3	1
		Open Vessel -- Holloware -- Bowl	68	23
		Open Vessel -- Unknown	2	2
	Zhangzhou Ware	Open Vessel -- Flatware -- Dish	6	1
		Open Vessel -- Unknown	17	6
	Unknown	Open Vessel -- Flatware -- Dish	1	1
		Open Vessel -- Holloware -- Bowl	4	2
Open Vessel -- Unknown		9	5	
Unknown Vessel		4	0	
CA-MRN-230	Kraak porcelain	Open Vessel -- Flatware -- Dish	1	1
	Late-Ming Provincial Ware	Open Vessel -- Holloware -- Bowl	1	1
CA-MRN-232	Kraak porcelain	Open Vessel -- Flatware -- Dish	24	5
		Open Vessel -- Flatware -- Saucer	9	1
		Open Vessel -- Holloware -- Bowl	25	5
		Open Vessel -- Unknown	3	1
		Closed Vessel -- Unknown	1	1
	Unknown Vessel	3	0	
	Late-Ming Provincial Ware	Open Vessel -- Unknown	1	1
	Zhangzhou Ware	Open Vessel -- Unknown	4	2
Unknown	Unknown Vessel	4	1	
CA-MRN-235	Late-Ming Provincial Ware	Open Vessel -- Unknown	2	2
	Zhangzhou Ware	Open Vessel -- Flatware -- Dish	1	1
	Unknown	Unknown Vessel	1	1
CA-MRN-236	Kraak porcelain	Open Vessel -- Flatware -- Dish	1	1
CA-MRN-242	Kraak porcelain	Open Vessel -- Flatware -- Dish	1	1
		Open Vessel -- Unknown	1	1
	Late-Ming Provincial Ware	Open Vessel -- Holloware -- Bowl	2	1
CA-MRN-271	Kraak porcelain	Open Vessel -- Flatware -- Dish	6	3
		Open Vessel -- Unknown	3	2
		Closed Vessel -- Bottle	5	2
	Unknown Vessel	4	1	
Late-Ming Provincial Ware	Open Vessel -- Holloware -- Bowl	1	1	
CA-MRN-274	Late-Ming Provincial Ware	Open Vessel -- Holloware -- Bowl	1	1
CA-MRN-280	Late-Ming Provincial Ware	Open Vessel -- Flatware -- Dish	1	1
CA-MRN-298	Kraak porcelain	Open Vessel -- Flatware -- Dish	70	16
		Open Vessel -- Holloware -- Bowl	31	13
		Open Vessel -- Unknown	31	3
		Closed Vessel -- Bottle	1	1
		Closed Vessel -- Unknown	1	1
		Unknown Vessel	1	0

<u>Site</u>	<u>Ware Type</u>	<u>Vessel Forms</u>	<u>Sherds (n)</u>	<u>MNV</u>
CA-MRN-298 (cont.)	Late-Ming Provincial Ware	Open Vessel -- Holloware -- Bowl	87	23
		Open Vessel -- Unknown	15	7
		Unknown Vessel	2	0
	Zhangzhou Ware	Open Vessel -- Flatware -- Dish	1	1
		Open Vessel -- Unknown	56	9
	Unknown	Open Vessel -- Unknown	11	3
Unknown Vessel		1	0	
CA-MRN-307	Kraak porcelain	Open Vessel -- Flatware -- Dish	4	2
		Open Vessel -- Holloware -- Bowl	6	2
		Open Vessel -- Unknown	3	0
	Late-Ming Provincial Ware	Open Vessel -- Flatware -- Dish	1	1
		Open Vessel -- Holloware -- Bowl	6	4
		Unknown Vessel	2	1
CA-MRN-308	Kraak porcelain	Open Vessel -- Flatware -- Dish	7	2
		Open Vessel -- Holloware -- Bowl	1	1
		Open Vessel -- Unknown	1	1
CA-MRN-389	Kraak porcelain	Open Vessel -- Flatware -- Dish	1	1
CA-MRN-392	Kraak porcelain	Open Vessel -- Unknown	1	1
CA-MRN-394	Kraak porcelain	Open Vessel -- Flatware -- Dish	5	4
		Open Vessel -- Unknown	1	1
	Late-Ming Provincial Ware	Open Vessel -- Holloware -- Bowl	3	2
		Open Vessel -- Unknown	1	1
	Unknown	Open Vessel -- Flatware -- Dish	2	1
Archaeological Sites Subtotals	Kraak porcelain	Open Vessel -- Flatware -- Dish	178	51
		Open Vessel -- Flatware -- Saucer	29	3
		Open Vessel -- Holloware -- Bowl	69	25
		Open Vessel -- Unknown	84	16
		Closed Vessel -- Bottle	6	3
		Closed Vessel -- Unknown	2	2
		Unknown Vessel	9	1
		Kraak Porcelain	377	101
	Late-Ming Provincial Ware	Open Vessel -- Flatware -- Dish	5	3
		Open Vessel -- Holloware -- Bowl	169	56
		Open Vessel -- Unknown	21	13
		Unknown Vessel	4	1
		Late-Ming Provincial Ware	199	73
	Zhangzhou Ware	Open Vessel -- Flatware -- Dish	8	3
		Open Vessel -- Unknown	77	17
		Zhangzhou Ware	85	20
	Unknown	Open Vessel -- Flatware -- Dish	3	2
		Open Vessel -- Holloware -- Bowl	4	2
		Open Vessel -- Unknown	20	8
		Unknown Vessel	10	2
Unknown		37	14	
Beach-Collected	Kraak porcelain	Open Vessel -- Flatware -- Dish	33	21
		Open Vessel -- Holloware -- Bowl	36	18
		Open Vessel -- Unknown	41	19

<u>Site</u>	<u>Ware Type</u>	<u>Vessel Forms</u>	<u>Sherds (n)</u>	<u>MNV</u>
Beach-Collected (cont.)	Kraak porcelain (cont.)	Unknown Vessel	57	1
		Kraak Porcelain	167	59
	Late-Ming Provincial Ware	Open Vessel -- Holloware -- Bowl	46	24
		Open Vessel -- Unknown	3	3
		Unknown Vessel	12	0
		Late-Ming Provincial Ware	61	27
	Zhangzhou Ware	Open Vessel -- Flatware -- Dish	6	3
		Open Vessel -- Holloware -- Bowl	1	1
		Open Vessel -- Unknown	4	3
		Unknown Vessel	1	1
		Zhangzhou Ware	12	8
	Unknown	Open Vessel -- Flatware -- Dish	5	4
		Open Vessel -- Holloware -- Bowl	11	4
		Open Vessel -- Unknown	11	3
		Unknown Vessel	156	0
		Unknown	183	11
	Grand Totals	Kraak porcelain	Open Vessel -- Flatware -- Dish	211
Open Vessel -- Flatware -- Saucer			29	3
Open Vessel -- Holloware -- Bowl			105	43
Open Vessel -- Unknown			125	35
Closed Vessel -- Bottle			6	3
Closed Vessel -- Unknown			2	2
Unknown Vessel			66	2
Kraak Porcelain			544	160
Late-Ming Provincial Ware		Open Vessel -- Flatware -- Dish	5	3
		Open Vessel -- Holloware -- Bowl	215	80
		Open Vessel -- Unknown	24	16
		Unknown Vessel	16	1
Late-Ming Provincial Ware		260	100	
Zhangzhou Ware		Open Vessel -- Flatware -- Dish	14	6
		Open Vessel -- Holloware -- Bowl	1	1
		Open Vessel -- Unknown	81	20
		Unknown Vessel	1	1
Swatow Ware		97	28	
Unknown		Open Vessel -- Flatware -- Dish	8	6
		Open Vessel -- Holloware -- Bowl	15	6
		Open Vessel -- Unknown	31	11
		Unknown Vessel	166	2
Unknown		220	25	

Table 8.5. Percentage of porcelain vessel forms from each archaeological site.

Site	Flatware		Holloware		Closed		Unknown	
	n	%	n	%	n	%	n	%
CA-MRN-216	88	36.8	78	32.6	0	0.0	73	30.5
CA-MRN-230	1	50.0	1	50.0	0	0.0	0	0.0
CA-MRN-232	33	44.5	25	33.7	1	1.4	15	20.2
CA-MRN-235	1	25.0	0	0.0	0	0.0	3	75.0
CA-MRN-236	1	100.0	0	0.0	0	0.0	0	0.0
CA-MRN-242	2	50.0	2	50.0	0	0.0	0	0.0
CA-MRN-271	6	31.5	1	5.2	5	26.3	7	36.8
CA-MRN-274	0	0.0	1	100.0	0	0.0	0	0.0
CA-MRN-280	1	100.0	0	0.0	0	0.0	0	0.0
CA-MRN-298	71	23.1	118	38.3	2	0.6	117	37.9
CA-MRN-307	5	22.7	12	54.5	0	0.0	5	22.8
CA-MRN-308	7	77.7	1	11.1	0	0.0	1	11.2
CA-MRN-389	1	100.0	0	0.0	0	0.0	0	0.0
CA-MRN-392	0	0.0	0	0.0	0	0.0	1	100.0
CA-MRN-394	7	58.3	3	25.0	0	0.0	2	16.7
Totals	224	32.1	242	34.7	8	1.1	224	32.1

count undecorated or other unidentifiable sherds in the assemblage, which may have come from any number of vessels, towards the overall MNV figure—these are classified as “unknown vessels” in Tables 8.2-8.5 (Miller and Moodey 1986; Orton 1993).

Orton (1993) developed an alternative method of determining the total number of whole vessels represented by an assemblage of ceramic fragments, which he termed estimated vessel-equivalents (EVE). This method assumes that sherds from an individual ceramic vessel in an assemblage represent a certain proportion of the vessel based on a scale of 0 to 1, which can be estimated by using specific diagnostic features, usually rims or bases. By measuring the total percentage of vessel rims or bases present in an assemblage, the number of estimated vessel-equivalents can be calculated (Orton 1993:173). I found, however, that this method has limited applicability to highly-fragmented ceramic assemblages for which only very small percentages of rims or bases are present for each potential vessel. After initial calculations demonstrated the EVE values were significantly under-representing the number of vessels present in the assemblage, I discarded EVE analysis as a viable alternative for my study.

The results of the MNV analysis indicate that the archaeological assemblage of 698 porcelain fragments represents at least of 208 different vessels, while the beach-collected assemblage of 423 individual porcelain fragments represents a minimum of 105 individual vessels (Table 8.6). Results of the vessel form analysis indicate that, even though the MNV for the archaeological assemblage is nearly twice the size of the beach-collected assemblage, the percentages of different vessels identified from both the excavated and beach-collected assemblages are very similar (see Figures 8.5 and 8.6). In other words, the ratio of vessel types collected by Tamal individuals from the *San Agustin* shipwreck site is very similar to a hypothetical random selection of vessel types from the shipwreck. This is one piece of evidence may indicate the Tamal had no preference for selecting specific vessel forms for salvage from

Table 8.6. Minimum number of vessels (MNV) from both archaeological and beach-collected contexts.

Site	Sherds (n)	MNV
CA-MRN-216	239	68
CA-MRN-230	2	2
CA-MRN-232	74	17
CA-MRN-235	4	4
CA-MRN-236	1	1
CA-MRN-242	4	3
CA-MRN-271	19	9
CA-MRN-274	1	1
CA-MRN-280	1	1
CA-MRN-298	308	77
CA-MRN-307	22	10
CA-MRN-308	9	4
CA-MRN-389	1	1
CA-MRN-392	1	1
CA-MRN-394	12	9
Subtotal	698	208
Beach-Collected	423	105
Total	1121	313

the *San Agustín*, which may imply that pragmatic or utilitarian concerns were not a top priority for Tamal villagers when they collected porcelain vessels and fragments.

The numerical distribution of ware-type and vessel forms does not indicate any strong patterns between sites (see Figures 8.3-8.6 and Tables 8.2-8.5). Percentages of flatwares versus hollowares varies somewhat between sites, but there are no strong tendencies, especially at the three sites with the largest assemblages (CA-MRN-216, CA-MRN-232, and CA-MRN-298). Flatwares exceed hollowares at CA-MRN-216 and CA-MRN-232, while the opposite is true at CA-MRN-298 (although it has a higher percentage of unidentifiable vessel forms). The only anomalous site is CA-MRN-271, which has a substantially higher proportion of closed vessels than any other site. Because there is such a small sample from the site, and because there are only two closed vessels represented (compared to one at CA-MRN-298 and none at any other site), it is hard to draw any conclusions from this observation. Likewise, the numerical distribution of ware-types does not seem to show any strong inter-site patterning. There is variation between sites, but overall the tendency (especially at the three sites with the largest samples, CA-MRN-216, CA-MRN-232, and CA-MRN-298) parallels that seen in the overall assemblage and the beach-collected assemblage, with the largest percentage of Kraak porcelain, fewer late-Ming provincial wares, and fewer still Zhangzhou wares.

Porcelain Refit Analysis

As an attempt to evaluate the extent to which the Tamal people selected whole porcelain vessels versus broken vessel fragments, I analyzed the number of porcelain fragments at each site that could be refit to other porcelain fragments. I also investigated whether any porcelain fragments could be refit between sites, possibly indicating an exchange of broken ceramic

fragments between settlements, or that individuals carried particular porcelain fragments to different locations. I also graphically plotted and examined the spatial distribution of refit groups from each site in GIS to see if these data could help illuminate activity areas or otherwise offer additional clues to how the Tamal incorporated the artifacts into their cultural practices.

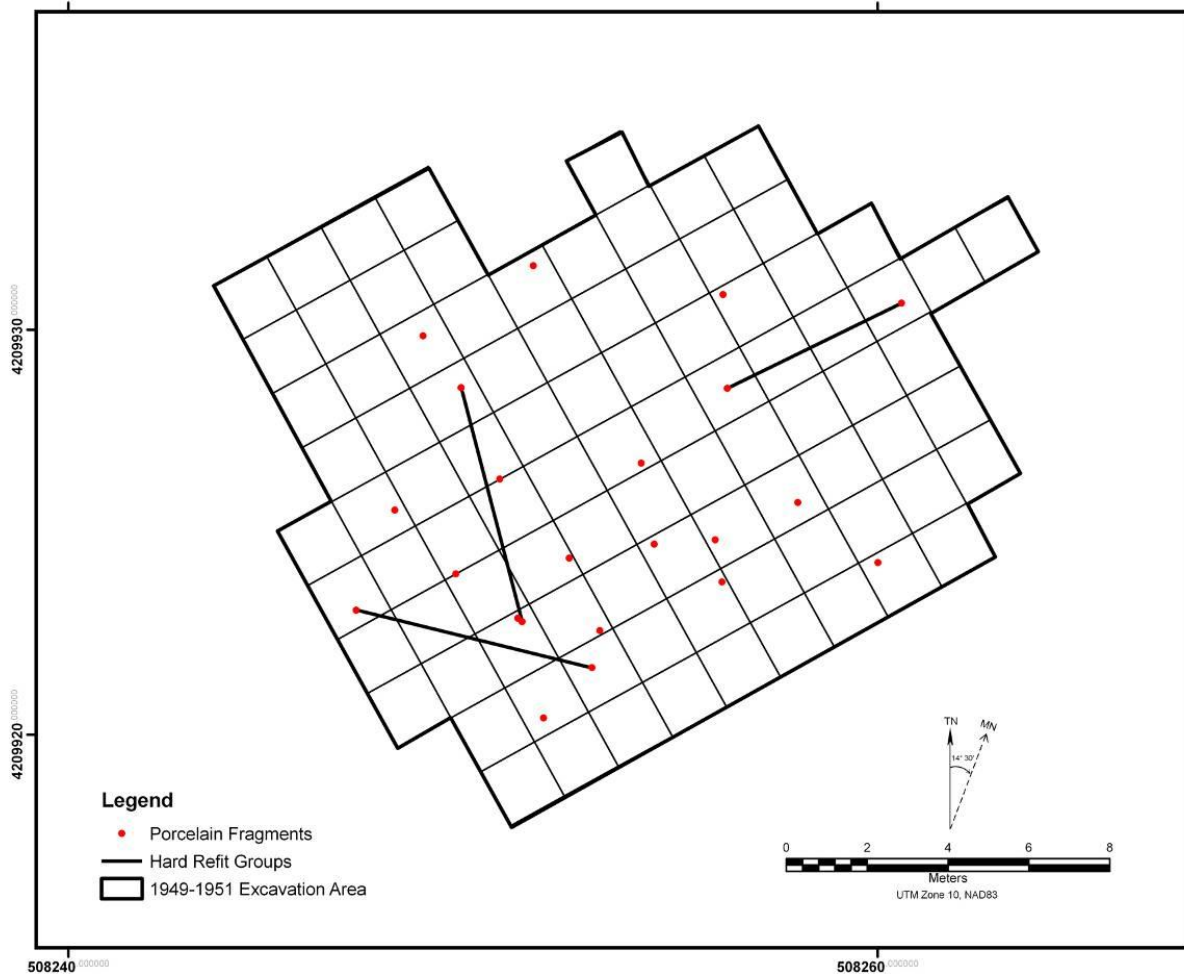
Nearly all the porcelain refit groups at each site were identified and reassembled by the original researchers during the 1940s-1970s (Beardsley 1941e, 1946a, 1946c; Heizer 1941; Meighan 1950a, 1950b, 1950d, 2002; Meighan and Heizer 1952; Von der Porten 1965, 1970, 1972), and in most cases, the PAHMA and PRNSM collections now hold refit groups that were reassembled in the past. Shangraw and Von der Porten (1981) later identified additional refits during their extensive comparison of the two museum collections, as well as a number of what I term “soft refits” – porcelain fragments that are clearly from the same vessel, based on ware, vessel form, and decorative motif, color, and quality, but that do not refit directly to one another. During my detailed examination of the sixteenth-century porcelain, I identified additional “soft refits” as part of my MNV analysis. For my refit analysis presented here, I consider both “hard refits” (i.e., porcelain fragments that can be directly reassembled) and “soft refits,” and I plot them separately in GIS.

Results of my refit analysis are presented in Table 8.7 and Figures 8.7-8.11. In general, as the number of sherds present at each site increases, the number of refit groups also increases. For the eight sites with less than four porcelain fragments present, almost no refit groups are present. The only exception is CA-MRN-242, which yielded just four porcelain fragments, but that has a single refit group present. The four sites that produced between nine and 22 porcelain sherds had 31.5% to 66.6% of the fragments that could be included in either hard or soft refit groups. Finally, for the three sites with more than 74 porcelain fragments recovered, the percentage of sherds that could be included in either hard or soft refit groups ranged from 66.2% to 82.4%.

Table 8.7. Hard and soft refit sherds from archaeological sites.

<u>Site</u>	<u>Sherds (n)</u>	<u>MNV</u>	<u>Hard-Refit Sherds</u>	<u>Soft-Refit Sherds</u>	<u>Percentage of Refit Sherds</u>
CA-MRN-216	239	68	133	34	69.8%
CA-MRN-230	2	2	0	0	0.0%
CA-MRN-232	74	17	27	34	82.4%
CA-MRN-235	4	4	0	0	0.0%
CA-MRN-236	1	1	0	0	0.0%
CA-MRN-242	4	3	2	0	50.0%
CA-MRN-271	19	9	4	2	31.5%
CA-MRN-274	1	1	0	0	0.0%
CA-MRN-280	1	1	0	0	0.0%
CA-MRN-298	308	77	183	21	66.2%
CA-MRN-307	22	10	9	0	40.9%
CA-MRN-308	9	4	0	6	66.6%
CA-MRN-389	1	1	0	0	0.0%
CA-MRN-392	1	1	0	0	0.0%
CA-MRN-394	12	9	2	4	50.0%
Totals	698	208	360	101	66.0%

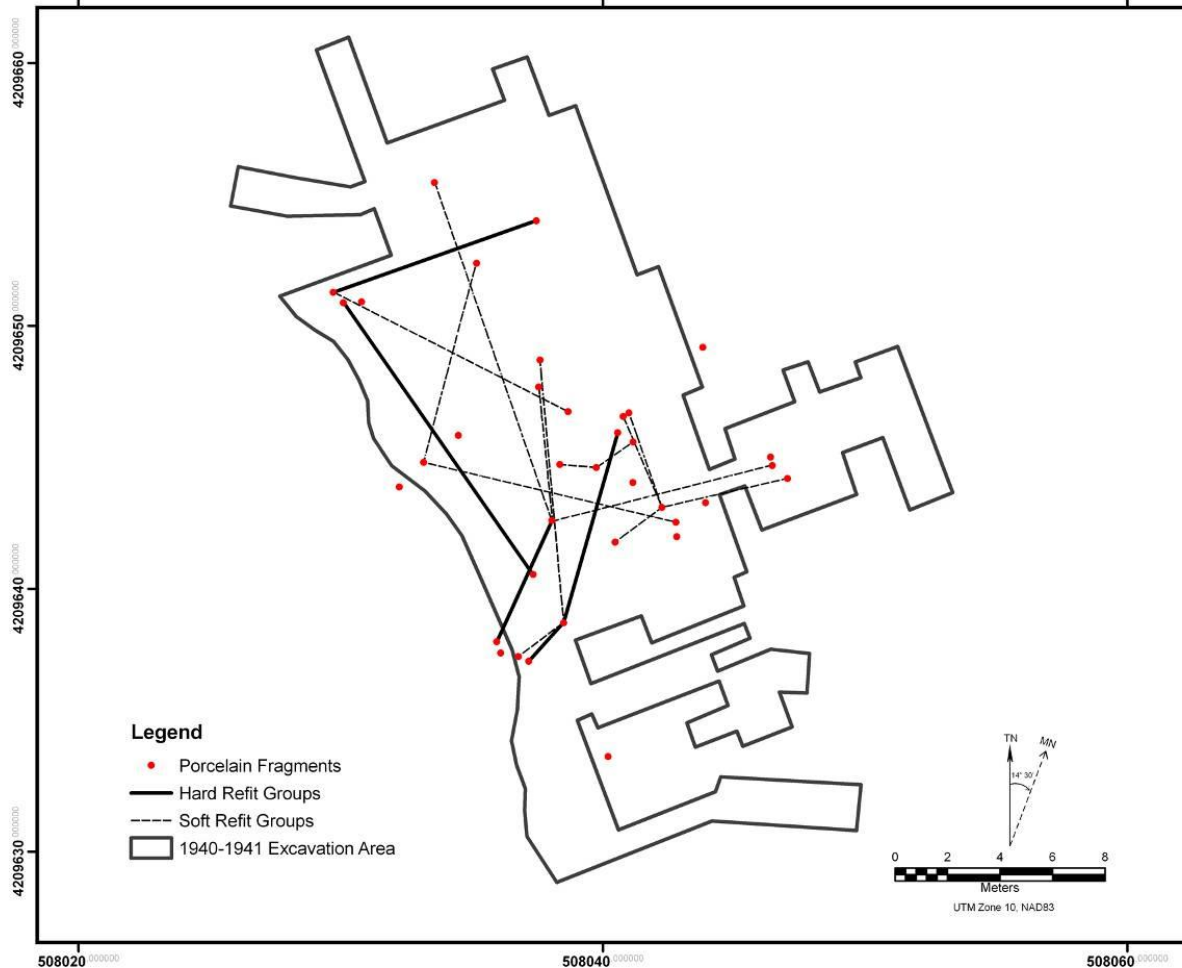
Figure 8.7. Porcelain refit groups at CA-MRN-307.



These results suggest that whole vessels likely dominated the objects retrieved by the Tamal inhabitants at the three sites with the largest porcelain assemblages (CA-MRN-216, CA-MRN-232, and CA-MRN-298). Perhaps not coincidentally, these three sites are also closest to the likely location of the *San Agustín* shipwreck, and the inhabitants at these sites may have had greater direct access to the ship and its cargo. Sites that are further away from Limantour Spit had fewer porcelain fragments, as well as fewer refit groups present. In general, these sites also had less extensive excavations conducted on them, which likely contribute to smaller number of both porcelain fragments present and identified refit groups—the extensive excavations at CA-MRN-242 and CA-MRN-307, however, are clear exceptions to this rule.

The results of the refit analysis suggest that, in general, at most sites Tamal villagers selected whole vessels over broken vessel fragments. While this might support a hypothesis that porcelain tablewares were used as utilitarian objects that were incorporated into native foodways for preparing and serving meals, there are a number of other factors that make this issue more complex. In the assemblages, there are at least four noteworthy cases of extremely beach-worn individual porcelain fragments, which were recovered from archaeological contexts, but that more closely resemble the beach-collected porcelain fragments and were likely collected by Tamal individuals from the beach, possibly long after the *San Agustín* shipwreck, much as

Figure 8.8. Porcelain refit groups at CA-MRN-232.

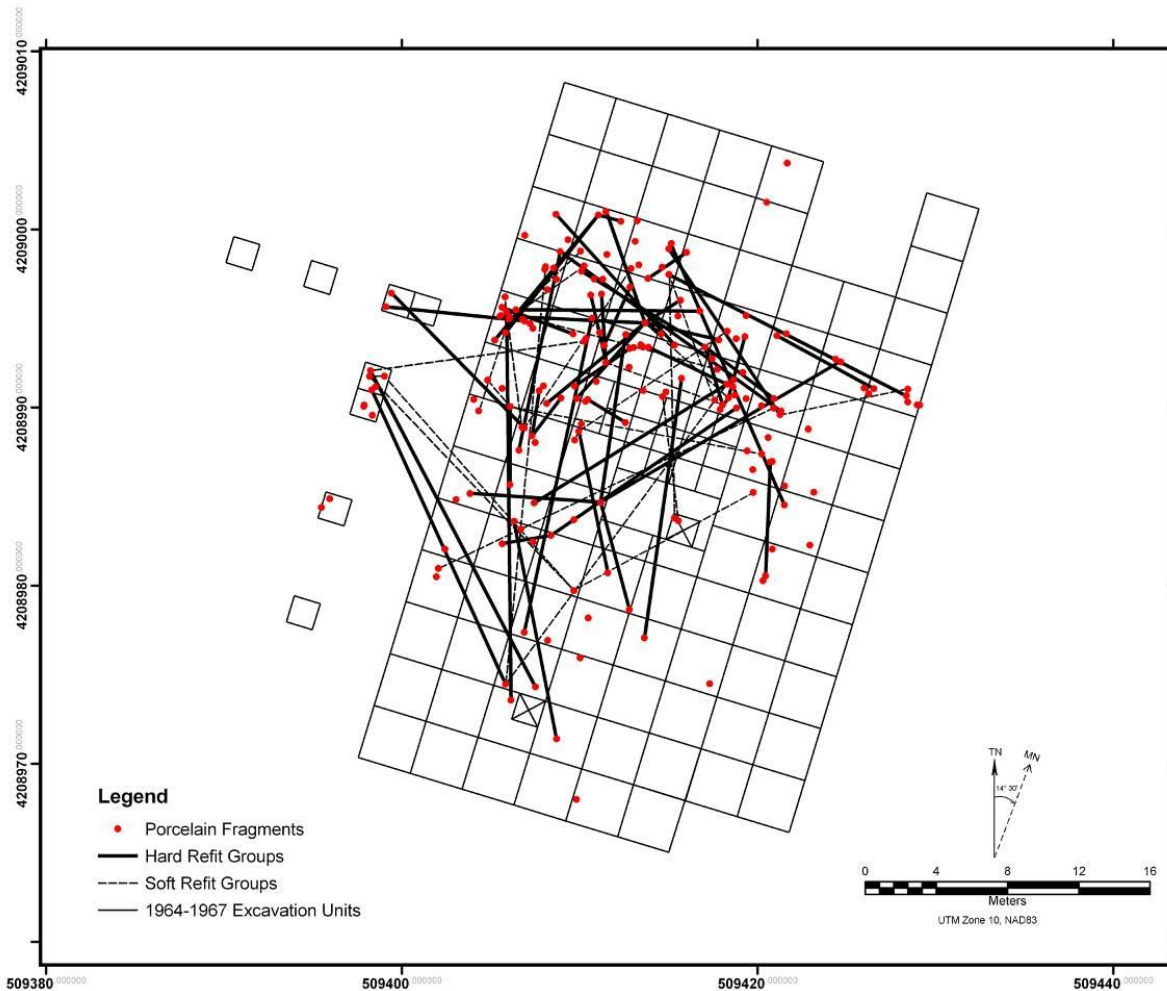


modern visitors collect porcelain today (Figure 8.12). This indicates that in some cases, individual porcelain fragments were inherently valued.

Examining the regional distribution of sites and the number of refit groups at each suggests an alternative possibility to the strictly utilitarian-value hypothesis—inhabitants of the larger village sites occupied at the time of the encounters at *tamál-húye*, especially CA-MRN-216 and CA-MRN-298, may have collected and “processed” goods from the shipwreck for distribution to their neighbors at smaller, surrounding sites. This interpretation may, in fact, be supported by the distribution of refit groups with these sites (see Figures 8.9-8.11). Due to limitations in artifact provenience data, I could only plot refit groups from four sites in GIS (CA-MRN-216, CA-MRN-232, CA-MRN-298, and CA-MRN-307). Only three refit groups of two sherds each are present at CA-MRN-307, so it is difficult to draw any conclusions from this site. It is interesting to note, however, that the refit groups at CA-MRN-307 are located either in the western part of the site (two groups) or the eastern part of the site (one group), but no sherds refit across the site.

At CA-MRN-232, on the other hand, refit groups span the entire site with no clustering or patterns observed. There is no spatially-segregated “midden” area for broken porcelain vessels,

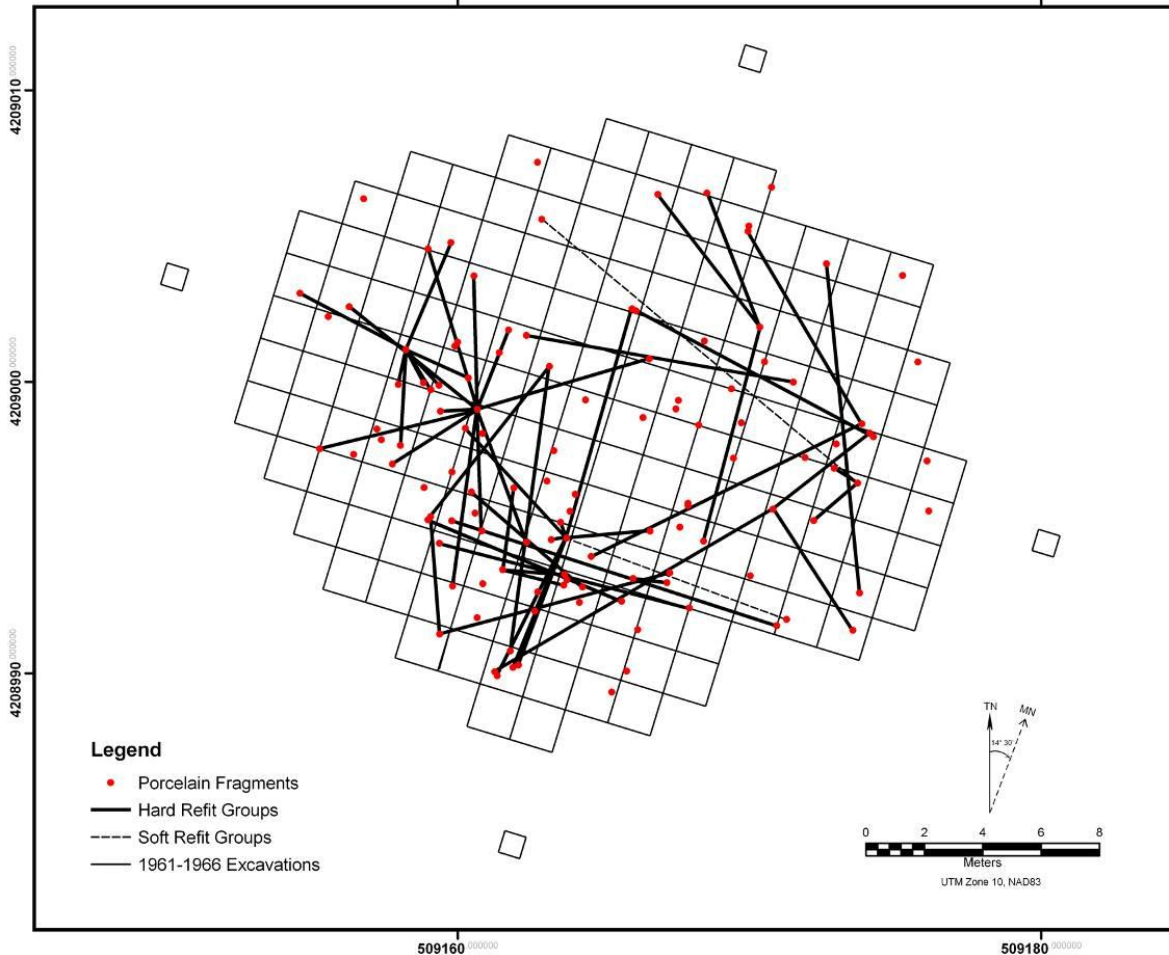
Figure 8.9. Porcelain refit groups at CA-MRN-216.



and no activity areas can be discerned based on the spatial distribution of porcelain refit groups alone.

At CA-MRN-216 and CA-MRN-298 on Limantour Spit, however, there do seem to be patterns to the distribution of refit groups. At CA-MRN-216, most refit groups cluster in the area of highest porcelain density in the northern part of the site (as expected), although several refit groups do span the site. Interestingly, porcelain fragments present in the southwestern part of the site, which is interpreted as a shell bead production area (see Chapter Seven), without exception refit to sherds outside of this area. In other words, there are no internal refit groups within the southwestern portion of the site. This suggests that whole porcelain vessels were not processed in southwestern part of the site as part of shell bead production, although a few individual fragments may have been transported there in attempts to modify them as shell beads (see below). In general, the porcelain refit groups cluster in the northern part of the site, where they are most closely associated with artifacts related to hunting and fishing, as well as (to a lesser degree) symbolic objects. In this case, it is possible that, rather than being associated with a different activity area, the porcelain vessels represent their own activity area where they were collected and “processed” for distribution to neighboring villages, either in whole form or as broken fragments.

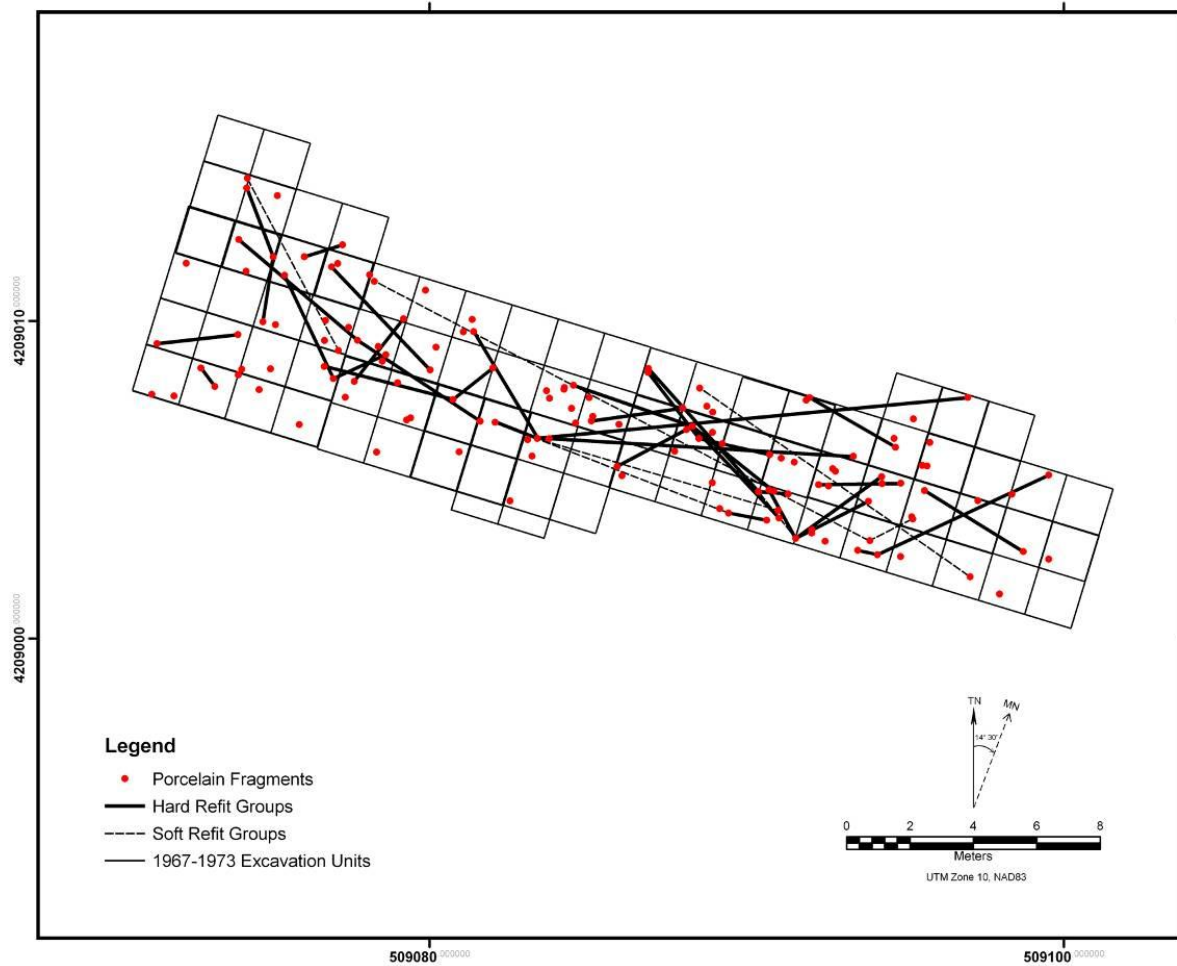
Figure 8.10. Porcelain refit groups at CA-MRN-298E.



The distributions of porcelain refit groups at the two loci at CA-MRN-298 also show distinct patterns. At CA-MRN-298E, most refit groups cluster together, although there are exceptions. Two large, individual refit groups are located in the western portion of the site, closely associated with the highest concentration of craft production objects and a likely shell bead production area. The remaining porcelain refit groups either cluster in the southern part of the site, where they are most closely associated with hunting and fishing-related objects, or the eastern part of the site, where they are most closely associated with ornamentation objects (mostly shell beads). Similarly, at CA-MRN-298W there are distinct clusters of refit groups, with nearly no cross-refitting between clustered groups. There is a smaller number of refit groups in the western portion of the site, mostly closely associated with shell bead production, and a larger number of refit groups in the central and eastern portions of the site, which have the highest concentrations of hunting and fishing-related objects.

The patterns at both loci of CA-MRN-298 suggest that some whole porcelain vessels were integrated into the shell bead production activities at the site, but that the majority of the whole vessels were associated with other activities, specifically those that may have been related to hunting and fishing. This parallels the results of the spatial analysis presented in Chapter Seven. With regards to the original test implication that suggested a preference for whole vessels

Figure 8.11. Porcelain refit groups at CA-MRN-298W.



over broken vessel fragments might support the idea that the Tamal integrated porcelain tablewares into their native foodways, it is interesting to note that there is a strong *non*-association between porcelain refit groups and food processing-related artifacts at the sites I analyzed. This would suggest that whole vessels were being recontextualized by the Tamal in ways unrelated to food production.

Finally, I also examined the porcelain assemblage for inter-site refit groups—porcelain fragments that are part of either hard or soft refit groups, which were found at different sites. My results indicate that very few inter-site refit groups exist. Shangraw and Von der Porten (1981:75) identify a single porcelain fragment with a unique decorative motif from CA-MRN-307 that may be associated as a soft refit with a much larger refit group from CA-MRN-232. At CA-MRN-232, there are two individual hard refit groups of three sherds each that are likely associated with each other, and with six other individual sherds, which are all part of the same Kraak dish that has a distinctive ducks-among-water plants rim decoration (Rinaldi 1989:76-80). The single sherd from CA-MRN-307 matches the CA-MRN-232 refit group in design, color and quality, and is likely from the same dish. The two sites are located just a few hundred meters away from each other, so the villagers living at each were likely in close contact. Nonetheless, it

Figure 8.12. Beach-worn porcelain sherd from CA-MRN-216 (catalog no. PORE 714).



is interesting that a Tamal villager evidently transported this single sherd between the two settlements.

Other than the single link between CA-MRN-232 and CA-MRN-307, there are also two likely soft refits between the two loci of CA-MRN-298. There are two separate instances of a late-Ming provincial ware sherds from CA-MRN-298E being a likely match to a single sherd at CA-MRN-298W. While this observation is noteworthy, what is perhaps more significant is that the two loci, which are nearly adjacent to each other, do not share more refit groups between them. For all intents and purposes, these two loci look like two separate sites with limited exchange between them.

Porcelain Decorative-Motif Analysis

I critically examined decorative motifs from all porcelain fragments and refit groups to identify frequency patterns within each site, and I compared the findings between sites. As a control, I also examined decorations on each of the beach-collected porcelain fragments, and I compared the distribution of decorative elements between the archaeological assemblage and the beach-collected assemblage. Finally, I reviewed the ethnographic literature, oral histories, and oral traditions available for Coast Miwok-speaking groups to identify themes, designs, or

animals that may be represented on the porcelain vessels that might have led Tamal villagers to salvage and select particular objects because of their cultural values.

While reviewing decorations on each individual porcelain fragment and developing an analytic criteria for the decorative motif study, I focused on recording animals and other recognizable objects, but I did not include plants, sprigs, leaves, and branches or other unidentifiable decorations. Because there is such a range of variability of plant depictions on the porcelain, it became too subjective in deciding which to include and which to discount. Also, because of the ubiquity of plant decorative motifs on the porcelain vessels, and the resulting large number of sherds with partial plant representations, I do not believe that using them as an analytical category would accurately represent Tamal intentionality. In other words, because of the sheer number of porcelain sherds with plant designs depicted, I do not believe that the Tamal people's intentional choice of porcelain fragments with those designs can be distinguished from their incidental presence in the assemblage. I therefore chose instead to focus solely on animals and other distinctive decorative elements for this aspect of my study. I identified six different types of animal and other distinct decorative elements depicted on the porcelain fragments, including deer, flying horse, duck or other water fowl, birds, mythical beasts (including dragons), and a single finely-executed drawing of a ceramic vessel (Figures 8.13-8.18). The deer, flying horse, water fowl, birds, and ceramic vessel are found on Kraak porcelain fragments, while birds and mythical beasts are depicted on both late-Ming provincial ware and Zhangzhou ware vessels.

Results of the decorative motif analysis are presented in Table 8.8. I identified a total of 59 individual porcelain fragments out of a total of 698 sherds from archaeological contexts that had decorative motifs in the categories I describe above (8.5%). This can be compared to the beach-collected assemblage, in which 15 of 423 porcelain fragments (3.5%) had animal and other distinctive design elements. This indicates a slightly higher percentage of porcelain fragments with distinctive design elements among the archaeologically-recovered assemblage compared with the beach-collected assemblage. The number of sherds with animal and other distinctive decorations at each site varied from 0% to 50%, with the number of decorated sherds generally falling as the sample size increased. The three sites with the largest samples (CA-MRN-216, CA-MRN-232, and CA-MRN-298) varied from 5% to 18.9% of sherds having distinctive decorations. Porcelain decorated with deer motifs represent the most numerous animal decorative element (54%), while ducks and mythical beasts each represent 13.6% of the decorated sherds, and birds comprised 11.8%. The three sherds decorated with flying horses represent 5% of the collection, and the single ceramic vessel-decorated porcelain fragment represents just 1.6% of the decorated sherds.

While it is clear that just a small minority of the porcelain fragments recovered from archaeological sites on the Point Reyes Peninsula have animal and other distinctive decorative motifs, it is still likely that in most cases, these decorations would have been recognized by the Tamal people and that the decorations may have contributed to these particular pieces being collected. Deer, water fowl (including ducks), and birds would have been easily recognizable to the Tamal as a familiar part of their environment. Further, ethnographic evidence suggests that white deer, in particular, may have held a special significance in Coast Miwok-speaking groups' cosmology. During interviews with University of California, Berkeley anthropologist Isabel Kelly, Maria Copa noted that, "[l]ong time ago they used to find a white mountain rat (*yulunwau*), and white rabbit (*wau*), or a light-colored deer. Skin put away for luck, especially in hunting" (Collier and Thalman 1996:134, 460). Other white animals such as a mud hen, flounder, and pelican also had special meaning (Collier and Thalman 1996:214, 372). This could

Figure 8.13. Deer decorative motif example, from CA-MRN-298 (catalog no. PORE 1000). Photo by Sara Brooks, courtesy of Point Reyes National Seashore Museum.



Figure 8.14. Flying horse decorative motif example, from beach-collected assemblage (catalog no. PORE 6341). Photo by Sara Brooks, courtesy of Point Reyes National Seashore Museum.



Figure 8.15. Duck or water fowl decorative motif example, from CA-MRN-394 (catalog no. PORE 1046). Photo by Sara Brooks, courtesy of Point Reyes National Seashore Museum.



Figure 8.16. Bird decorative motif example, from CA-MRN-298 (catalog no. PORE 890). Photo by Sara Brooks, courtesy of Point Reyes National Seashore Museum.



Figure 8.17. Mythical beast decorative motif example, from beach-collected assemblage (catalog no. PORE 1064). Photo by Sara Brooks, courtesy of Point Reyes National Seashore Museum.



Figure 8.18. Ceramic vessel decorative motif example, from CA-MRN-232 (catalog no. PAHMA 1-77957)



Table 8.8. Porcelain fragments from archaeological and beach-collected contexts with animals or other distinctive decorative motifs.

Site	Sherds (n)	Distinctive Motif (n)	Percentage	Deer	Flying Horse	Duck	Bird	Mythical Beast	Ceramic Vessel
CA-MRN-216	239	12	5.0%	4		4	3	1	
CA-MRN-230	2	1	50.0%				1		
CA-MRN-232	74	14	18.9%	12		1			1
CA-MRN-235	4	1	25.0%				1		
CA-MRN-236	1	0	0.0%						
CA-MRN-242	4	0	0.0%						
CA-MRN-271	19	1	5.2%				1		
CA-MRN-274	1	0	0.0%						
CA-MRN-280	1	0	0.0%						
CA-MRN-298	308	26	8.4%	15	2	2		7	
CA-MRN-307	22	1	4.5%	1					
CA-MRN-308	9	1	11.1%		1				
CA-MRN-389	1	0	0.0%						
CA-MRN-392	1	0	0.0%						
CA-MRN-394	12	2	16.6%			1	1		
Subtotals	698	59	8.5%	32	3	8	7	8	1
Beach-Collected	423	15	3.5%	6	1		3	5	
Totals	1121	74	6.6%	38	4	8	10	13	1

indicate that the high percentage of deer-decorated porcelain fragments may not be a coincidence, and that these sherds were collected, or perhaps produced, because of this significance. In addition, the ceramic vessel depicted on one sherd would likely have been evocative of the baskets that were such an important part of California Indians' material culture, or it might have evoked the porcelain vessels themselves. Only the various mythical beasts, including dragons, and the flying horses would not have represented creatures or objects with direct parallel in the landscape, and though there is no ethnographic or oral evidence, even in these cases they may have had parallels from Tamal mythology.

Results of the decorative motif analysis indicate that overall, with just 8.5% of the porcelain assemblage displaying animal and other distinctive decoration, the design of individual pieces may not have been the primary motivation for collection of porcelain vessels and fragments. Given the designs that were chosen, however, specific decorative motifs almost certainly played a role in the selection and modification of specific, individual fragments.

Porcelain Modification Analysis

Finally, I carefully examined the ceramic assemblage for evidence of California Indian reuse, retouch, use-wear, and other modification. Some indigenous modification was easily identified, for example some sherds were clearly modified as probable bead blanks or pendant blanks, and there were a number of dish and bowl bases that were chipped and ground into circular medallions (which are now broken). Other signs of retouch or modification of porcelain fragments into indigenous stone-tool forms such as unifacial or bifacial tools were not as easily

distinguished from natural modification because the porcelain does not fracture like obsidian or other raw materials that leave characteristic signs. In some cases I could not determine whether broken edges were natural or the result of human activity, and in those cases I did not include them in the overall counts of modified porcelain sherds.

After careful examination of all 698 porcelain sherds from the 15 archaeological sites, I identified 95 sherds as modified, which (including refit groups) represent 44 individual, indigenously-manufactured objects. This equates to 13.6% of the porcelain from archaeological contexts (Table 8.9). A total of 30 additional porcelain fragments may have been modified, but without being able to distinguish the modification from natural alteration, I chose not to include these sherds in my overall counts. The remaining 573 showed no signs of deliberate modification that I could identify. As expected, none of the beach-collected porcelain sherds were culturally modified.

A number of different artifact forms are represented by the modified porcelain fragments (Table 8.10). These include three possible bead blanks—porcelain fragments that have been chipped and shaped to resemble *Saxidomus* clamshell disk bead blanks—recovered from CA-MRN-216 and CA-MRN-298 (Figure 8.19). The painted designs on the three possible bead blanks do not have any distinctive decorative motifs. According to the original field notes, at least three additional porcelain bead blanks were identified by original researchers, but these were lost from the museum collection at some time in the past.

The modified porcelain also includes four possible pendant blanks—chipped and ground porcelain fragments shaped like traditional *Haliotis* pendants, but which lack a hole for stringing or are otherwise unfinished. These artifacts were also recovered from the Limantour Spit sites, CA-MRN-216 and CA-MRN-298. Two pendant blanks are fully formed (see Figure 8.19), while two others are possible pendant blanks in the process of being shaped. One of the pendant blanks is shaped around four vertical blue dots, which were obviously chosen as the subject for the pendant, while the other has a portion of a white deer design—it is unknown if that design was deliberately chosen.

Table 8.9. Number of modified porcelain fragments from each site.

<u>Site</u>	<u>No. of Sherds</u>	<u>No. of Modified Sherds</u>	<u>No. of Possibly Modified Sherds</u>
CA-MRN-216	239	24	8
CA-MRN-230	2	0	0
CA-MRN-232	74	10	2
CA-MRN-235	4	1	0
CA-MRN-236	1	0	0
CA-MRN-242	4	0	1
CA-MRN-271	19	0	3
CA-MRN-274	1	0	0
CA-MRN-280	1	0	0
CA-MRN-298	308	54	14
CA-MRN-307	22	4	1
CA-MRN-308	9	0	0
CA-MRN-389	1	0	0
CA-MRN-392	1	0	0
CA-MRN-394	12	2	1
Total	698	95	30

Table 8.10. Artifact types and numbers represented by modified porcelain fragments, divided into definite modified artifacts and possible modified artifacts. The numbers reflect individual modified artifacts, many of which are composed of several refit porcelain fragments.

<u>Artifact Type</u>	<u>Definite</u>	<u>Possible</u>
Bead Blank	3	0
Biface	14	6
Medallion	7	0
Pendant Blank	4	1
Uniface	7	8
Unknown (Ground Edges)	9	6
Total	44	21

Figure 8.19. Some of the porcelain fragments excavated at Point Reyes that were modified into indigenous artifact types, compared to native forms. At left, abalone (*Haliotis* sp.) pendants; at right, clamshell (*Saxidomus nuttalli*) disk bead blanks, with a whole, holed *Saxidomus nuttalli* shell in the center. For scale, porcelain bead blank at center, bottom is 1 cm in diameter. Photo by Carola DeRooy, courtesy of Point Reyes National Seashore Museum.



Another distinctive artifact form I term a “medallion,” and I identified at least seven sherds or refit groups of sherds that represent this artifact type (see Figure 8.18). In addition, a number of the artifacts categorized as “unknown” have ground edges that look like they could be portions of medallions. These artifacts were recovered from CA-MRN-216 and CA-MRN-298 on Limantour Spit, as well as from CA-MRN-232 and a single example from CA-MRN-235/301. These objects are made from the base of a bowl or dish, which has had the center medallion carefully chipped out and the edges ground smooth. All are now broken or incomplete. The objects’ purpose or function is unknown. In most cases, the medallion has a distinctive decorative motif, such as deer, bird, or water fowl. One artifact excavated from CA-MRN-232 has a very distinctive ceramic vessel as its decorative motif. A number of the artifacts are now in refit groups with large numbers of sherds, and the pattern of breakage suggests the medallions may have been deliberately broken (Shangraw and Von der Porten 1981:70; Von der Porten 1972:16). Regardless of their purpose, it is obvious that most of these artifacts were deliberately made from Kraak porcelain dishes and bowls with recognizable center medallion design motifs.

The majority of the modified porcelain artifacts show simple unifacial or bifacial retouch, although none resemble finished, formal tools (Figure 8.20). These objects have had small flakes removed from the edges, or have had the edges lightly chipped. In a few noteworthy cases, the flaked porcelain fragments can be refit to other, non-modified sherds, indicating the ceramic vessel was either deliberately broken to utilize the fragments as raw materials, or the fragments were modified after the vessel had been broken during other use.

Spatial distribution of modified objects, specifically, revealed some distinctive patterns at three of the four sites for which data exist. At CA-MRN-232 modified objects do not seem to be associated with any artifact categories in any discernable pattern. At CA-MRN-307, the sherds modified as possible bifaces or uniface also do not appear in any patterns, however, the single edge-ground sherd was located within the highest density of craft production objects, and may have been in the process of being fashioned into some kind of decorative object.

At CA-MRN-216, the single porcelain possible bead blank was recovered from the northeast part of the site, and not in the primary shell bead production area in the site’s southwest quadrant. Nonetheless, the bead blank was found in association with a number of holed shells and flaked stone drills, as well as bird bone tubes, and may have been part of a secondary craft production area. The possible bifaces and four uniface were recovered in all quadrants of the site except the southeast (where the burials were located), although only one had noteworthy association with other artifacts. It was recovered near a cluster of lithic production objects, as well as close to several obsidian projectile points, and may have been part of a small lithic production activity area. The remaining modified artifacts from CA-MRN-216 are in close proximity to a number of different artifact types, but no patterns emerge from the associations.

Examining the spatial distribution of modified porcelain fragments at CA-MRN-298E, a possible bead blank and possible pendant blank were recovered from the southern part of the site, near a cluster of ornaments, including a *Haliotis* pendant, two clamshell disk beads, and two bird bone tubes, as well as moderate concentrations of food processing and craft production-related artifacts. In addition, a large refit group that comprises a possible medallion were all recovered in the western part of the site, and show a strong association with a concentration of symbolic objects and are near highest density of craft production objects. A second large refit group that may also have been part of a medallion was recovered in the south and eastern parts of the site, near another concentration of craft production objects.

Figure 8.20. Two views of an example of a bifacially-worked porcelain fragment, from CA-MRN-298 (catalog no. PORE 864). Photo by Sara Brooks, courtesy of Point Reyes National Seashore Museum.



Finally, at CA-MRN-298W, several modified porcelain fragments, including a possible pendant blank and an unknown, ground sherd were recovered from the western portion of the site, which was likely a shell bead production area in the site. In addition, two refit groups that are possibly part of medallions were recovered in central and eastern parts of the site, near a concentration of craft production-related artifacts, as well as hunting and fishing-related objects and ornaments. There are no compelling associations with any of these concentrations, however.

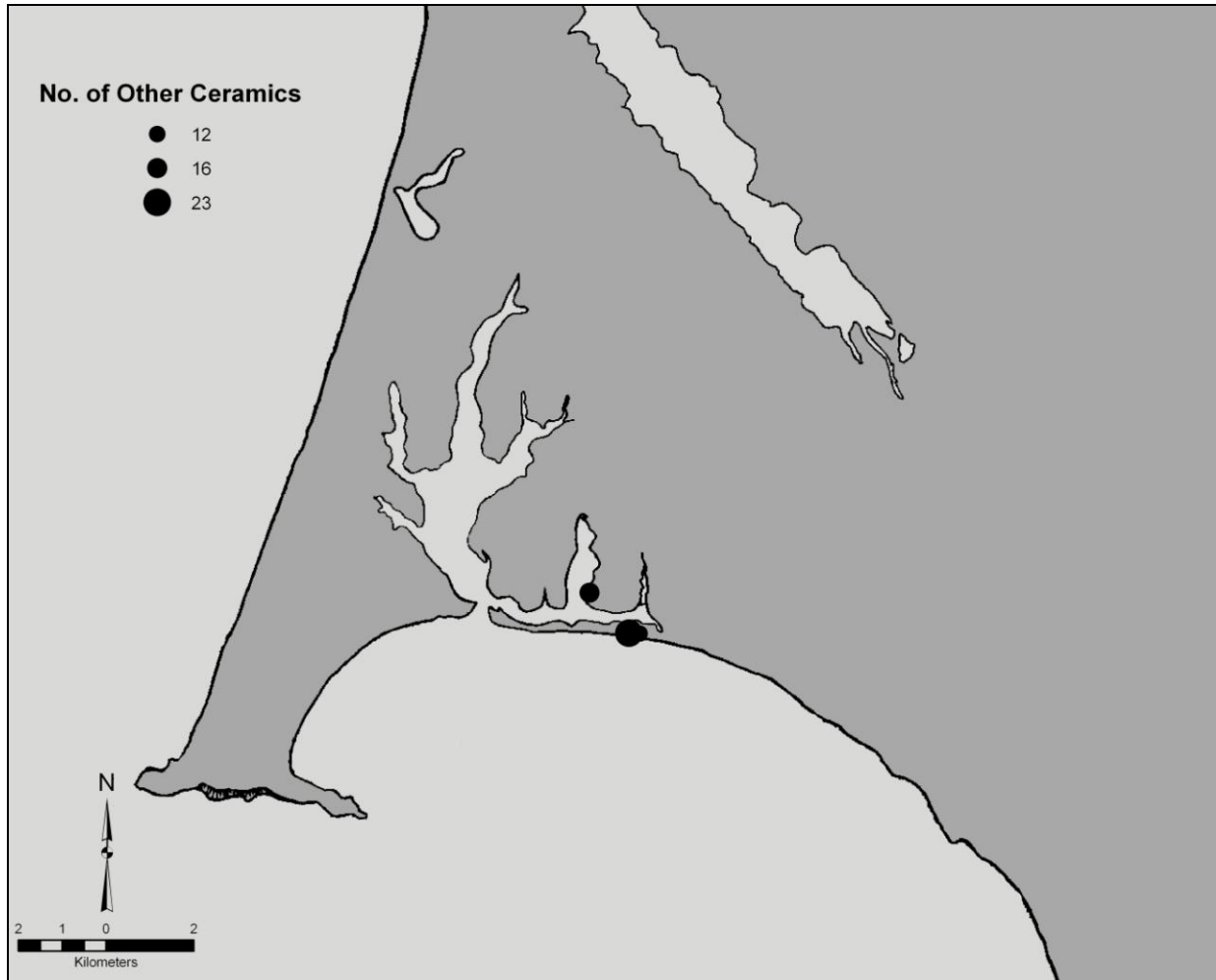
The majority of sherds, 82.1%, showed no modification. While this could support the notion that the vessels were used for food preparation and serving, and were discarded as they broke, however, evidence from spatial analysis of artifact distributions does not support this notion. This result could also support the idea that the Tamal people collected the porcelain fragments for their own sake, that they were valued as individual objects, and not because of their perceived value as a raw material. Possibly they were valued and collected because of their symbolic meaning. Although this result does not rule out the hypothesis that the porcelain fragments were collected as simple curiosities, I think the sheer volume of porcelain recovered from the sites makes that unlikely.

Another, more likely, explanation of the modification analysis results, however, is that the large numbers of unmodified porcelain fragments are by-products of “processing” activities I discussed earlier. Especially at the two Limantour Spit sites, where researchers recovered the largest volumes of porcelain, spatial analysis I presented in Chapter Seven suggests that porcelain fragments were concentrated in distinct areas of the site that were spatially segregated from shell bead production activity areas. Combined with the refit analysis I presented above, which showed that most refit groups clustered in those areas, and the modification analysis, this suggests the possibility that Tamal individuals living and working on Limantour Spit actively broke apart whole porcelain vessels in order to separate distinctive sherds for modification into indigenous artifact types. These may have been used for bead and pendant blanks, medallions, or unifacial or bifacial tools. Another alternative, however, is that Tamal individuals who were processing porcelain vessels were looking for distinctive fragments that could be used for other purposes, for example as hunting charms or amulets for shaman’s kits, much the way that distinctive manuports such as large crystals, fossilized shark teeth, and fossil whalebone fragments may have been used (I discuss this possibility in more detail in Chapter Nine). In any case, the large numbers of broken, unmodified porcelain fragments may represent the by-products of breaking apart porcelain vessels in order to select specific fragments for reuse in traditional ways.

Other Ceramics Analysis

In addition to analyzing the blue-and-white underglaze Chinese porcelain found at *tamálhúye*, I also examined other ceramic fragments found at four sites that likely have a sixteenth-century origin (Figure 8.21). Previous researchers recovered at least 53 other ceramic sherds from CA-MRN-216, CA-MRN-298, and CA-MRN-307 during investigations from 1949-1973. Von der Porten (1968) discusses these finds in detail. Because the sample size for the non-porcelain ceramics is relatively small compared to the previously-discussed porcelain, and in all cases the sherds are undecorated and unmodified so they cannot be included in my design motif or modification analysis presented in this chapter, the most pertinent data for my study are those related to the spatial analysis presented in Chapter Seven. Nonetheless, I discuss the non-porcelain ceramic assemblage below, and I summarize refit patterns at each of the sites.

Figure 8.21. Approximate locations of three sites on the Point Reyes Peninsula with non-porcelain ceramics from the *San Agustín* shipwreck, shown as a function of the number of recovered artifacts.



The largest category of non-porcelain sixteenth-century ceramic found on the Point Reyes Peninsula includes several types of both glazed and unglazed coarse earthenware ceramics, which Von der Porten (1968) refers to as terra cotta ware. In most cases, these fragments represent utilitarian wares or large storage vessels. The two sites on Limantour Spit (CA-MRN-216 and CA-MRN-298) yielded all of these ceramic fragments—at least 23 individual fragments representing a minimum of 12 vessels were found at CA-MRN-298, while at least 12 fragments representing at least eight vessels were recovered from CA-MRN-216. Many of these sherds can be refit to other sherds found on-site. Interestingly, two refit sherds from CA-MRN-216 can be refit to another two-sherd refit group from CA-MRN-298, and other sherds possibly from the same vessel are also found at both sites (Von der Porten 1968:32). This indicates some movement of broken ceramic vessel fragments between sites.

In addition to coarse earthenware, Meighan recovered 16 fragments from a single large stoneware vessel from CA-MRN-307 during University of California investigations from 1949-1951 (Meighan 2002; Meighan and Heizer 1952). These fragments and the vessel they represent are unique to the collection of materials recovered from the Point Reyes Peninsula. In addition,

and most interestingly, based on the depth of recovery of the stoneware fragments compared to the depth of recovery of porcelain fragments, Meighan attributes this vessel to a pre-1595 event, although he does not specifically attribute the find to Drake. Other researchers, however, do not share this opinion, and suggest the relatively deeper depth of these objects is due to their large size and weight (Von der Porten 1968:40-42).

Iron Fastener Observations

Other than porcelain, the second most abundant sixteenth-century introduced object type recovered from sites at *tamál-húye* are iron ship's fasteners than can be attributed to the *San Agustín* shipwreck. In most cases these artifacts are in very poor shape today and have deteriorated significantly since they were excavated. This makes verifying their date and origin difficult, and so in all cases I rely on the original researchers' conclusions about whether individual artifacts date to the sixteenth-century or to the nineteenth or twentieth century (Beardsley 1941e, 1946a, 1946c, 1954a; Heizer 1941; Meighan 1950a, 1950b, 1950d, 2002; Meighan and Heizer 1952; Treganza and King 1968; Von der Porten 1965). Even with objects in good shape, however, it is sometimes difficult to differentiate whether hand-forged fasteners were produced in the sixteenth or nineteenth centuries, leading various researchers to sometimes arrive at different conclusions. I have assembled my sample of sixteenth-century iron fasteners based on first-hand observation combined with both published accounts and unpublished notes about the artifacts. Based on my research, 83 iron fasteners that previous researchers attributed to a sixteenth-century origin have been found at a total of eight sites on the Point Reyes Peninsula (Figure 8.22 and Table 8.11).

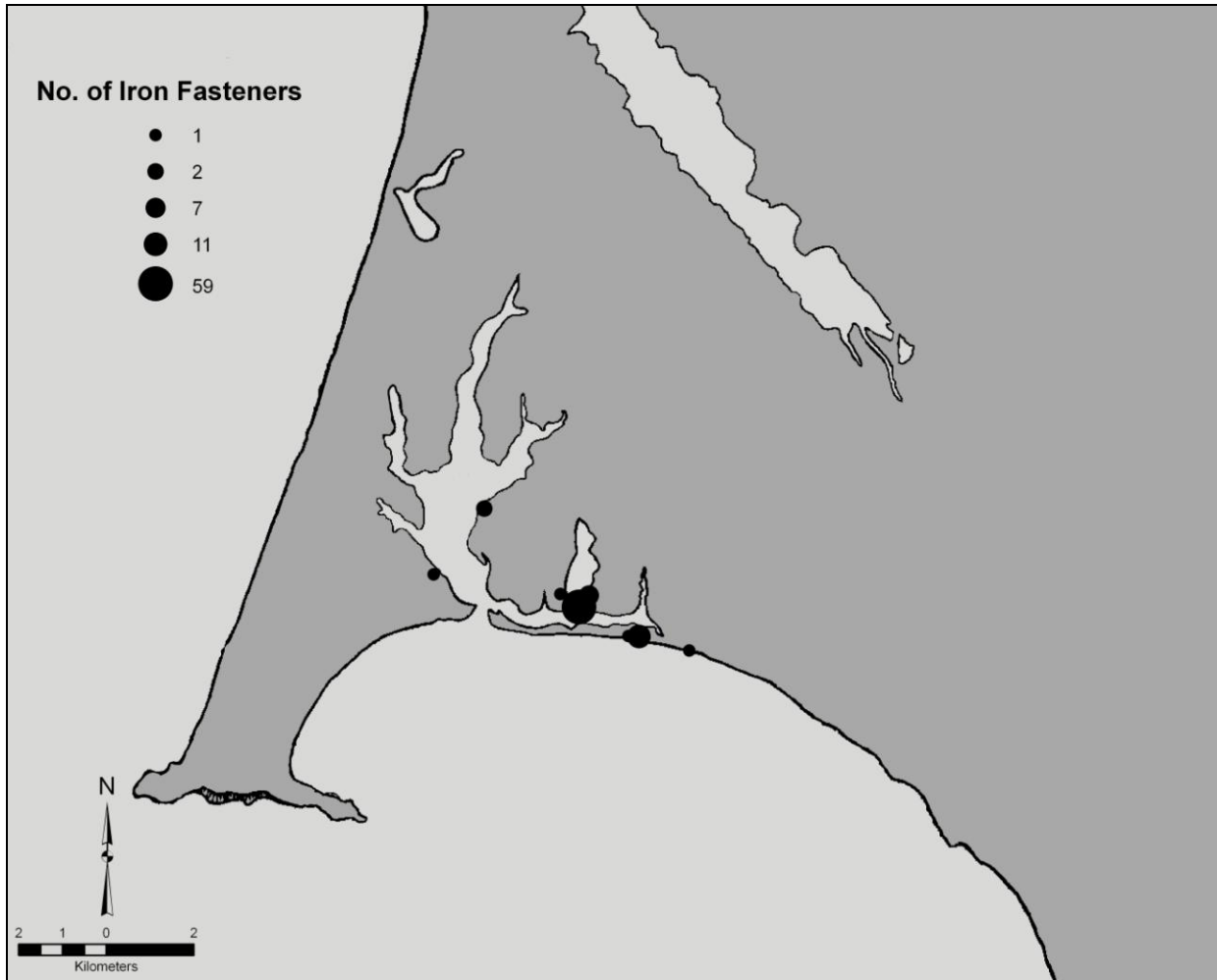
For my research questions, the most relevant data about the iron fasteners are their spatial distribution within each site, which I discuss in Chapter Seven. There is limited information that can be discerned from the artifacts themselves, especially given their present condition. As discussed by previous researchers, many of the fasteners are bent into "J" shapes, likely as a result of the timbers they fastened being wrenched apart during the shipwreck's disintegration. Other than this natural modification, there are no other indications from the artifacts themselves that they were modified or clues to how they were used.

The distribution of iron fasteners among the sites, with the large majority from a single site, CA-MRN-232, suggests that the objects were probably salvaged from shipwreck elements and fragments that washed ashore as the *San Agustín* disintegrated, possibly over a long period of time. Depending on the location of the shipwreck and the mouth to Drakes Estero in the late-sixteenth century (the estero mouth has migrated several hundred meters east and west over a period of years, see Chapter Three), the inhabitants of CA-MRN-232 were possibly in the best position to collect flotsam from the wreck as it washed ashore, with smaller numbers of shipwreck elements and fragments available to inhabitants of other settlements farther away. Given this rationale, however, it is somewhat surprising that more iron fasteners were not recovered from the Limantour Spit sites, as the inhabitants of CA-MRN-216 and CA-MRN-298 may also have been in a good position to collect shipwreck debris.

Discussion of Other Objects

Over the decades, a number of objects have been recovered from various sites around *tamál-húye* that previous researchers have possibly attributed to the sixteenth-century

Figure 8.22. Approximate locations of the eight sites on the Point Reyes Peninsula with sixteenth-century iron fasteners from the *San Agustín* shipwreck, shown as a function of the number of recovered artifacts.



encounters. Most of these are objects, such as asphaltum or wax, can also be explained by more likely origins—asphaltum also has natural sources in the region, while wax was most likely introduced as part of World War II-era practice ordinance. There are, however, two objects described by previous researchers that warrant mention because of their uniqueness.

The first object was recovered from CA-MRN-235/301 by Aubrey Neasham, a National Park Service, and later State of California, historian, during a 1951-1952 excavation in partnership with the Drake Navigators Guild. Neasham excavated at least five 5 ft. by 5 ft. (1.5 m by 1.5 m) units, but there are no extant records of this excavation (Von der Porten 1963:25). Artifacts from the excavation are curated at the PAHMA, and include a single conical brass tip, about 5 cm long and about 2 cm wide at the base, constructed from a single small sheet of brass and twisted into a cone. At least one previous researcher (Von der Porten 1963:25) has suggested the artifact may have been introduced during one of the sixteenth-century European encounters at *tamál-húye*, and that it was re-purposed for indigenous use as a staff tip or other ornamental object. I agree this is a possibility, although without any provenience or other

Table 8.11. Sixteenth-century iron ship's fasteners recovered from archaeological sites.

<u>Site</u>	<u>Iron Fasteners (n)</u>
CA-MRN-216	11
CA-MRN-230	0
CA-MRN-232	59
CA-MRN-235	1
CA-MRN-236	1*
CA-MRN-242	2
CA-MRN-271	0
CA-MRN-274	0
CA-MRN-280	0
CA-MRN-298	1
CA-MRN-307	7
CA-MRN-308	1**
CA-MRN-389	0
CA-MRN-392	0
CA-MRN-394	0
Total	83
*Heizer (1941) lists a single spike, but none in PAHMA collection	
** Treganza (1959) lists a single spike, but none in PRNSM collection	

contextual data, it is difficult to be certain. It is possible that metallurgical analysis of the artifact could give a better indication of its age and origin.

The second object was also recovered at CA-MRN-235/301 by the Drake Navigators Guild during later investigations in 1958-1959 (Von der Porten 1963:25-29). The artifact is a small iron object with a pin attached in the center, which Von der Porten (1963) suggested could be a compass needle, possibly from the sixteenth-century European visitors. Unfortunately, this metal object is not part of the collection at either the PAHMA nor the PRNSM and therefore is not available for re-study, so it is impossible to verify the possible origin. Because there is no context and associations for either object from CA-MRN-235/301, no conclusions can be drawn about their presence in the site.

CONCLUSIONS

The results of my examination of the sixteenth-century introduced artifacts recovered from sites around *tamál-húye* suggest that the Tamal people incorporated material from the *San Agustín* into their cultural practices in complex ways that cannot be simply characterized as either “utilitarian” or “symbolic.” Results indicate that in general, vessel ware-type and vessel form were not important variables that led to the Tamal differentially collecting particular porcelain vessels. My refit analysis suggests that whole vessels were probably collected more frequently than individual broken fragments, although there are a number of clear cases where Tamal individuals collected porcelain fragments from the beach, and broken porcelain fragments were exchanged between loci or sites. This would indicate that a possible “utilitarian” function was not the sole motivating factor for collecting porcelain vessels. In fact, a strong non-association of porcelain fragments and porcelain refit groups with food processing artifacts observed in Chapter Seven indicates that porcelain vessels were likely not primarily integrated

into native foodways. Decorative motifs may have played a role in motivating the Tamal to collect and reuse specific porcelain vessels—there are many examples that suggest specific porcelain vessels and fragments were used and modified because of these decorative motifs. Ultimately, evidence suggests that one of the reasons that Tamal villagers collected porcelain vessels from the *San Agustín* is for use as a raw material for utilitarian objects (unifacial and bifacial tools), decorative items (beads, pendants, and medallions) or unmodified symbolic items (hunting charms), and that the majority of unmodified, broken porcelain fragments may represent the by-products of that process.

Examining the material evidence of the sixteenth-century encounters at *tamál-húye* through multiple lenses—focusing on vessel ware and form, refits, decoration, and modification—demonstrates that these items held multiple meanings for the Tamal villagers who salvaged them from the *San Agustín* shipwreck. By combining evidence from the artifacts themselves with the artifacts' spatial distributions within each site, and by considering historical, ethnographic and oral evidence that allows us to think about Tamal world view, we have the best chance at teasing apart the complex and nuanced ways in which the Tamal inhabitants of the Point Reyes Peninsula recontextualized material culture from their sixteenth-century encounters with European visitors. In Chapter Nine, I draw together these multiple lines of evidence to address my original research questions.

CHAPTER NINE

CONCLUSIONS

This dissertation has explored a pair of sixteenth-century encounters between California Indians and European voyagers in *tamál-húye*, examining the intercultural interactions using an approach grounded in historical anthropology. By combining multiple lines of evidence from the archaeological record, historical narratives, ethnographic accounts, and oral traditions, I have investigated how the Tamal population of the Point Reyes Peninsula incorporated sixteenth-century introduced objects into their cultural practices and, using a theoretical framework based on an event-oriented archaeology, I have examined whether the encounters and subsequent recontextualization of material goods had long-term implications for Tamal culture change and/or continuity.

In this concluding chapter, I summarize the ways in which the Tamal people likely recontextualized the sixteenth-century introduced objects based on my analysis of the archaeological remains recovered by previous researchers from the 1940s to 1970s, and by combining it with additional lines of evidence. Using the perspective of an event-based framework to address the question of whether the sixteenth-century encounters at *tamál-húye* constituted an “event” in the history of the Tamal people, I also synthesize data available to assess the question of the long-term implications of the encounters. Finally, I offer directions for future research that would help clarify and provide additional evidence to support my findings.

TAMAL RECONTEXTUALIZATION OF SIXTEENTH-CENTURY INTRODUCED OBJECTS

Archaeological Evidence

I presented archaeological evidence of how the Tamal incorporated material remains from the sixteenth-century encounters at *tamál-húye* into their cultural practices in Chapters Seven and Eight. Results from the spatial analysis of artifact distributions at the six sites I reconstructed within a Geographic Information System (GIS) framework offer some clues about how Tamal inhabitants of the Point Reyes Peninsula salvaged and used objects from the *San Agustín* shipwreck. To summarize, spatial data indicate that sixteenth-century Chinese porcelain distributions are often concentrated, discrete, and spatially-segregated from primary craft production activity areas (e.g. lithic, bead producing places). They are most often associated with high densities of hunting and fishing-related objects, mostly obsidian projectile points and point fragments, and, to a lesser extent, with objects I categorized as “symbolic,” including charmstones and other distinctive manuports (unmodified crystals, fossilized shark teeth, fragments of fossilized whale bone, etc.). This pattern was most evident at CA-MRN-216 and the two loci of CA-MRN-298—the sites and site loci with the highest numbers of sixteenth-century introduced objects. Just as important as the associated artifact distributions are the clear *non*-associations evident at the sites between artifact distributions. Important non-associations include the observation that porcelain and other sixteenth-century introduced object distributions are spatially-segregated from the primary shell bead production areas at CA-MRN-216 and both loci of CA-MRN-298. Although a number of individual porcelain fragments were recovered from the shell bead production areas, the largest concentrations of porcelain are clearly separated from those areas. Results of the spatial analysis also demonstrate a lack of association between

sixteenth-century porcelain distributions and indigenously-manufactured objects related to food processing, such as mortars and pestles and flaked stone bifaces. This observation has important implications for evaluating alternative hypotheses for how the Tamal utilized porcelain tablewares and fragments (see below).

In addition to analyzing distributions of porcelain and other sixteenth-century ceramics, comparing the distribution of iron ship's fasteners (spikes) to indigenously-manufactured artifact distributions offers clues about how the Tamal recontextualized those items. Although the data are not as abundant, evidence from several sites indicates that individual iron fasteners were spatially associated with objects, such as worked bone and worked antler flakers and wedges, related to production of both flaked and ground stone objects and craft production, such as wood-working and basketry-making. This raises the possibility that the iron fasteners were used in a "utilitarian" way for the manufacture of various traditional Tamal tools and objects. The distribution of iron fasteners at CA-MRN-232, which had the largest collection of spikes, also does not discount Heizer and Meighan's observations that the fasteners may have been incidentally deposited from timbers and planks used in the construction of shelters (Meighan 1950b).

Detailed examination of sixteenth-century introduced objects, especially Chinese porcelain, also gives a great deal of information about how the objects were used and perceived. Examining the complete assemblage of sixteenth-century porcelain recovered from archaeological contexts, analyzing the individual fragments from a number of different perspectives, and comparing the results to the assemblage of beach-collected sixteenth-century porcelain indicates the complexity involved in evaluating how the Tamal "used" the porcelain fragments. Results of the porcelain study indicate that the Tamal did not have a strong preference for any particular porcelain ware (Kraak, late-Ming provincial ware, or Zhangzhou) or vessel form (flatware or hollowware). I also found that a large percentage of sherds that could be refit together (refit groups), either directly or indirectly, were present at many of the archaeological sites, but also discovered substantial numbers of non-refit porcelain fragments. While examining both distinctive decorative motifs found on individual porcelain fragments and porcelain that had been modified into other, traditional artifact types, I found that while neither of these characteristics dominated the assemblage, there were enough unique examples of both that they clearly influenced the ways the Tamal people perceived and used the porcelain vessels and fragments.

To summarize, the Tamal utilized Chinese porcelain salvaged from the *San Agustín* shipwreck in a variety of ways. Archaeological evidence indicates that the Tamal used porcelain fragments as raw materials for at least four different types of different objects. First, the porcelain assemblage includes a number of fragments that have been modified using lithic reduction techniques into possible unifacial and bifacial tools. I identified 21 unifaces and bifaces in the porcelain assemblage, although none have been reduced into formal blades or projectile points, and there are an additional 14 that I could not identify with certainty. Although some of objects are comprised of refit groups that include more than one porcelain fragment, the overall percentage of the porcelain assemblage that has been modified as unifacial and bifacial tools is about 5%.

Second, Tamal villagers also used porcelain fragments as a raw material similar to local shellfish such as *Saxidomus* and *Haliotis*, which are in found in abundance at sites around *tamá-l-húye*, for decorative objects like beads and pendants. Previous researchers did not recover completed beads or pendants during their excavations, but they found a number of porcelain

fragments that had been ground into bead and pendant blanks, especially at the Limantour Spit sites (CA-MRN-216 and CA-MRN-298). Third, the Tamal modified a number of porcelain vessels by removing the sides and grinding the edges of the center portion of the plate or bowl bottom into a smooth, circular shape. Previous researchers identified several large porcelain fragments that had been chipped and ground into circular medallions. In all cases, these artifacts display a distinctive decorative motif that is probably the reason they were chosen. I identified a number of other artifacts also possibly ground into those shapes. In total, I identified 23 porcelain fragments and refit groups that were fashioned into decorative objects (bead and pendant blanks, medallions), and another seven that were possibly modified into similar shapes. Although several of these refit groups included large numbers of porcelain sherds, the overall percentage of sherds modified into bead and pendant blanks is about 2%, while about 2% were formed into circular medallions.

Finally, there are at least four instances of beach-collected porcelain fragments in the archaeological sites that were clearly recovered by Tamal individuals, possibly years or decades, after the *San Agustín* shipwreck. There is also the possibility that some unmodified sherds, especially those with distinctive decorative motifs, may have been produced and valued for their own sake, possibly as charms or amulets to bring good luck in hunting and other activities. The strong spatial correlation between porcelain fragments and flaked stone projectile points supports this notion, which I discuss in more detail below.

Archaeological evidence suggests that in most cases the Tamal favored whole porcelain vessels over individual sherds, although there are clear cases of individual fragments that were collected from the beach and brought into the village sites. Based on the large number of unmodified porcelain fragments present, especially at CA-MRN-216 and both loci of CA-MRN-298, however, in most cases it seems that porcelain whole vessels were collected and processed at these sites. The majority of the porcelain assemblage, unmodified with no distinctive decorative motifs visible, probably represents the discarded by-products of the process of choosing, sorting, breaking apart, and modifying the porcelain into traditional Tamal objects.

Revisiting the hypotheses I identified in Chapter One in light of the evidence presented in this dissertation, it is impossible to say that the Tamal people living in *tamál-húye* utilized the porcelain and other sixteenth-century ceramics from the *San Agustín* shipwreck as either “utilitarian” or “symbolic” objects. Instead, they seem to have valued the goods in ways that were a combination of both. The most common conclusion from previous researchers suggested that the Tamal incorporated Chinese porcelain from the *San Agustín* in a strictly utilitarian way, that the Tamal used porcelain plates and bowls for food preparation, serving, and as storage containers, which they discarded as they broke (e.g. Heizer 1941). Although multiple fragments of individual ceramic vessels were present at each archaeological site in the form of refit groups, indicating a preference for whole vessels, the ratio of porcelain bowls (hollowware) to dishes (flatware) in the archaeological assemblage is similar to the ratio found in the beach-collected assemblage (a hypothetical random selection of porcelain vessels from the *San Agustín* shipwreck). This indicates to me that the Tamal did not strongly prefer one particular vessel form over another, and this may indicate that using porcelain vessels as containers for food preparation, serving, and storage was not a priority for the Tamal. In addition, there is a strong non-association between porcelain and food processing artifact distributions that does not support the idea that the Tamal salvaged porcelain tablewares from the *San Agustín* for use in native foodways.

A different hypothesis I explored in my study is that the Tamal people living on the Point Reyes Peninsula did not value porcelain and other sixteenth-century introduced objects from the *San Agustín* primarily because of their utilitarian value in native foodways, or as raw materials for the equivalent of flaked stone tools or worked shell ornaments, but because the objects may have had inherent meaning by themselves, possibly as symbolic reminders of the encounters with Drake in 1579 or Cermeño and the *San Agustín* shipwreck in 1595 (Lightfoot and Simmons 1998). This premise is based on the possibility that the Tamal population interpreted the encounter with Drake and his crew in supernatural or ceremonial terms, and in Chapter Three I used ethnographic evidence and oral traditions to describe the Coast Miwok-speaking village community's world view, or cosmology, within which this interpretation can be contextualized. Examining refit patterns, I found several examples of porcelain fragments from the same vessels recovered at different sites (inter-site refit groups), indicating some level of exchange of individual porcelain fragments themselves. I also found some evidence of symbolic value by examining the decorative elements of the porcelain fragments themselves, where I found the number of culturally-recognized symbols and designs, in particular white deer motifs, was slightly higher than that found in the beach-collected assemblage. I also noted that most of the "medallions" were chosen because of their decorative motifs. Porcelain fragments with animals or other distinctive designs represent 8.5% of the overall porcelain assemblage, indicating that decoration at least played a role in the selection of individual porcelain fragments for re-use in a variety of ways. In addition, my GIS study indicates sixteenth-century introduced objects were sometimes found in association with "symbolic" objects associated with ceremonial or ritual practice. At several sites, the distributions of porcelain and distributions of "symbolic" objects were associated. More frequently, however, I observed a spatial association between porcelain and objects related to hunting and fishing, in particular obsidian projectile points and fragments. This finding is particularly interesting when evaluated in the context of ethnographic evidence for extensive use of both natural and manufactured objects as hunting charms, which I discuss in more detail below.

Archaeological evidence indicates that in some cases, the Tamal perceived porcelain vessels from the *San Agustín* as a raw material, similar to obsidian, chert, or shell, that could be modified through various reduction techniques into utilitarian objects such as bifacial tools and projectile points, or beads and pendants that had decorative, monetary, or symbolic value, for example as regalia for costumes used during dances and ceremonies. My GIS analysis, however, did not indicate a strong association between porcelain fragments and objects related to lithic production activities (flaked stone tools in various stages of production, lithic debitage, hammerstones, and worked bone or antler flakers) at any of the sites. As I discussed above, there was a tendency for porcelain to be associated with finished and broken projectile points. However, I did not categorize completed projectile points as objects related to lithic production, but instead associated them with hunting activities. In addition, at the sites and site loci that had clearly identifiable shell bead production areas (CA-MRN-216, CA-MRN-298E, and CA-MRN-298W), the porcelain distributions were distinctly separate from those areas. Because the porcelain distributions were concentrated in their own spatially-segregated areas at those sites, however, it is possible the porcelain formed its own activity area, possibly related to processing porcelain fragments for use in a variety of forms. The rest of the undecorated and unmodified majority of porcelain fragments may be discarded by-products from the production of these different traditional, indigenously-manufactured artifact types.

Turning to iron ship's fasteners, the second-largest category of sixteenth-century introduced object found on the Point Reyes Peninsula, spatial analysis of artifact distributions indicate iron spikes were often spatially-associated with indigenously-manufactured worked bone or antler tools, which are often associated with craft production or lithic production (both flaked stone and ground stone). Evidence from my GIS analysis presented in Chapter Seven indicates that at several sites, in particular the site with the highest concentration of iron fasteners (CA-MRN-232), indicates that they were found spatially associated with worked bone and antler artifacts that previous researchers identified as wedges and flakers. There was also a possible association in several cases with ground stone objects, such as net weights, indicating that the iron fasteners may have been used in the manufacture of such objects. Unfortunately, I could not evaluate the presence of use-wear on any of the iron fasteners because of their poor state of preservation. Previous researchers, however, did not note any obvious signs of re-use.

Previous researchers have also suggested that iron fasteners were not actually re-used at all, but that timbers and planks from the shipwreck included the fasteners that were used for shelter construction, and the fasteners were secondarily-deposited as the timbers and planks deteriorated. Meighan (1950b) speculated that the pattern of iron fasteners recovered from CA-MRN-232 supported the idea that they were articulated with planks used in shelter construction, and my GIS analysis neither supports nor refutes this idea. Most of the iron fasteners at CA-MRN-232 are distributed across the central and southern portion of the site, and this could indicate association with house structures within the village.

Evidence from my GIS analysis does not support the premise that iron fasteners were associated with "symbolic" objects from the sites. This suggests to me that the Tamal likely perceived and utilized the iron fasteners from the *San Agustín* differently than the porcelain, and that they primarily valued the iron objects for their utilitarian value.

In summary, my results suggest the Tamal people incorporated material culture from the *San Agustín* shipwreck in complex ways. Whole porcelain vessels may have been used in native foodways, but several lines of evidence suggest this was probably not the case. Some porcelain fragments were modified into traditional, indigenously-manufactured artifacts such as bead blanks, pendants, medallions, bifaces, or other objects. The large quantity of unmodified and indistinctive porcelain fragments may represent discarded by-products from the production of these and other objects. Spatial associations between porcelain and lithic projectile points and symbolic objects, such as charmstones, suggests that some ceramic fragments may have been valued as hunting charms, which were ubiquitous objects for the Tamal people, and which took many different forms. Overall, the ways in which the Tamal recontextualized sixteenth-century introduced objects is not easily identified as either utilitarian or symbolic, but was likely a complex combination of the two.

Ethnographic Evidence

Examining the possible use of introduced objects in symbolic contexts is not easily tested archaeologically. The introduced artifacts were not included in burials, and there are no material signatures evident on the artifacts themselves that suggest they held special meaning or were used ritually or ceremonially. My GIS analysis indicates that concentrations of sixteenth-century porcelain fragments were often found spatially associated with concentrations of objects related to hunting and fishing, primarily lithic projectile points and point fragments. While I acknowledge the issues inherent in using ethnographic data to inform archaeological

interpretations, a clue to this association may be found in the ethnographic literature from Coast Miwok-speaking individuals (Collier and Thalman 1996). Coast Miwok-speaking individuals believed a wide variety of objects could provide luck in different endeavors, especially in hunting. Some charms or amulets used to bring luck were natural objects, such as sand dollars (*tcúluluk*), old abalone shells found on the beach, or natural stones with unusual shapes (Collier and Thalman 1996:460-462). Tom Smith, a Coast Miwok-speaking elder interviewed by Isabel Kelly in the early-1930s, observed, “[s]ome stones bring good luck, some not. You got to think. See a nice stone; bring it home; dream it. If good, keep it. A rock or stick, any kind, might bring luck...” (Collier and Thalman 1996:14). In addition, white animals, or the skins of white animals, including mud hen, flounder, and deer were considered lucky by Coast Miwok-speaking groups (Collier and Thalman 1996:14). Although a large number of naturally-produced talismans considered lucky for hunting or for collecting marine and estuarine resources existed, these were usually not the same—natural objects that brought luck on land did not work well in the water, and vice versa (Collier and Thalman 1996:xvi). For example, a skull or other bone from the head of a bear killed during the hunt could bring luck in collecting mussels from the ocean, but did not aid in hunting deer (Collier and Thalman 1996:134).

Objects that brought luck in hunting and fishing could also be manufactured. One of the most common was the charmstone (*tcila*), an object commonly found on many northern California archaeological sites. Discussing charmstones, Tom Smith noted, “[r]ub it every day until it is finished. Then tie a cord and sling it under left arm. Only worn while hunting, otherwise hidden or buried” (Collier and Thalman 1996:134, 462). Charmstones could also be passed down between generations, as Tom Smith related, “I had one of these stones but lost it. Got it from the old people; my mother gave it to me, and I didn't ask where she got it. It brought me pretty good luck” (Collier and Thalman 1996:462). Another object manufactured to bring luck in hunting was an obsidian blade used as a hunting charm (*tcitca*). It was carried slung under the right arm on a cord while hunting, and could be rubbed on an arrow for good luck. The *tcitca* was specifically used for hunting on land, and was not used to bring luck in fishing (Collier and Thalman 1996:134, 462). When not slung under the hunter's arm, Coast Miwok-speaking hunters carried hunting amulets, along with an obsidian knife for butchering, in a small, willow basket, manufactured by men specifically for that purpose (Collier and Thalman 1996:134, 156). Tom Smith noted that the charmstone (*tcila*) and obsidian blade (*tcitca*) were usually not used together, but he noted that both were sometimes used together for “quick luck” (Collier and Thalman 1996:134, 462).

The spatial association between porcelain fragments and projectile points I observed at several sites suggests that the two categories of objects were related. One possible explanation for this is that some porcelain fragments were used as hunting charms by Tamal individuals. Because they came from the ocean, from the *San Agustín* shipwreck, perhaps they were considered to be similar to *tcúluluk* or old abalone shells that brought luck. Because of the special nature of white-skinned animals, perhaps the fragments decorated with white deer motifs were thought to be especially powerful. This premise is difficult to “prove” conclusively, but in this case the archaeological evidence and ethnographic evidence combined support the notion that porcelain fragments and obsidian projectile points were related, as well as the suggestion that some porcelain fragments were used as hunting charms.

Polysemic Nature of Objects

When assessing the Tamal people's incorporation of sixteenth-century introduced objects into their cultural practices, it is important to recognize the difficulty in differentiating between "utilitarian" and "symbolic" objects, and to acknowledge that these categories are not mutually exclusive. Objects rarely possess a single meaning, but often have complex, nuanced meanings that can be at once pragmatic and symbolic, or pragmatic in certain circumstances and symbolic in others. According to ethnographic information from Coast Miwok-speaking informants, for example, obsidian bifaces could be either utilitarian tools used for butchering game or ritually-charged talismans used in ceremonial dances and as part of a shaman's kit for curing (Collier and Thalman 1996:154, 222, 371). Everyday objects, like obsidian bifaces, held a variety of meanings, both pragmatic and symbolic—sometimes both simultaneously. This aspect of Tamal cultural tradition must be understood and considered in any interpretation of how introduced material culture from European voyagers was recontextualized and used. Items without previous association, but with clear pragmatic value like iron fasteners that could be used as tools, may have been desired both for their utilitarian value, as well as for myriad other culturally-constructed meanings beyond simple pragmatism. As Thomas (1991:108) noted about cross-cultural exchange in the Pacific during the eighteenth century,

[t]o say that black bottles were given does not tell us what was received. This is so partly because the uses of which things were put were not inscribed in them by their metropolitan producers, and partly because gifts and commodities could be variously recontextualized as commodities or gifts, as unique articles for display, as artifacts of history, or as a new category of prestige valuable, the manipulation of which sustained the construction of political inequalities.

Like perception of the Europeans themselves (see Chapter Three), the meaning of sixteenth-century introduced objects cannot be easily disentangled and separated into symbolic and utilitarian categories, and objects may even have had new meanings that combined both indigenous and foreign cultural values in novel ways (Thomas 1997b, 2002a). Incorporating foreign material culture in Tamal cultural practice, therefore, likely occurred in complex ways, and also likely varied considerably across class, gender, and age lines. It is likely that not all Tamal individuals perceived European outsiders or their material culture in the same ways.

Exchange Outside *tamál-húye*

Coast Miwok-speaking groups in modern-day Marin County, including the Tamal inhabitants of the Point Reyes Peninsula, had exchange relationships with their neighbors to the north and east. Ethnographic evidence indicates that Coast Miwok-speaking village communities supplied clam and abalone shells to their Wappo neighbors to the northeast, and clam shells and clamshell disk beads to the Pomo inhabitants of the coast north of them (Davis 1961:18, 73; Driver 1936:194). In exchange, they received resources not available on the coast, such as obsidian, magnesite, steatite, and yellow pigment (Collier and Thalman 1996:204; Kelly 1978a:419). All of these items are commonly found in archaeological sites on the Point Reyes Peninsula. One of the goals for my project was to evaluate the extent to which introduced objects from the encounters at *tamál-húye* were incorporated into existing exchange networks

outside the local area, both regionally with other Coast Miwok-speaking groups beyond the Point Reyes Peninsula, as well as pan-regionally with other California Indian groups outside the traditional Coast Miwok-speaking territory. To do this I examined archaeological literature and selected collections from numerous archaeological sites in Marin County and beyond to look for evidence of sixteenth-century European and Asian artifacts that might be attributed to either of the sixteenth-century encounters at *tamál-húye*.

During my research I found just four references to sixteenth-century porcelain that had been found outside the Point Reyes Peninsula. Compas (1998:57), citing Moratto (1974:71-72), noted that site CA-MRN-222 on Tomales Bay contained sixteenth-century Chinese porcelain like that carried on board *San Agustín*. Site CA-MRN-222 is a small shell midden at Marshall Beach, on Tomales Bay's western shore (Compas and Praetzellis 1994). Moratto cited Treganza and King (1968), who described Treganza and Rackerby's 1964 San Francisco State College (SFSC) excavation at the site. During that investigation, Treganza and Rackerby excavated a small collection of traditional California Indian artifacts (flaked and ground stone, and worked bone and shell objects) and nineteenth-century European-made materials (green and clear glass, and brass and iron items)—23 artifacts in all (Treganza and King 1968:10-13). They described one artifact (no. 5777) as a "clear white porcelain rimsherd" (Treganza and King 1968:13), which may be the artifact Compas referred to as sixteenth-century in origin. I examined the assemblage from CA-MRN-222 at the Treganza Museum at San Francisco State University (SFSU), in particular the ceramic sherd in question, and I found the ceramic fragment is nineteenth- or twentieth-century stoneware, which matches the rest of the Historic Period artifacts from the site. There is no evidence, therefore, of sixteenth-century introduced artifacts from *San Agustín* at CA-MRN-222.

In addition, Stewart (2003:192) noted that "[s]everal of the sites with European/Asian materials are on Limantour Spit and Drakes Estero, but one important one, MRN-378/H, is in Bear Valley." Site CA-MRN-378 is a large midden near modern-day Olema that has never been excavated (Moratto 1974:87). Although there are recent surface finds from the site in the Point Reyes National Seashore Museum, none of them are sixteenth-century in origin (personal communication, Kirsten Kvam, 4/30/08). Several scholars have noted that CA-MRN-378 may be the ethnographically-documented Coast Miwok village of *olemaloke* (Moratto 1974:87; Stewart 2003:191), which may have been visited by Drake in 1579 or Cermeño in 1595 (Moratto 1974:87; Slaymaker 1982:334). While there are no artifacts providing evidence for sixteenth-century contacts, the possible Drake or Cermeño connection may be the source of Stewart's reference. Because the site has never been excavated it may still contain evidence to the contrary, but at present there is no material evidence of sixteenth-century introduced artifacts at CA-MRN-378.

The other two sites outside of *tamál-húye* where previous researchers noted sixteenth-century Chinese porcelain likely from the *San Agustín* are site CA-MRN-209, located on the western shore of Tomales Bay, and CA-MRN-193, also known as Olompali and located just north of modern-day Novato in eastern Marin County. Finds from both sites have been verified as Ming Dynasty Chinese porcelain from the Wan Li era, and therefore match the porcelain carried by the *San Agustín*.

Site CA-MRN-209, located in Tomales Bay State Park, was tested by California State Parks archaeologists in the mid-1990s. During excavation of a single 1 m by 1 m test unit, researchers recovered a single rim sherd from a late-Ming provincial ware bowl, similar in appearance to the many examples found at Point Reyes (Wheeler 1996:10). Because only a

single test unit was excavated, there is limited information on context and association with other artifacts and features from the site. The porcelain fragment does not appear to be modified, nor is there a recognizable decorative motif present. Because it is a relatively unique occurrence, the most compelling information about the fragment is simply its presence at the site. The site was also investigated by archaeologists from the University of California in 1906 and again in 1952, but after examining the collections from those investigations in the Phoebe A. Hearst Museum of Anthropology, I determined that the earlier researchers did not recover any sixteenth-century artifacts.

The site of Olompali (CA-MRN-193), now part of Olompali State Historic Park, was extensively excavated by Slaymaker during the 1970s (Slaymaker 1982). During the excavations, researchers recovered two ceramic fragments that are likely sixteenth-century Chinese porcelain, which Von der Porten (1976) later examined. Neither sherd appeared to be intentionally modified, nor did either have a distinctive decorative motif. Little has been published about the excavations at Olompali, so there is no information available about context and associations with other artifacts or features. In addition, the ceramic sherds themselves, along with the rest of the collections from the excavation, are not available for study, so I was not able to examine them firsthand. Like the single fragment from CA-MRN-209, the most noteworthy observation about the sherds recovered at Olompali is their mere presence and the implications this has for long-distance exchange of porcelain from the *San Agustín* shipwreck.

Despite evidence of an active and vibrant trade between the Tamal inhabitants of the Point Reyes Peninsula and their Coast Miwok-speaking neighbors within modern-day Marin County, as well as with California Indian groups outside of Marin County, there is no evidence that sixteenth-century porcelain or other objects from the *San Agustín* shipwreck were incorporated into those exchange networks. With only three sixteenth-century porcelain fragments recovered from two sites outside of *tamál-húye*, a compelling question is why the sixteenth-century introduced objects from the *San Agustín* were not actively exchanged, either regionally or pan-regionally.

There are a number of possible answers to this question. Based on evidence I presented in Chapter Three, the Point Reyes Peninsula and the area immediately to the east, including Tomales Bay and possibly portions of the Lagunitas Valley, were likely the territory of a single tribe or village community; the Olema Valley and areas immediately south may also have been part of the same village community's territory (Milliken 1995, 2009). Although the sociopolitical boundary of territory claimed by the Tamal is unknown, it is likely that all sites that have produced sixteenth-century introduced artifacts, except one (CA-MRN-193, Olompali) were occupied by members of the same village community. When considering this fact, there are two possible explanations why the Tamal did not circulate porcelain and other objects from the *San Agustín* beyond their own village community: either the goods had little value beyond the people who had experienced the encounters at *tamál-húye* firsthand, and they were not in demand by neighboring groups, or the Tamal considered them to be too valuable to exchange and kept them out of exchange networks. It is possible that aspects of both explanations may have merit.

However, in light of the archaeological and ethnographic evidence I presented above about the possible perception of porcelain fragments as charms that brought luck in hunting, I believe it is likely the porcelains were considered by the Tamal to be too valuable to exchange. Ethnographic evidence suggests there was a strong feeling about respecting and maintaining property among Coast Miwok-speaking groups (Kelly 1978a:418), and it is possible that the

strong associations the Tamal inhabitants of the Point Reyes Peninsula had for the encounters with Drake and Cermeño prevented them from exchanging the material evidence of those encounters. If the Tamal considered the porcelain fragments to be charms or amulets, or if they considered them imbued with symbolism, then they likely would not have traded them. During Kelly's interviews with Tom Smith, he noted that he would not give away or sell something lucky: "Sell it? If this brought me luck, I wouldn't sell it. My luck would be all gone. If it brought me no luck, I might sell it..." (Collier and Thalman 1996:196). If the Tamal considered the porcelain fragments to be objects that brought luck in hunting, then they would not likely be found in archaeological contexts beyond the Point Reyes Peninsula.

If the porcelain was considered too valuable or lucky to exchange outside the village community, however, then why was porcelain recovered from Olompali, which was likely part of a separate village community within the Coast Miwok-speaking territory? There a number of possible reasons, but the explanation might be found by considering social bonds between village communities. Intermarriage between village communities was not common, but occurred in about 10% of marriages, and usually took place between neighboring tribes that were not more than about 16-19 km apart (Milliken 1995:23). Since Olompali is about 22.5 km from the possible site of *olemaloke*, which may have been the primary village in the Tamal village community, it is possible that a Tamal individual who relocated to Olompali as part of a marriage took the porcelain with them as an amulet or talisman.

EVALUATING LONG-TERM IMPLICATIONS

Previous Researchers' Conclusions

As I discussed in Chapter One, a number of previous researchers have offered conclusions about how the sixteenth century introduced objects from the *San Agustín* may have been used by Tamal inhabitants of the Point Reyes Peninsula (Heizer 1941; Treganza and King 1968; Von der Porten 1963, 1968). Some of these researchers have also addressed the larger question of culture change on the Point Reyes Peninsula as a result of the sixteenth-century encounters. During the University of California investigation in the 1940s, Beardsley (1954a) examined the sixteenth-century historical accounts from Point Reyes for descriptions about cultural practices and material culture of Coast Miwok-speaking groups, and he compared his findings to both late-eighteenth and early-nineteenth century historical narratives, and to ethnographic data collected in the early-twentieth century (which he assumed also represented early Historic Period practice). According to Beardsley (1954a:19), "[c]orrespondence between ethnographic data from the Coast Miwok and the earliest historical accounts are so close in those items for which comparison is possible to justify the conclusion that cultural groups did not shift in the intervening two hundred years....[T]his conclusion is borne out by archeological evidence."

Beardsley's conclusion may be ostensibly true based primarily on material culture and cultural practices for which descriptions are available, but it needs to be considered that Coast Miwok-speaking groups underwent massive social change as the result of Spanish and Russian colonization of the Bay Area and forced integration into the Spanish mission system. Beardsley's conclusions, therefore, are based on a comparison of limited and potentially biased European historical descriptions from both the sixteenth century and the late-eighteenth and early-nineteenth century, and on ethnographic data collected from a small number of individuals

who had lived through a period of fundamental social transformation in the nineteenth-century. The archaeological evidence he cites to support his conclusion is based on the continuity of artifact types, and does not take into account a more fine-grained analysis of intra-site spatial patterning or a detailed examination of sixteenth century introduced artifact use. It is likely, therefore, that Beardsley's scale of analysis did not take into consideration subtle cultural transformations like those I am examining in my study.

Summarizing both his work in 1949-1950 and earlier University of California excavation at Point Reyes, Meighan (1950a) reaches the same conclusion as Beardsley. He observed that the sixteenth century material excavated from sites at Point Reyes,

gives the archaeologist a known time datum for the Indian culture in this part of California which is almost 400 years old. This, in turn, enables the archaeologist to assess the changes which have taken place in Indian culture during the centuries which have passed since first contact with the Whites. Analysis of the aboriginal artifacts recovered from the porcelain-bearing layers of the archaeological sites shows that these artifact types are of the latest known Indian culture in the region; indeed, they are identical to the objects used by the Indians when the Spanish missions were established in Northern California, some two centuries later....The Late culture of Marin County (historically that of the Coast Miwok tribe) is thus shown to have undergone remarkably little modification of a long period of time, at least in the department of material culture (Meighan 1950a:28)

Meighan's conclusions, like Beardsley's, are based solely material culture, and do not consider other types of cultural transformation that may not be reflected by artifacts alone, but that may be revealed by other types of archaeological examination such as those presented in this study. In addition, Meighan does not take into account the introduction of the sixteenth-century artifacts themselves, and what changes the integration of those objects into Tamal cultural practice may have had.

Later researchers from SFSC did not specifically address the question of culture change among the Tamal inhabitants of Point Reyes, but based on their excavations on Limantour Spit at CA-MRN-216 and CA-MRN-298, they speculate that the introduction of porcelain from the *San Agustín* and the advent of the clamshell disk bead production at those sites may be contemporaneous (Treganza and King 1968:80). Unfortunately, stratigraphic data at these sites are poor and there are no chronometric dates from the sites, so this question is difficult to assess. Historical evidence from the 1579 Drake encounter suggests clamshell disk beads were present at that time (Heizer 1947; Kroeber 1925), and archaeological evidence from other parts of northern California indicate that clamshell disk bead production had begun by A.D. 1500 to 1550 (Milliken, et al. 2007:117), so it is likely that the clamshell disk bead industry at Point Reyes also predates the sixteenth-century encounters there.

Finally, a more recent study by Compas (1998) moved beyond material culture and evaluated additional archaeological evidence from the Point Reyes Peninsula to assess culture change following the sixteenth-century encounters. By conducting a broad survey of sites at Point Reyes, examining different site types and attempting to control for the lack of fine-grained chronology that exists at most sites, Compas also concluded that settlement patterns and resource procurement did not change between the late-sixteenth century and the beginning of the Historic

Period (about 1770). She does acknowledge, however, that the introduction of European objects as a result of the *San Agustín* shipwreck represents a change in material culture, but she does not suggest what affect this had or how they were used.

Culture change and/or Cultural Continuity

To address one of the primary theoretical questions posed in this dissertation—do the encounters at *tamál-húye* qualify as historical events from the perspective of the Tamal—I examine the results of my study through the lens of a theoretical perspective based on an “event-oriented archaeology,” a framework I described in detail in Chapter Two. Here, I examine the “eventfulness” of the sixteenth-century European visits to the Point Reyes Peninsula by evaluating this question against a rubric outlined by Sewell (2005).

According to Sewell, there are a number of common elements present in historical events, several of which are relevant to my discussion. First, historical events are cultural transformations and rearticulate existing cultural structures in novel ways, or as Sewell stated it, events are “dislocations and transformative rearticulations of structures” (Sewell 2005:244-245). Events fundamentally change certain aspects of cultural practice. An important consideration when conceptualizing this change is a sense of scale—an event is characterized by change at what scale? Sewell addressed this issue through the idea of “multiple structures,” which I discussed in Chapter Two—that is, society is composed of numerous groups that interact at multiple levels, from the individual to the entire culture as a whole, and change that occurs at any level may be considered an event at that level (Sewell 2005:211). He also noted that historical events are spatial, as well as temporal processes, which occur within a bounded area (Sewell 2005:259). In the case of the Tamal, this means that “change” needs to be assessed at multiple levels—does change in cultural practices at the village level, or in the local area (i.e., *tamál-húye*), constitute an event, or does change need to reverberate throughout the entire village community, or to all Coast Miwok-speaking groups, before it can be considered an event? Defining the boundaries of a historical event requires an act of judgment on the part of the researcher, and the evidence needs to be evaluated at multiple scales (Sewell 2005:260).

In addition to the basic notion of culture change, events and their subsequent interpretation also have a symbolic connotation. Sewell wrote, “[t]he novel articulation that makes this happening a momentous event in world history is an act of signification.... This implies that symbolic interpretation is part and parcel of the historical event” (Sewell 2005:245). As part of this process, according to Sewell, it follows that historical events are characterized by heightened emotion and they are punctuated by ritual (Sewell 2005:248, 251). Change ushered in by events takes place in a very different environment than the quotidian existence of everyday life and daily practice, and this new environment is in part created by imparting symbolic significance, possibly through ritual contexts that are accompanied by strong emotional responses, to the happenings. Sewell summarized these ideas by observing that,

[d]islocation of structures...produces in actors a deep sense of insecurity, a real uncertainty about how to get on with life. I think that this uncertainty is a necessary condition for the kind of collective creativity that characterizes so many great historical events. In times of structural dislocation, ordinary routines of social life are open to doubt, the sanctions of existing power relations are uncertain or suspended, and new possibilities are thinkable. In ordinary times,

cultural schemas, arrays of resources, and modes of power are bound into self-reproducing streams of structured social action. But in times of dislocation...resources are up for grabs, cultural logics are elaborated more freely and applied to new circumstances, and modes of power are extended to unforeseen social fields (Sewell 2005:250-251).

Sewell argued that events are characterized by a series of occurrences that culminate in cultural transformation. The series of occurrences begins with something unusual that disrupts the normal routine and starts a process of cascading “happenings” that result in a fundamentally new and durable structure. He succinctly summarized his viewpoint by writing, “[a] historical event, then, is (1) a ramified sequence of occurrences that (2) is recognized as notable by contemporaries, and that (3) results in a durable transformation of structures” (Sewell 2005:227-228).

In the case of the sixteenth-century encounters at *tamál-húye*, it is likely that the arrival of Drake and his crew in 1579 was an occurrence that disrupted the Tamal people’s normal routine of daily life. It is unknown if durable social change was the result of that visit. Historical narratives and oral traditions about the sixteenth-century encounter do not contain enough detail to allow assessment of whether it should be considered an event in the history of the Tamal people. The accounts of Drake’s visit to *tamál-húye*, which suggest an unusual reception, and perception, of the English voyagers by the Tamal displays a number of the elements Sewell suggests are necessary for the episode to be considered an event. The narratives seem to indicate a symbolic interpretation, describe heightened emotion, and suggest ritual overtones in the ways that the indigenous population interacted with the English sailors (see Chapter Three). There is not enough information available between the historical accounts of the 1579 visit and the narratives of the 1595 Spanish encounter, however, to assess whether fundamental change in any aspects of cultural practice took place, and so whether the Drake encounter should be considered an event, using the criteria outlined above.

If the Drake encounter did not usher in social transformation of some kind, it is possible that it was only the initial occurrence, and that the wreck of the *San Agustín* 16 years later, and the resulting influx of material goods, could be considered part of the same sequence of occurrences that perhaps solidified the cultural transformations. In assessing the question of change in cultural practices following the 1595 encounter with Cermeño and the shipwrecked crew of the *San Agustín* by using material evidence from the previously-excavated archaeological sites, I was limited by the present archaeological record on the Point Reyes Peninsula. The major hurdle to adequately address this question is the lack of fine-grained chronological controls at any of the excavated sites at *tamál-húye*. At several sites, broad distinctions can be made between, for example, Middle Period occupation (from 2500 B.P. to 1000 B.P.) and Late Period occupation (from 1000 B.P. to contact), but current data are not detailed enough to distinguish between pre-contact occupation and immediate post-contact occupation, until the Historic Period that began with European colonization of the Bay Area nearly 175 years after the *San Agustín* shipwreck. Better chronological control than previous excavators could provide is necessary to adequately address this question. This presents a window of opportunity for future work on these sites, which could bring to bear the full suite of modern excavation and analytical techniques (see below).

The archaeological evidence from previous excavations does contain a number of clues to help assess the issue of culture change. The most obvious observation is that the introduction of

sixteenth-century goods from the *San Agustin* shipwreck fundamentally changed the material culture of the inhabitants of *tamál-húye*, and it therefore changed an important aspect of their cultural practice. The Tamal people made use of the porcelain and other remnants of the shipwreck in a variety of ways, but the very fact that they salvaged material from the shipwreck and made its use part of their daily practices means that an aspect of their culture changed from before the arrival of the Spanish visitors. At present, there is not enough evidence available to assess whether this alone constitutes an “event” in Tamal history.

Another important piece of evidence regarding cultural continuity comes from CA-MRN-216, where researchers excavated a burial that included an eighteenth-century porcelain cup, glass trade beads, and a number of other introduced objects. Because of the objects found in direct association with the burial, researchers concluded that the burial—a cremation—could be dated to the Historic Period (post-1770)(Treganza and King 1968:34). The cremation is notable because it offered a clue about the continuity of burial practices on the Point Reyes Peninsula, with the inclusion of material goods, likely belongings to the deceased, being placed in the grave, from both before and after the sixteenth-century encounters. It also demonstrates that the site continued to be occupied, at least occasionally, during the intervening years after the Spanish departed in 1595 and when they next encountered the Tamal at Point Reyes, sometime after 1770. Fragments of late-eighteenth century porcelain ceramics from CA-MRN-307 (see Chapter Five) indicate the same thing—that the site was likely occupied into the Historic Period. This further demonstrates continuity in settlement patterns from before the 1579 Drake encounter until the period of Spanish and Russian colonization. In addition, and most interestingly, these clues also indicate the continued acquisition of porcelain, likely through exchange with European settlers, by the Tamal inhabitants of the Point Reyes Peninsula into the Historic Period. This may show a continued appreciation for porcelain that was passed on through the generations beyond the sixteenth-century encounters at *tamál-húye*. Perhaps that is evidence that some kind of durable change had occurred to Tamal culture as a result of the Drake encounter and the *San Agustin* shipwreck.

DIRECTIONS FOR FUTURE RESEARCH

Disease Introduction

An issue that I do not explore in detail, but that should be investigated with regards to the long-term implications of the sixteenth-century encounters at *tamál-húye*, is the possibility that diseases introduced by European visitors may have had substantial impacts on the indigenous population. The issue has not been directly investigated on the Point Reyes Peninsula.

Previous research has demonstrated that infectious diseases introduced to indigenous populations in the Americas during early European colonial expansion had devastating effects on local populations. In some cases, indigenous populations declined by up to 90% in the wake of disease introduction, and diseases often swept ahead of colonizing forces impacting areas not previously contacted by Europeans (Ramenofsky 1987). In southern California, the effects of infectious disease introduction on native populations in the late-eighteenth and nineteenth centuries is well-documented (e.g. Walker and Johnson 1992, 1994), but it is unclear whether sixteenth-century maritime contacts in both northern and southern California introduced Old World diseases before Spanish and Russian colonization (Erlandson and Bartoy 1995; Preston 1996, 1997, 2002). In southern California’s Channel Islands, Erlandson et al. (2001)

hypothesized a sharp population decline in the 1550-1650 time period and argued that introduced disease led to large-scale demographic collapse. In addition, Erlandson and Bartoy (1995; 1996) presented a model for exploring the effects of introduced disease in California before Spanish and Russian colonization, while acknowledging that little archaeological research has focused on the issue. As their study indicated, coastal California Indian groups had numerous contacts with European voyagers during the sixteenth and early-seventeenth centuries, and the populations would have been highly susceptible to introduced disease epidemics (Erlandson and Bartoy 1995:153). They suggested that because of substantial opportunities for disease transmission, and scanty historical documentation about this issue, the question needs to be addressed archaeologically in much greater detail.

If indigenous populations suffered sharp declines following initial European contact in the sixteenth century, it may have had a substantial effect on California Indian cultures even before permanent European colonization efforts began in the late-eighteenth century. As the richest archaeological record of sixteenth-century California Indian-European interaction, contact-period sites in Point Reyes have the potential to directly contribute to answering these important questions. An archaeological investigation of potential disease impact at Point Reyes following sixteenth-century contact could follow a methodology advocated by Ramenofsky (1987), which keeps archaeological and historical lines of evidence separate and independently evaluates each, and which limits use of population estimates that are based on ethnographic analogy. Archaeological estimates of population have been problematic in the past because of their reliance on ethnographic analogy, which does not adequately consider the possibility of population decline and culture change before ethnographic observations took place (Ramenofsky 1987:4). Instead, Ramenofsky advocates using archaeological information as the primary data set for estimating native population changes over time. To determine the effects of disease after contact with Europeans, it is necessary to measure population across space and through time in the region under study (Ramenofsky 1987:22-29). A general methodology at Point Reyes would begin by estimating the Tamal population before 1579 using archaeological indicators, and then estimate the population after the sixteenth-century encounters, but before permanent colonization began in the region in the 1770s, to see if there is a discernable change.

Archaeological methods for estimating population include using grave counts from individual sites, or using regional settlement data. Ramenofsky excludes grave counts from her research, however, noting that populations may change burial practices over time, which may lead to an unreliable population estimate. Using regional settlement data may be a more reliable way to estimate population, and there are several ways settlement data can be used, including estimating settlement counts, and by calculating both settlement area and roofed area within a site. Regional population can then be estimated as the sum of individual settlement populations. One potential problem to keep in mind while working with seasonally mobile hunter-gatherers is that counting settlements for mobile populations can overestimate population. In addition, developing accurate site chronologies is critical for using this methodology (Ramenofsky 1987:23-29).

Although difficult, additional archaeological research on the Point Reyes Peninsula may be able to determine if populations were stable after the sixteenth-century encounters until sustained Spanish and Russian contact began in the late-eighteenth century, or if population declined in the wake of the encounters at *tamál-húye*. Developing accurate, fine-grained chronologies of various sites on the Point Reyes Peninsula is critical to this line of inquiry. At present, it is likely the data are not detailed enough to address these issues. Future

archaeological research is necessary to fill in gaps in data to evaluate the potential effects of introduced disease on the Tamal population at Point Reyes.

Change in Cultural Practices

In addition to changes in material culture like those highlighted in this study, future research should focus on a variety of other archaeological variables to assess the possibility of culture change as a result of the sixteenth-century encounters at *tamál-húye*. My study, which is based almost entirely on existing archaeological data, some more than 70 years old, is limited in the scope of the questions that can be successfully addressed. As discussed above, one of the most serious limitations is the lack of fine-grained chronological control at any of the sites investigated. Previous investigations and chronometric dating efforts have resulted in data that are not detailed enough to distinguish archaeological deposits and features that pre-date the late-sixteenth century from those that immediately post-date the sixteenth-century contacts. During past investigations, the presence of sixteenth-century introduced objects alone has been the criteria used to differentiate deposits. In most cases, these data have reinforced the homogenous nature of stratigraphy at the sites.

Future investigations using modern recovery and dating techniques, however, might be more successful at distinguishing discrete pre- and post-sixteenth century contact deposits, either in sites that have not been extensively excavated in the past, or by focusing on undisturbed deposits (like those identified during my study, see Chapter Six) of previously excavated sites. If future archaeological work can identify deposits pre-dating the arrival of Drake in 1579 and distinguish them from strata that were deposited after 1595, but before 1770, then a number of different aspects of cultural practice can be evaluated for change. This would allow for a more accurate assessment of culture change than, for example Beardsley's, which relied solely on material culture and practices that could be identified in both historical and ethnographic records, and which led him to determine that no culture changes had taken place (Beardsley 1954a:19). Examining such variables as organization of residential space, foodways and subsistence, ceremonial and mortuary practice, trash disposal, settlement patterns and layout, and social relations and regional exchange networks would allow a more accurate view of whether culture change and/or continuity resulted from the encounters with European voyagers in the sixteenth century.

CONCLUSION

In conclusion, working together in a collaborative research project with tribal members from the Federated Indians of Graton Rancheria, this study has worked to untangle the meaning behind the earliest meetings of Europeans and California Indians on the beaches of northern California. Understanding how those events unfolded, and the long-term implications, can help communities today put those early contacts into perspective and discuss them in terms relevant to contemporary societies.

This project can be considered part of a broader literature addressing the archaeology of culture contact and colonialism. Culture contact studies in archaeology have steadily worked to include a broader array of perspectives and have become more inclusive, moving beyond a Eurocentric point of view centering on colonial populations to highlight the indigenous experience of intercultural engagements and colonial encounters. Methodological approaches

have also become more sophisticated and nuanced, and better represent the complicated nature of the cross-cultural landscape. In this regard, archaeologies of cross-cultural encounters, of which this project is a part, continue to be at the cutting edge of archaeological method and theory.

While I utilized multiple lines of evidence to address my primary research questions, including a detailed analysis of historical accounts written by European voyagers, and incorporating ethnographic evidence and native oral traditions for an indigenous perspective when possible, archaeology has provided the foundation for my study. By utilizing existing museum collections and archival field data from previous archaeological excavations, some nearly 70 years old, as my primary data source, my project demonstrates the continuing research value of “old” archaeological collections and their ability to address contemporary anthropological questions. Because the archaeological sites on the Point Reyes Peninsula are protected within a national park, and because of the sensitivity about conducting new archaeological investigations in an area that has been heavily impacted by archaeological research over the past 70 years, large-scale excavations like these undertaken on the Point Reyes Peninsula will likely not take place again. A complete re-evaluation of these collections and their original context like this study has conducted, therefore, is an important and necessary step before any future intrusive research should be considered at Point Reyes.

The lasting significance, and most interesting part of sixteenth-century European visits to northern California, is not what they meant to the outsiders, because their experience was fleeting, but what the encounters meant to the Coast Miwok-speaking inhabitants of the area who had been here for thousands of years and what, if any, lasting significance they had. Anthropologists studying “culture contact” are often interested in how native communities around the globe experienced the spread of European culture, which often led to their incorporation into larger colonial structures. But because there was no permanent colonial presence established in California for many generations after these early encounters, the most interesting question in this case is how the Coast Miwok-speaking inhabitants of *tamál-húye* metaphorically folded the Europeans and the goods they left behind into *their* cultural practice. By working together with California Indian tribal members, combining data from terrestrial sites and shipwrecks, drawing on multiple lines of evidence, and by re-analyzing old archaeological collections from excavations that began in the 1940s and using them to address new anthropological questions, this project has helped piece together a more inclusive picture of the past that will help us better understand the importance of the earliest meetings between European voyagers and California Indians in northern California.

REFERENCES CITED

- Abdul-Rahman, A. and M. Pilouk
2008 *Spatial Data Modelling for 3D GIS*. Springer, New York.
- Adams, R.
1984 *In the Land of Strangers: A Century of European Contact with Tanna, 1774-1874*. Australian National University, Canberra.
- Adhyatman, S.
1999 *Zhangzhou (Swatow) Ceramics: Sixteenth to Seventeenth Centuries Found in Indonesia*. Ceramic Society of Indonesia, Jakarta.
- Aker, R.
1965 *The Cermeño Expedition at Drakes Bay, 1595*. Drakes Navigators Guild, Point Reyes, CA.
- Amherst, L. and B. Thomson (editors)
1901 *The Discovery of the Solomon Islands by Alvaro de Mendana in 1568*. The Hakluyt Society, London.
- Anonymous
1940 University of California Archaeological Site Survey Record, Mrn-232. On file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.
- 1966 University of California Archaeological Field Specimen Inventory Record, Various Sites, Fall 1966. Manuscript No. 6679, Box 3, Folder 7, on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.
- 1982-2001 Inadvertent and Excavation Discoveries at Point Reyes National Seashore. Manuscript No. 8060, Box 1, Folder 5, on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.
- 1973a Storer Collection MRN-232 Surface Washout Artifact Drawings. Manuscript No. PORE 6680, Box 1, Folder 16 on File at Point Reyes National Seashore Archives, Point Reyes Station, CA.
- 1973b Storer Collection MRN-242 Surface Washout Artifact Drawings. Manuscript No. PORE 6680, Box 1, Folder 17 on File at Point Reyes National Seashore Archives, Point Reyes Station, CA.
- 1973c Storer Collection MRN-307 Surface Washout Artifact Drawings. Manuscript No. PORE 6680, Box 1, Folder 24 on File at Point Reyes National Seashore Archives, Point Reyes Station, CA.

Appadurai, A.

1986a Introduction: Commodities and the Politics of Value. In *The Social Life of Things: Commodities in Cultural Perspective*, edited by A. Appadurai, pp. 3-63. Cambridge University Press, Cambridge, UK.

1986b *The Social Life of Things: Commodities in Cultural Perspective*. Cambridge University Press, Cambridge, UK.

Armit, I. and B. Finlayson

1995 Social Strategies and Economic Change. In *The Emergence of Pottery: Technology and Innovation in Ancient Societies*, edited by W. K. Barnett and J. W. Hoopes, pp. 267-275. Smithsonian Institution Press, Washington D.C.

Bancroft, H. H.

1884 *Native Races of the Pacific States* 3. A.L. Bancroft and Co., San Francisco.

Barber, I. G.

1999 Early Contact Ethnography and Understanding: An Evaluation of the Cook Expeditionary Accounts of the Grass Cove Conflict. In *Voyages and Beaches: Pacific Encounters, 1769-1840*, edited by A. Calder, J. Lamb and B. Orr, pp. 156-179. University of Hawaii Press, Honolulu.

Barrett, S. A.

1908 The Ethno-Geography of the Pomo and Neighboring Indians. *University of California Publications in American Archaeology and Ethnology* 6(1):1-332.

Batty, M.

2005 Approaches to Modeling in GIS: Spatial Representation and Temporal Dynamics. In *GIS, Spatial Analysis, and Modeling*, edited by D. J. Maguire, M. Batty and M. F. Goodchild, pp. 41-61. ESRI Press, Redlands, CA.

Beardsley, R. K.

1941a Letter to Alfred Kroeber, August 11, 1941. In *Series 4, Subseries 4: Correspondence, Box 32 (Beardsley, R., 1937-1955), Records of the Department of Anthropology, CU-23, University Archives*. The Bancroft Library, University of California, Berkeley, CA.

1941b Letter to Alfred Kroeber, July 9, 1941. In *Series 4, Subseries 4: Correspondence, Box 32 (Beardsley, R., 1937-1955), Records of the Department of Anthropology, CU-23, University Archives*. The Bancroft Library, University of California, Berkeley, CA.

1941c Letter to Alfred Kroeber, July 24, 1941. In *Series 4, Subseries 4: Correspondence, Box 32 (Beardsley, R., 1937-1955), Records of the Department of Anthropology, CU-23, University Archives*. The Bancroft Library, University of California, Berkeley, CA.

- 1941d Letter to Alfred Kroeber, June 20, 1941. In *Series 4, Subseries 4: Correspondence, Box 32 (Beardsley, R., 1937-1955), Records of the Department of Anthropology, CU-23, University Archives*. The Bancroft Library, University of California, Berkeley, CA.
- 1941e Notes on Various Marin County Sites (Manuscript No. 112). In *Collection of Manuscripts from the Archaeological Archives of the Phoebe Hearst Museum of Anthropology*, Phoebe Hearst Museum of Anthropology, University of California, Berkeley.
- 1941f Proposal for 1941 Fieldwork, February 27, 1941. In *Series 4, Subseries 4: Correspondence, Box 32 (Beardsley, R., 1937-1955), Records of the Department of Anthropology, CU-23, University Archives*. The Bancroft Library, University of California, Berkeley, CA.
- 1946a Miscellaneous Notes and Distributions on SF and Drake's Bay Sites (Manuscript No. 48). In *Collection of Manuscripts from the Archaeological Archives of the Phoebe Hearst Museum of Anthropology*, Phoebe Hearst Museum of Anthropology, University of California, Berkeley.
- 1946b San Francisco State College Archaeological Site Survey Record, Mrn-232. On file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.
- 1946c Site Maps and Artifact Charts for Various Marin County Sites, including the McClure Site, Mrn-266 (Manuscript No. 100). In *Collection of Manuscripts from the Archaeological Archives of the Phoebe Hearst Museum of Anthropology*, Phoebe Hearst Museum of Anthropology, University of California, Berkeley.
- 1946d University of California Archaeological Survey Site Record, Mrn-242. University of California Archaeological Survey Site Records, Phoebe A. Hearst Museum of Anthropology, Berkeley, CA.
- 1947 *Temporal and Areal Relationships in Central California Archaeology*. Ph.D. Dissertation, University of California, Berkeley.
- 1948 Cultural Sequences in Central California Archaeology. *American Antiquity* 14(1):1-28.
- 1954a *Temporal and Areal Relationships in Central California Archaeology, Part One*. University of California Archaeological Survey Report No. 24. Department of Anthropology, University of California, Berkeley.
- 1954b *Temporal and Areal Relationships in Central California Archaeology, Part Two*. University of California Archaeological Survey Report No. 25. Department of Anthropology, University of California, Berkeley.

- Beaudry, S.
1983 *A Reassessment of 10 Endangered Archeological Sites within the Point Reyes National Seashore, Marin County, California*. PORE 8060, Box 4, Folder 9 on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.
- Beck, R. A. J., D. J. Bolender, J. A. Brown and T. K. Earle
2007 Eventful Archaeology: The Place of Space in Structural Transformation. *Current Anthropology* 48(6):833-860.
- Bennyhoff, J. A. and R. E. Hughes
1987 Shell Bead and Ornament Exchange Networks Between California and the Western Great Basin. *Anthropological Papers of the American Museum of Natural History* 64:79-175.
- Biersack, A. (editor)
1991a *Clio in Oceania: Toward a Historical Anthropology*. Smithsonian Institution Press, Washington D.C.
- Biersack, A.
1990 Histories in the Making: Paiela and Historical Anthropology. *History and Anthropology* 5(1):63-85.

1991b Introduction: History and Theory in Anthropology. In *Clio in Oceania: Toward a Historical Anthropology*, edited by A. Biersack, pp. 1-36. Smithsonian Institution Press, Washington D.C.
- Binford, L. R.
1962 Archaeology as Anthropology. *American Antiquity* 28(2):217-225.

1965 Archaeological Systematics and the Study of Culture Process. *American Antiquity* 31(2):203-210.
- Bintliff, J. (editor)
1991a *The Annales School and Archaeology*. New York University Press, New York.
- Bintliff, J.
1991b The Contribution of an *Annaliste*/Structural History Approach to Archaeology. In *The Annales School and Archaeology*, edited by J. Bintliff, pp. 1-33. New York University Press, New York.
- Birmingham, J.
2000 Resistance, Creolization or Optimal Foraging at Killalpaninna Mission, South Australia. In *The Archaeology of Difference: Negotiating Cross-Cultural Engagements in Oceania*, edited by R. Torrence and A. Clarke, pp. 360-405. Routledge, London.

- Borofsky, R.
1997 CA Forum on Theory in Anthropology: Cook, Lono, Obeyesekere, and Sahlins. *Current Anthropology* 38(2):255-282.
- Bourdieu, P.
1977 *Outline of A Theory of Practice*. Cambridge University Press, Cambridge.
- Braudel, F.
1972 *The Mediterranean and the Mediterranean World in the Age of Philip II*. Translated by S. Reynolds. Volume 1. Harper & Row, New York.

1973 *The Mediterranean and the Mediterranean World in the Age of Philip II*. Translated by S. Reynolds. Volume 2. Harper & Row, New York.

1980 *On History*. Translated by S. Matthews. University of Chicago Press, Chicago.
- Bryant, S.
1934a Notes on the Indian Shell Mounds, Point Reyes Quadrangle (Manuscript No. 25). In *Collection of Manuscripts from the Archaeological Archives of the Phoebe Hearst Museum of Anthropology*, Phoebe Hearst Museum of Anthropology, University of California, Berkeley.

1934b University of California Archaeological Site Survey Record, Mrn-271. On file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.
- Burley, D. V.
1989 Function, Meaning and Context: Ambiguities in Ceramic Use by the Hivernant Metis of the Northwestern Plains. *Historical Archaeology* 23(1):97-106.
- Burley, D. V., G. A. Horsfall and J. D. Brandon
1992 *Structural Considerations of Metis Ethnicity: An Archaeological, Architectural, and Historical Study*. University of South Dakota Press, Vermillion, SD.
- Cabak, M. and S. Loring
2000 "A Set of Very Fair Cups and Saucers": Stamped Ceramics as an Example of Inuit Incorporation. *International Journal of Historical Archaeology* 4(1):1-34.
- Calder, A., J. Lamb and B. Orr (editors)
1999 *Voyages and Beaches: Pacific Encounters, 1769-1840*. University of Hawaii Press, Honolulu.
- Callaghan, C. A.
1970 *Bodega Miwok Dictionary*. University of California Publications in Linguistics 60. University of California Press, Berkeley.

- 1997 Evidence for Yok-Utian. *International Journal of American Linguistics* 63(1):18-64.
- Champion, T. C.
1989 Introduction. In *Centre and Periphery: Comparative Studies in Archaeology*, edited by T. C. Champion, pp. 1-21. Unwin Hyman, London.
- Childers, B. L.
1967a An Archaeological Site Survey of the Murphy Ranch (Document #S-17744). Unpublished manuscript on file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.

1967b San Francisco State College Archaeological Site Survey Record, Mrn-242. On file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.
- Childers, B. L., W. Henn and R. L. Edwards
1967 San Francisco State College Archaeological Field Specimen Inventory Record, MRN-242. Manuscript No. 6679, Box 1, Folder 6, on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.
- Clark, G. A.
1982 Quantifying Archaeological Research. In *Advances in Archaeological Method and Theory*, edited by M. B. Schiffer, pp. 217-273. vol. 5. Academic Press, New York.
- Clarke, A.
2000 Time, Tradition and Transformation: The Negotiation of Cross-Cultural Engagements on Groote Eylandt, Northern Australia. In *The Archaeology of Difference: Negotiating Cross-Cultural Engagements in Oceania*, edited by R. Torrence and A. Clarke, pp. 142-181. Routledge, London.
- Clarke, D.
1978 *Analytical Archaeology*. Second ed. Columbia University Press, New York.
- Cobb, C. R.
1991 Social Reproduction and the *Longue Duree* in the Prehistory of the Midcontinental United States. In *Processual and Postprocessual Archaeologies: Multiple Ways of Knowing the Past*, edited by R. W. Preucel, pp. 168-182. Occasional Paper No. 10. Center for Archaeological Investigations, Southern Illinois University at Carbondale, Carbondale, IL.
- Collier, M. E. T. and S. B. Thalman (editors)
1996 *Interviews with Tom Smith and Maria Copa: Isabel Kelly's Ethnographic Notes on the Coast Miwok Indians of Marin and Southern Sonoma Counties, California*. Miwok Archaeological Preserve of Marin, Occasional Paper No. 6, San Rafael, CA.

- Compas, L.
1998 *Research Design, Case Study, and Proposed Management Plan: Post-Contact Coast Miwok Settlement Patterns and Resource Procurement Strategies in Point Reyes National Seashore*, M.A. Thesis, Cultural Resources Management Program, Sonoma State University.
- Compas, L. and A. Praetzellis
1994 *Archaeological Site Recording and Site Record Updating of Twenty-One Tomales Bay Archaeological Sites in Point Reyes National Seashore, Marin County, California*. Anthropological Studies Center, Sonoma State University, Rohnert Park, CA.
- Connolly, B. and R. Anderson
1987 *First Contact*. Viking, New York.
- Conolly, J. and M. Lake
2006 *Geographical Information Systems in Archaeology*. Cambridge University Press, Cambridge.
- Cook, S. F.
1976 *The Conflict Between the California Indians and White Civilization*. University of California Press, Berkeley, CA.
- Crowell, A. L.
1997 *Archaeology and the Capitalist World System: A Study from Russian America*. Plenum Press, New York.
- Cusick, J. G. (editor)
1998 *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*. Occasional Paper No. 25. Center for Archaeological Investigations, Southern Illinois University at Carbondale, Carbondale, IL.
- Cutter, D. C. (editor)
1969 *The California Coast: A Bilingual Edition of Documents from the Sutro Collection*. University of Oklahoma Press, Norman, OK.
- D'Andrea, A., R. Gallotti and M. Piperno
2002 Taphonomic Interpretation of the Developed Oldowan Site of Garba IV (Melka Kunture, Ethiopia) Through a GIS Application. *Antiquity* 9:991-1003.
- Davis, J. T.
1961 *Trade Routes and Economic Exchange Among the Indians of California*. Reports of the University of California Archaeological Survey No.54. University of California Archaeological Survey, Department of Anthropology, University of California, Berkeley, CA.

Deagan, K. (editor)

1983 *Spanish St. Augustine: The Archaeology of a Colonial Creole Community*. University Press of Florida, Gainesville.

1995 *Puerto Real: The Archaeology of a Sixteenth-Century Spanish Town in Hispaniola*. University Press of Florida, Gainesville.

Deagan, K.

1978 The Material Assemblage of 16th Century Spanish Florida. *Historical Archaeology* 12:25-50.

1987 *Artifacts of the Spanish Colonies of Florida and the Caribbean 1500-1800* Volume 1: Ceramics, Glassware, and Beads. Smithsonian Institution Press, Washington D.C.

1990 Accommodation and Resistance: The Process and Impact of Spanish Colonization in the Southeast. In *Columbian Consequences: Volume 2, Archaeological and Historical Perspectives on the Spanish Borderlands East*, edited by D. H. Thomas, pp. 297-314. Smithsonian Institution Press, Washington D.C.

DeCorse, C. R.

1992 Culture Contact, Continuity, and Change on the Gold Coast, AD 1400-1900. *African Archaeological Review* 10:163-196.

1998 Culture Contact and Change in West Africa. In *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*, edited by J. G. Cusick, pp. 358-377. Occasional Paper No. 25. Center for Archaeological Investigations, Southern Illinois University at Carbondale, Carbondale, IL.

Deetz, J.

1978 Archaeological Investigations at La Purisima Mission. In *Historical Archaeology: A Guide to Substantive and Theoretical Contributions*, edited by R. L. Schuyler, pp. 160-190. Baywood Publishing Company, Farmingdale, NY.

Delgado, J. P.

2009 *Gold Rush Port: The Maritime Archaeology of San Francisco's Waterfront*. University of California Press, Berkeley, CA.

Dellino-Musgrave, V. E.

2006 *Maritime Archaeology and Social Relations: British Action in the Southern Hemisphere*. Springer, New York.

Dening, G.

1980 *Islands and Beaches: Discourse on a Silent Land - Marquesas 1774-1880*. Melbourne University Press, Carlton, Victoria, Australia.

1986 Possessing Tahiti. *Archaeology in Oceania* 21(1):103-118.

- 1992 *Mr. Bligh's Bad Language: Passion, Power and Theatre on the Bounty*. Cambridge University Press, Cambridge.
- 1995 *The Death of William Gooch: A History's Anthropology*. University of Hawaii Press, Honolulu.
- 2004 *Beach Crossings: Voyaging Across Times, Cultures, and Self*. University of Pennsylvania Press, Philadelphia.
- Desroches, J.-P.
1998 Oriental Ceramics and Porcelains. In *Nossa Senhora dos Martires: The Last Voyage*, pp. 228-251. Verbo, Lisbon.
- Dietler, M.
1998 Consumption, Agency, and Cultural Entanglement: Theoretical Implications of a Mediterranean Colonial Encounter. In *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*, edited by J. G. Cusick, pp. 288-315. Occasional Paper No. 25. Center for Archaeological Investigations, Southern Illinois University at Carbondale, Carbondale, IL.
- Dillingham, M. P.
1953 University of California Archaeological Site Survey Record, Mrn-216. On file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.

1956 University of California Archaeological Site Survey Record, Mrn-298. On file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.
- Dixon, R. B. and A. L. Kroeber
1919 Linguistic Families of California. *University of California Publications in American Archaeology and Ethnology* 16(3):47-118.
- Driver, H. E.
1936 Wappo Ethnography. *University of California Publications in American Archaeology and Ethnology* 36(3):179-220.
- Duke, P.
1992 Braudel and North American Archaeology: An Example from the Northern Plains. In *Archaeology, Annales, and Ethnohistory*, edited by A. B. Knapp, pp. 99-111. Cambridge University Press, Cambridge.
- Ebert, D.
2004 Applications of Archaeological GIS. *Canadian Journal of Archaeology* 28(2):319-341.

Edwards, R. L.

1967a San Francisco State College Archaeological Site Survey Record, 4-MRN-232. On file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.

1967b San Francisco State College Archaeological Site Survey Record, 4-MRN-298. On file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.

1968 *Archaeological Survey of Point Reyes Peninsula and a Settlement Pattern Hypothesis*. Manuscript on File at National Park Service.

1970 A Settlement Pattern Hypothesis for the Coast Miwok Based on an Archaeological Survey of Point Reyes National Seashore. In *Contributions to the Archaeology of Point Reyes National Seashore: A Compendium in Honor of Adan E. Treganza*, edited by R. E. Schenk, pp. 105-113. Treganza Museum Papers No. 6, San Francisco State College.

Elsasser, A. B.

1978 Development of Regional Prehistoric Cultures. In *Handbook of North American Indians*, edited by R. F. Heizer, pp. 37-57. vol. 8, California. Smithsonian Institution, Washington D.C.

Emberson, G., S. Thalman and D. Theodoratus

1999 Point Reyes National Seashore Cultural Affiliation Report, NPS Cooperative Agreement No. 1443-CA-8530-97-017. Federated Coast Miwok Cultural Preservation Association, Novato, CA.

Erlandson, J. M. and K. Bartoy

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

1996 Protohistoric California: Paradise or Pandemic? *Proceedings of the Society for California Archaeology* 9:304-309.

Erlandson, J. M., T. C. Rick, D. J. Kennett and P. 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.

Farnsworth, P.

1989a The Economics of Acculturation in the Spanish Missions of Alta California. *Research in Economic Anthropology* 11:217-249.

1989b Native American Acculturation in the Spanish Colonial Empire: The Franciscan Missions of Alta California. In *Centre and Periphery: Comparative Studies in Archaeology*, edited by T. C. Champion, pp. 186-206. Unwin Hyman, London.

- 1992 Missions, Indians, and Cultural Continuity. *Historical Archaeology* 26(1):22-36.
- 1996 The Influence of Trade on Bahamian Slave Culture. *Historical Archaeology* 30(4):1-23.
- Feinman, G. M.
 1997 Thoughts on New Approaches to Combining the Archaeological and Historical Records. *Journal of Archaeological Method and Theory* 4(3/4):367-377.
- Fletcher, R.
 1992 Time Perspectivism, *Annales*, and the Potential of Archaeology. In *Archaeology, Annales, and Ethnohistory*, edited by A. B. Knapp, pp. 35-49. Cambridge University Press, Cambridge.
- Follett, W. I.
 1964 Fish Remains from a Sixteenth Century Site on Drakes Bay, California. In *Archaeological Survey Annual Report, 1963-1964*, pp. 31-42. Department of Anthropology, University of California, Los Angeles.
- Friedman, J.
 1985 Captain Cook, Culture and the World System. *Journal of Pacific History* 20(4):191-201.
- Fritz, J. M. and F. T. Plog
 1970 The Nature of Archaeological Explanation. *American Antiquity* 35(4):405-412.
- Fury, C. A.
 2002 *Tides in the Affairs of Men: The Social History of Elizabethan Seamen, 1580-1602*. Greenwood Press, Westport, CT.
- Garner, H. S.
 1954 *Oriental Blue and White*. Faber and Faber, London.
- Gell, A.
 1998 *Art and Agency: An Anthropological Theory*. Oxford University Press, Oxford.
- Gibbs, M.
 2002 Maritime Archaeology and Behaviour During Crisis: The Wreck of the VOC Ship *Batavia* (1629). In *Natural Disasters and Cultural Change (One World Archaeology 45)*, edited by R. Torrence and J. Grattan. Routledge, London.
- 2003 The Archaeology of Crisis: Shipwreck Survivor Camps in Australasia. *Historical Archaeology* 37(1):128-145.

- Giddens, A.
1979 *Central Problems in Social Theory: Action, Structure and Contradiction in Social Analysis*. University of California Press, Berkeley.
- Gifford, E. W.
1945 Letter to Eugene C. Compton, May 25, 1945. Phoebe A. Hearst Museum of Anthropology, Accession No. 843, University of California, Berkeley, CA.

1947 Californian Shell Artifacts. *University of California Anthropological Records* 9(1).
- Goldsmith, M.
2006 The Evolution of Marshall Sahlins. In *Texts and Contexts: Reflections in Pacific Islands Historiography*, edited by D. Munro and B. V. Lal, pp. 76-86. University of Hawaii Press, Honolulu.
- Golla, V.
2007 Linguistic Prehistory. In *California Prehistory: Colonization, Culture, and Complexity*, edited by T. L. Jones and K. A. Klar, pp. 71-82. AltaMira Press, Lanham, MD.
- Gonzalez-Tennant, E.
2009 Using Geodatabases to Generate "Living Documents" for Archaeology: A Case Study from the Otago Goldfields, New Zealand. *Historical Archaeology* 43(3):20-37.
- Greengo, R. E.
1951 *Molluscan Species in California Shell Middens*. Reports of the University of California Archaeological Survey No. 13. University of California Archaeological Survey, Department of Anthropology, University of California, Berkeley, CA.
- Groza, R. G.
2002 *An AMS Chronology for Central California Olivella Shell Beads*, M.A. Thesis, Department of Anthropology, San Francisco State University.
- Hamell, G. R.
1987 Strawberries, Floating Islands, and Rabbit Captains: Mythical Realities and European Contact in the Northeast During the Sixteenth and Seventeenth Centuries. *Journal of Canadian Studies* 21(4):72-94.
- Hamlin, W. M.
1996 Imagined Apotheoses: Drake, Harriot and Raleigh in the Americas. *Journal of the History of Ideas* 57(3):405-428.
- Harris, T. M. and G. R. Lock
1996 Multi-dimensional GIS: Exploratory Approaches to Spatial and Temporal Relationships Within Archaeological Stratigraphy. In *Interfacing the Past: Computer*

Applications and Quantitative Methods in Archaeology, CAA95, edited by H. Kamermans and K. Fennema, pp. 307-316. University of Leiden, Leiden, Netherlands.

Harrison, R.

2004 Contact Archaeology and the Landscapes of Pastoralism in the North-west of Australia. In *The Archaeology of Contact in Settler Societies*, edited by T. Murray, pp. 109-143. Cambridge University Press, Cambridge.

Harrison, R. and C. Williamson

2004 Introduction: 'Too many Captain Cooks'? An archaeology of Aboriginal Australia after 1788. In *After Captain Cook: The Archaeology of the Recent Indigenous Past in Australia*, edited by R. Harrison and C. Williamson, pp. 1-13. AltaMira Press, Walnut Creek.

Harrison-Hall, J.

2001 *Catalogue of Late Yuan and Ming Ceramics in the British Museum*. British Museum Press, London.

Hayden, B.

1995 The Emergence of Prestige Technologies and Pottery. In *The Emergence of Pottery: Technology and Innovation in Ancient Societies*, edited by W. K. Barnett and J. W. Hoopes, pp. 257-265. Smithsonian Institution Press, Washington D.C.

Heizer, R. F.

1940a Drakes Bay Field Notebook. In *Series 4: Records of Archaeological Excavations, 1926-1978, Subseries 4.1: California, 1933-1978, Robert Fleming Heizer Papers, BANC FILM 2106 (Originals: BANC MSS 78/17 c)*. Reel 129, Frames 166-188. The Bancroft Library, University of California, Berkeley.

1940b Letter to Alfred Kroeber, June 17, 1940. In *Series 4, Subseries 4: Correspondence, Box 69 (Heizer, R., 1936-1944, 1945-1954). Records of the Department of Anthropology, CU-23, University Archives*. The Bancroft Library, University of California, Berkeley, CA.

1940c Letter to Alfred Kroeber, May 31, 1940. In *Series 4, Subseries 4: Correspondence, Box 69 (Heizer, R., 1936-1944, 1945-1954). Records of the Department of Anthropology, CU-23, University Archives*. The Bancroft Library, University of California, Berkeley, CA.

1940d University of California Archaeological Site Survey Record, Mrn-242. University of California Archaeological Survey Site Records, Phoebe A. Hearst Museum of Anthropology, Berkeley, CA.

1941 Archaeological Evidence of Sebastian Rodriguez Cermeno's California Visit in 1595. *California Historical Society Quarterly* 20(4):315-328.

1947 Francis Drake and the California Indians, 1579. *University of California Publications in American Archaeology and Ethnology* 42(3):251-302.

1949a Entries Dated August-September 1949, Frames 344-345. In *Heizer's California Archaeological Survey Notes, Field Trip Records by R.F.H, August 1948-1956, Series 4: Records of Archaeological Excavations, 1926-1978, Subseries 4.1: California, 1933-1978, Reel 128, Frames 332-352, Robert Fleming Heizer papers, BANC FILM 2106 (Originals: BANC MSS 78/17 c)*. The Bancroft Library, University of California, Berkeley, CA.

1949b Letter to Richard K. Beardsley, September 8, 1949. In *Series 4, Subseries 4: Correspondence, Box 32 (Beardsley, R., 1937-1955), Records of the Department of Anthropology, CU-23, University Archives*. The Bancroft Library, University of California, Berkeley, CA.

1949c *A Manual of Archaeological Field Methods*. The National Press, Millbrae, CA.

1950 Entries Dated April-October 1950, Frames 348-349. In *Heizer's California Archaeological Survey Notes, Field Trip Records by R.F.H, August 1948-1956, Series 4: Records of Archaeological Excavations, 1926-1978, Subseries 4.1: California, 1933-1978, Reel 128, Frames 332-352, Robert Fleming Heizer papers, BANC FILM 2106 (Originals: BANC MSS 78/17 c)*. The Bancroft Library, University of California, Berkeley, CA.

1974 *Elizabethan California*. Ballena Press, Ramona, CA.

1978 Introduction. In *Handbook of North American Indians*, edited by R. F. Heizer, pp. 1-5. vol. 8, California. Smithsonian Institution, Washington D.C.

Heizer, R. F. and W. W. Elmendorf

1942 Francis Drake's California Anchorage in the Light of the Indian Language Spoken There. *Pacific Historical Review* 11:213-217.

Henn, W.

1970 Faunal Analysis of 4-Mrn-216, A Seasonal Site on Limantour Sandspit, Point Reyes National Seashore. In *Contributions to the Archaeology of Point Reyes National Seashore: A Compendium in Honor of Adan E. Treganza*, edited by R. E. Schenk, pp. 195-210. Treganza Museum Papers No. 6, San Francisco State College.

Hill, J. D.

1998 Violent Encounters: Ethnogenesis and Ethnocide in Long-Term Contact Situations. In *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*, edited by J. G. Cusick, pp. 146-171. Occasional Paper No. 25. Center for Archaeological Investigations, Southern Illinois University at Carbondale, Carbondale, IL.

- Hodder, I. (editor)
1987 *Archaeology as Long-Term History*. Cambridge University Press, Cambridge.
- Hodder, I.
1982 Theoretical Archaeology: A Reactionary View. In *Symbolic and Structural Archaeology*, edited by I. Hodder, pp. 1-16. Cambridge University Press, Cambridge, UK.

1985 Postprocessual Archaeology. In *Advances in Archaeological Method and Theory*, edited by M. B. Schiffer, pp. 1-26. vol. 8. Academic Press, New York.
- Hodder, I. and S. Hutson
2003 *Reading the Past: Current Approaches to Interpretation in Archaeology*. 3rd ed. Cambridge University Press, Cambridge.
- Hodder, I. and C. Orton
1976 *Spatial Analysis in Archaeology*. Cambridge University Press, Cambridge.
- Hoover, R. L.
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 D. H. Thomas, pp. 395-406. Smithsonian Institution Press, Washington D.C.

1992 Some Models for Spanish Colonial Archaeology in California. *Historical Archaeology* 26(1):37-44.
- Hughes, R. E. and R. Milliken
2007 Prehistoric Material Conveyance. In *California Prehistory: Colonization, Culture, and Complexity*, edited by T. L. Jones and K. A. Klar, pp. 259-271. AltaMira Press, Lanham, MD.
- Jones, A.
2001 *Archaeological Theory and Scientific Practice*. Cambridge University Press, Cambridge, UK.
- Jones, R.
1991 Archaeology, the Longue Durée and the Limits of the Roman Empire. In *The Annales School and Archaeology*, edited by J. Bintliff, pp. 93-107. New York University Press, New York.
- Jones, T.
2000 *Distribution Analysis of the Jimerson Collection of Ming Pottery Sherds at Drakes Bay*. Unpublished Manuscript on File at National Park Service.

- Jorg, C. J. A.
1997 *Chinese Ceramics in the Collection of the Rijksmuseum, Amsterdam: The Ming and Qing Dynasties*. Philip Wilson, Amsterdam.
- Joyce, R. A.
2003 Concrete Memories: Fragments of the Past in the Classic Maya Present (500-1000 AD). In *Archaeologies of Memory*, edited by R. M. Van Dyke and S. E. Alcock, pp. 104-125. Blackwell, Oxford.
- Justice, N. D.
2002 *Stone Age Spear and Arrow Points of California and the Great Basin*. Indiana University Press, Bloomington, IN.
- Katsianis, M., S. Tsipidis, K. Kotsakis and A. Kousoulakou
2008 A 3D Digital Workflow for Archaeological Intra-site Research Using GIS. *Journal of Archaeological Science* 35:655-667.
- Keate, G.
2002 [1788] *An Account of the Pelew Islands*, edited by K. L. Nero and N. Thomas. Leicester University Press, London.
- Kelly, I.
1978a Coast Miwok. In *Handbook of North American Indians*, edited by R. F. Heizer, pp. 414-425. vol. 8, California. Smithsonian Institution, Washington D.C.

1978b Some Coast Miwok Tales. *Journal of California Anthropology* 5(1):21-41.
- Kelly, K.
2002 Indigenous Responses to Colonial Encounters on the West African Coast: Hueda and Dahomey from the Seventeenth through Nineteenth Century. In *The Archaeology of Colonialism*, edited by C. L. Lyons and J. K. Papadopoulos, pp. 96-120. Getty Research Institute, Los Angeles.
- Kepecs, S.
1997 Introduction to New Approaches to Combining the Archaeological and Historical Records. *Journal of Archaeological Method and Theory* 4(3/4):193-198.
- King, T. F. and W. F. Upson
1970 Protohistory on Limantour Sandspit: Archaeological Investigations at 4-Mrn-216 and 4-Mrn-298. In *Contributions to the Archaeology of Point Reyes National Seashore: A Compendium in Honor of Adan E. Treganza*, edited by R. E. Schenk, pp. 114-194. Treganza Museum Papers No. 6, San Francisco State College.
- Kirch, P. V.
1992 *Anahulu: The Anthropology of History in the Kingdom of Hawaii. The Archaeology of History*. Vol. 2. University of Chicago Press, Chicago.

- Kirch, P. V. and M. Sahlins
1992 *Anahulu: The Anthropology of History in the Kingdom of Hawaii*. 2 Vols. University of Chicago Press, Chicago.
- Knapp, A. B.
1992a Archaeology and *Annales*: Time, Space, and Change. In *Archaeology, Annales, and Ethnohistory*, edited by A. B. Knapp, pp. 1-21. Cambridge University Press, Cambridge.

1992b *Archaeology, Annales, and Ethnohistory*. Cambridge University Press, Cambridge.
- Kopytoff, I.
1986 The Cultural Biography of Things: Commoditization as Process. In *The Social Life of Things: Commodities in Cultural Perspective*, edited by A. Appadurai, pp. 64-91. Cambridge University Press, Cambridge, UK.
- Kostromitinov, P.
1974 Notes on the Indians of 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 by F. Stross and R. F. Heizer, pp. 7-18. Archaeological Research Facility, University of California, Berkeley.
- Krahl, R. and J. Ayers
1986 *Chinese Ceramics in the Topkapi Saray Museum, Istanbul: A Complete Catalogue* Volume III: Qing Dynasty Porcelains. Sotheby's Publications, London.
- Kroeber, A. L.
1907 The Religion of the Indians of California. *University of California Publications in American Archaeology and Ethnology* 4(6):319-356.

1908 On the Evidences of the Occupation of Certain Regions by the Miwok Indians. *University of California Publications in American Archaeology and Ethnology* 6(3):369-380.

1911 The Languages of the Coast of California North of San Francisco. *University of California Publications in American Archaeology and Ethnology* 9(3):273-435.

1922 Elements of Culture in Native California. *University of California Publications in American Archaeology and Ethnology* 13(8):259-328.

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

1932 The Patwin and Their Neighbors. *University of California Publications in American Archaeology and Ethnology* 29(4):253-423.

- 1942 Introduction. In *Archaeological Evidence of Sebastian Rodríguez Cermeño's California Visit in 1595*, pp. 1-3, Reprint from *California Historical Society Quarterly*, Vol. XX, No. 4 (December 1941). California Historical Society, San Francisco.
- 1962 The Nature of Land-Holding Groups in Aboriginal California. In *Two Papers on the Aboriginal Ethnography of California*, pp. 19-58. Reports of the University of California Archaeological Survey No.56. University of California Archaeological Survey, Department of Anthropology, University of California, Berkeley, CA.
- Kuwayama, G.
1997 *Chinese Ceramics in Colonial Mexico*. Los Angeles County Museum of Art, Los Angeles.
- Lamb, J., V. Smith and N. Thomas (editors)
2000 *Exploration and Exchange: A South Seas Anthology 1680-1900*. University of Chicago Press, Chicago.
- Layton, R.
2006 Structuralism and Semiotics. In *Handbook of Material Culture*, edited by C. Tilley, W. Keane, S. Kuchler, M. Rowlands and P. Spyer, pp. 29-42. Sage Publications, London.
- Le Roy Ladurie, E.
1979 *The Territory of the Historian*. University of Chicago Press, Chicago.
- Leone, M. P. and P. B. Potter, Jr.
1988 Introduction: Issues in Historical Archaeology. In *The Recovery of Meaning: Historical Archaeology in the Eastern United States*, edited by M. P. Leone and P. B. Potter, Jr., pp. 1-22. Smithsonian Institution Press, Washington D.C.
- Lévi-Strauss, C.
1963 *Structural Anthropology*. Translated by C. Jacobson and B. Grundfest Schoepf. Basic Books, New York.
- L'Hour, M., L. Long and E. Rieth
1990 The Wreck of an 'Experimental' Ship of the 'Oost-Indische Companie': The *Mauritius* (1609). *International Journal of Nautical Archaeology and Underwater Exploration* 19(1):63-73.
- Li, H.
1996 *Chinese Ceramics: A New Comprehensive Survey From the Asian Art Museum of San Francisco*. Rizzoli, New York.
- Lightfoot, K. G.
1995 Culture Contact Studies: Redefining the Relationship Between Prehistoric and Historical Archaeology. *American Antiquity* 60(2):199-217.

- 2001 Traditions as Cultural Production: Implications for Contemporary Archaeological Research. In *The Archaeology of Tradition: Agency and History Before and After Columbus*, edited by T. R. Pauketat, pp. 237-252. University Press of Florida, Gainesville.
- 2003 Russian Colonization: The Implications of Mercantile Colonial Practices in the North Pacific. *Historical Archaeology* 37(4):14-28.
- 2005a *Indians, Missionaries, and Merchants: The Legacy of Colonial Encounters on the California Frontiers*. University of California Press, Berkeley.
- 2005b The Archaeology of Colonization: California in Cross-Cultural Perspective. In *The Archaeology of Colonial Encounters: Comparative Perspectives*, edited by G. J. Stein, pp. 207-236. School of American Research Press, Santa Fe.
- Lightfoot, K. G. and A. Martinez
1995 Frontiers and Boundaries in Archaeological Perspective. *Annual Review of Anthropology* 24:417-492.
- Lightfoot, K. G., A. Martinez and A. M. Schiff
1998 Daily Practice and Material Culture in Pluralistic Social Settings: An Archaeological Study of Culture Change and Persistence from Fort Ross, California. *American Antiquity* 63(2):199-222.
- Lightfoot, K. G. and O. Parrish
2009 *California Indians and Their Environment: An Introduction*. University of California Press, Berkeley, CA.
- Lightfoot, K. G., A. M. Schiff and T. A. Wake (editors)
1997 *The Archaeology and Ethnohistory of Fort Ross, California, Vol. 2: The Native Alaskan Neighborhood A Multiethnic Community at Colony Ross*, Contributions of the University of California Archaeological Research Facility No. 55. University of California, Berkeley.
- Lightfoot, K. G. and W. 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.
- Lightfoot, K. G., T. A. Wake and A. M. Schiff
1991 *The Archaeology and Ethnohistory of Fort Ross, California, Vol. 1*. Contributions of the University of California Archaeological Research Facility No. 49. University of California, Berkeley.
- 1993 Native Responses to the Russian Mercantile Colony of Fort Ross, Northern California. *Journal of Field Archaeology* 20:159-175.

- Lillard, J. B., R. F. Heizer and F. Fenenga
 1939 *An Introduction to the Archaeology of Central California*. Sacramento Junior College, Department of Anthropology. Bulletin 2.
- Linnekin, J.
 1991 Inside, Outside: A Hawaiian Community in the World-System. In *Clio in Oceania: Toward a Historical Anthropology*, edited by A. Biersack, pp. 165-203. Smithsonian Institution Press, Washington D.C.
- Little, B. J. and P. A. Shackel
 1989 Scales of Historical Anthropology: An Archaeology of Colonial Anglo-America. *Antiquity* 63(240):495-509.
- Litzenburg, T. V. J.
 2003 *Chinese Export Porcelain in the Reeves Center Collection at Washington and Lee University*. Third Millennium Publishing, London.
- Loeb, E. M.
 1926 Pomo Folkways. *University of California Publications in American Archaeology and Ethnology* 19(2):149-405.
 1932 The Western Kuksu Cult. *University of California Publications in American Archaeology and Ethnology* 33(1):1-137.
- Loren, D. D.
 2000 The Intersections of Colonial Policy and Colonial Practice: Creolization on the Eighteenth-Century Louisiana/Texas Frontier. *Historical Archaeology* 34(3):85-98.
 2001 Manipulating Bodies and Emerging Traditions at the Los Adaes Presidio. In *The Archaeology of Tradition: Agency and History Before and After Columbus*, edited by T. R. Pauketat, pp. 58-76. University Press of Florida, Gainesville.
- Luby, E. M., C. D. Drescher and K. G. Lightfoot
 2006 Shell Mounds and Mounded Landscapes in the San Francisco Bay Area: An Integrated Approach. *Journal of Island and Coastal Archaeology* 1:191-214.
- Lyons, C. L. and J. K. Papadopoulos (editors)
 2002 *The Archaeology of Colonialism*. Getty Research Institute, Los Angeles.
- Maguire, D. J., M. Batty and M. F. Goodchild
 2005 GIS, Spatial Analysis, and Modeling: Current Status and Future Prospects. In *GIS, Spatial Analysis, and Modeling*, edited by D. J. Maguire, M. Batty and M. F. Goodchild, pp. 445-455. ESRI Press, Redlands, CA.

- Marken, M. W.
1994 *Pottery From Spanish Shipwrecks 1500-1800*. University Press of Florida, Gainesville, FL.
- Markham, S. C. (editor)
1904 *The Voyages of Pedro Fernandez de Quiros, 1595-1606*. Two Volumes. The Hakluyt Society, London.
- Marshall, Y. and A. Maas
1997 Dashing Dishes. *World Archaeology* 28(3):275-290.
- Martin, C. J. M.
1979 Spanish Armada pottery. *International Journal of Nautical Archaeology and Underwater Exploration* 8(4):279-302.
- Martinez, A.
1997 View From the Ridge: The Kashaya Pomo in a Russian-American Company Context. *Kroeber Anthropological Society Papers* 81:141-156.
- Martínez, A.
1597 f. 420(mod)/420v, 285(or)/285v. In *Archivo Historico de Hacienda, Vol. 1239-2*. Archivo General de la Nacion, Mexico City.
- Mathes, W. M. (editor)
1965 *Californiana I: Documentos Para la Historia de la Demarcacion Comercial de California, 1583-1632*. Ediciones Jose Porrua Turanzas, Madrid.
- McCoy, M. D. and T. N. Ladefoged
2009 New Developments in the Use of Spatial Technology in Archaeology. *Journal of Archaeological Research* 17(3):263-295.
- McEwan, B. G.
1991 The Role of Ceramics in Spain and Spanish America during the 16th Century. *Historical Archaeology* 26:92-108.
- Meighan, C. W.
1949 University of California Archaeological Site Survey Record, 4-MRN-307. University of California Archaeological Survey Site Records, Phoebe A. Hearst Museum of Anthropology, Berkeley, CA.

1950a *Excavations in Sixteenth Century Shellmounds at Drake's Bay, Marin County*. University of California Archaeological Survey Report No. 9, Papers on California Archaeology No. 9. Department of Anthropology, University of California, Berkeley, CA.

1950b *Report on the 1949 Excavation of 16th Century Indian Shellmounds at Drake's Bay*. Archaeological Archives Manuscript No. 79, Phoebe A. Hearst Museum of Anthropology, University of California, Berkeley.

1950c *Observations on the Efficiency of Shovel Archaeology*. University of California Archaeological Survey Report No. 7, Papers on California Archaeology No. 4. Department of Anthropology, University of California, Berkeley, CA.

1950d Field Notes, Site 4-Mrn-307 (Manuscript No. 79). In *Collection of Manuscripts from the Archaeological Archives of the Phoebe Hearst Museum of Anthropology*, Phoebe Hearst Museum of Anthropology, University of California, Berkeley.

1966 *Archaeology: An Introduction*. Chandler Publishing Company, San Francisco.

1981 "This is the Way the World Ends": Native Responses to the Age of Exploration in California. In *Early California: Perception and Reality*, pp. 45-74. William Andrews Clark Memorial Library, University of California, Los Angeles.

2002 The Stoneware Site, A 16th Century Site on Drakes Bay. In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, edited by W. J. Wallace and F. A. Riddell, pp. 62-87. Contributions of the University of California Archaeological Research Facility No. 60. University of California, Berkeley.

Meighan, C. W. and R. F. Heizer

1952 Archaeological Exploration of Sixteenth-Century Indian Mounds at Drake's Bay. *California Historical Society Quarterly* 31(2):99-108.

Merriam, C. H.

1907 Distribution and Classification of the Mewan Stock of California. *American Anthropologist* 9(2):338-357.

1910 *The Dawn of the World: Myths and Weird Tales Told by the Mewan Indians of California*. The Arthur H. Clark Co., Cleveland.

1967 *Ethnographic Notes on California Indian Tribes, III. Ethnological Notes on Central California Indian Tribes*. Compiled and Edited by Robert F. Heizer. Reports of the University of California Archaeological Survey No. 68, Part III. University of California Archaeological Research Facility, Department of Anthropology, University of California, Berkeley.

1977 *Ethnogeographic and Ethnosynonymic Data from Central California Tribes*. Assembled and Edited by Robert F. Heizer. Contributions to Native California Ethnology from the C. Hart Merriam Collection. Archaeological Research Facility, Department of Anthropology, University of California, Berkeley.

- Miller, C. L. and G. R. Hamell
1986 A New Perspective on Indian-White Contact: Cultural Symbols and Colonial Trade. *Journal of American History* 73(2):311-328.
- Miller, D.
1987 *Material Culture and Mass Consumption*. Basil Blackwell, Oxford.
- Miller, G. L. and M. Moodey
1986 Of Fish and Sherds: A Model for Estimating Vessel Populations from Minimal Vessel Counts. *Historical Archaeology* 20(2):59-85.
- Milliken, R.
1995 *A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769-1810*. Ballena Press, Menlo Park, CA.

2009 Ethnohistory and Ethnogeography of the Coast Miwok and Their Neighbors, 1783-1840. Technical Paper Submitted to National Park Service, Golden Gate National Recreation Area, San Francisco, CA.
- Milliken, R., R. T. Fitzgerald, M. G. Hylkema, R. Groza, T. Origer, D. G. Bieling, A. Leventhal, R. S. Wiberg, A. Gottsfield, D. Gillette, V. Bellifemine, E. Strother, R. Cartier and D. A. Fredrickson
2007 Punctuated Culture Change in the San Francisco Bay Area. In *California Prehistory: Colonization, Culture, and Complexity*, edited by T. L. Jones and K. A. Klar, pp. 99-124. AltaMira Press, Lanham, MD.
- Mills, B. J.
2004 The Establishment and Defeat of Hierarchy: Inalienable Possessions and the History of Collective Prestige Structures in the Pueblo Southwest. *American Anthropologist* 106(2):238-251.
- Mitchell, A.
2005 *The ESRI Guide to GIS Analysis, Volume 2: Spatial Measurements and Statistics*. Environmental Systems Research Institute, Redlands, CA.
- Moratto, M. J.
1974 *An Assessment of the Cultural Resources Within Point Reyes National Seashore*. A Report of Research, Prepared in Fulfillment of U.S. National Park Service Contract No. PX810030185 with the Frederic Burk Foundation For Education.

1984 *California Archaeology*. Academic Press, New York.
- Moreland, J. F.
1992 Restoring the Dialectic: Settlement Patterns and Documents in Medieval Central Italy. In *Archaeology, Annales, and Ethnohistory*, edited by A. B. Knapp, pp. 112-129. Cambridge University Press, Cambridge.

- Muckelroy, K.
1978 *Maritime Archaeology*. Cambridge University Press, Cambridge.
- Murray, T. (editor)
2004 *The Archaeology of Contact in Settler Societies*. Cambridge University Press, Cambridge.
- Neasham, A.
1949 Letter to NPS Archaeologist Caywood, August 31, 1949. In *Box 2, Folder 16, Allen Lawrence Chickering Papers (Manuscript No. 371)*. North Baker Research Library, California Historical Society, San Francisco, CA.
- Nigro, J. D., P. S. Ungar, D. J. de Ruiter and L. R. Berger
2003 Developing a Geographic Information System (GIS) for Mapping and Analysing Fossil Deposits at Swartkrans, Gauteng Province, South Africa. *Journal of Archaeological Science* 30:317-324.
- Nutley, D.
1995 More Than a Shipwreck: The Convict Ship Hive - Aboriginal and European Contact Site. *Bulletin of the Australian Institute for Maritime Archaeology* 19(2):17-26.
- Nuttall, Z. (editor)
1914 *New Light on Drake: A Collection of Documents Relating to his Voyage of Circumnavigation, 1577-1580*. The Hakluyt Society, London.
- Obeyesekere, G.
1992 *The Apotheosis of Captain Cook: European Mythmaking in the Pacific*. Princeton University Press, Princeton.

1995 Re-Weaving the Argument: A Response to Parker. *Oceania* 65(3):268-273.

1998 Cannibal Feasts in Nineteenth-Century Fiji: Seamen's Yarns and the Ethnographic Imagination. In *Cannibalism and the Colonial World*, edited by F. Barber, P. Hulme and M. Iversen, pp. 63-86. Cambridge University Press, Cambridge.
- Origer, T. M.
1987 *Temporal Control in the Southern North Coast Ranges of California: The Application of Obsidian Hydration Analysis*. Papers in Northern California Anthropology No. 1, Northern California Anthropological Group, Berkeley, CA.
- Ortner, S. B.
1984 Theory in Anthropology Since the Sixties. *Comparative Studies in Society and History* 26(1):126-166.

- Orton, C.
1993 How Many Pots Make Five? An Historical Review of Pottery Quantification. *Archaeometry* 35(2):169-184.
- Parker, S. K.
1995 The Revenge of Practical Reason? A Review Essay on Gannath Obeyesekere's The Apotheosis of Captain Cook. *Oceania* 65(3):257-267.
- Pauketat, T. R.
2001a A New Tradition in Archaeology. In *The Archaeology of Tradition: Agency and History Before and After Columbus*, edited by T. R. Pauketat, pp. 1-16. University Press of Florida, Gainesville.

2001b Practice and History in Archaeology: An Emerging Paradigm. *Anthropological Theory* 1(1):73-98.
- Perez-Mallaina, P. E.
1998 *Spain's Men of the Sea: Daily Life on the Indies Fleets in the Sixteenth Century*. Translated by C. R. Phillips. Johns Hopkins University Press, Baltimore, MD.
- Péron, R. K., E. P. Von der Porten and W. F. Upson
1973 Excavations and Site Survey Information from Point Reyes National Seashore Under Permit No. 71-CA-061. PORE 6680, Box 4, Folder 6 on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.
- Peter, J.
1923 Survey of Tomales Bay, Bodega Bay and Sonoma County Coast Sites, with Quadrangle Maps (Manuscript No. 436). In *Collection of Manuscripts from the Archaeological Archives of the Phoebe Hearst Museum of Anthropology*, Phoebe Hearst Museum of Anthropology, University of California, Berkeley.
- Playford, P.
1996 *Carpet of Silver: The Wreck of the Zuytdorp*. University of Western Australia Press, Nedlands, Western Australia.
- Plog, F. T.
1973 Diachronic Anthropology. In *Research and Theory in Current Archeology*, edited by C. L. Redman, pp. 181-198. John Wiley & Sons, New York.
- Polansky, B.
1998 *A Prehistoric Archaeological Settlement Pattern Model for the Point Reyes Peninsula*, M.A. Thesis, Cultural Resources Management Program, Sonoma State University.

- Pope, J. A.
1956 *Chinese Porcelains from the Ardebil Shrine*. Smithsonian Institution Freer Gallery of Art, Washington D.C.
- Powell, J. W.
1891 Indian Linguistic Families of America North of Mexico. In *Bureau of American Ethnology, Seventh Annual Report, 1885-1886*, pp. 1-142, Washington D.C.
- Preston, W. L.
1996 Serpent in Eden: Dispersal of Foreign Diseases into Pre-Mission California. *Journal of California and Great Basin Anthropology* 18(1):2-37.

1997 Serpent in the Garden: Environmental Change in Colonial California. *California History* 76(2 and 3):260-298.

2002 Portents of Plague from California's Protohistoric Period. *Ethnohistory* 49(1):69-121.
- Preucel, R. W.
2006 *Archaeological Semiotics*. Blackwell, London.
- Preucel, R. W. and L. Meskell
2004 Knowledges. In *A Companion to Social Archaeology*, edited by L. Meskell and R. W. Preucel, pp. 3-22. Blackwell Publishing, Oxford.
- Ramenofsky, A. F.
1987 *Vectors of Death: The Archaeology of European Contact*. University of New Mexico Press, Albuquerque.
- Rick, T. C.
2007 Household and Community Archaeology at the Chumash Village of Niaqla, Santa Rosa Island, California. *Journal of Field Archaeology* 32(3):243-263.
- Riley, L. M.
1976 *An Assessment of Endangered Archaeological Sites at Point Reyes National Seashore*. Manuscript on file at Point Reyes National Seashore Archives.
- Rinaldi, M.
1989 *Kraak Porcelain: A Moment in the History of the Trade*. Bamboo Publishing, London.
- Robertson, G.
1769 [1766-1768] Journal of the Dolphin's 2d Voyage by Mr George Robertson, Master of her. In *The Discovery of Tahiti: A Journal of the Second Voyage of H.M.S. Dolphin Round the World, Under the Command of Captain Wallis, R.N., in the Years*

1766, 1767 and 1768 written by her master George Robertson, edited by H. Carrington, pp. 1-255. The Hakluyt Society, London.

Rogers, J. D.

1990 *Objects of Change: The Archaeology and History of Arikara Contact with Europeans*. Smithsonian Institution Press, Washington D.C.

Rogers, J. D. and S. M. Wilson (editors)

1993 *Ethnohistory and Archaeology: Approaches to Postcontact Change in the Americas*. Plenum Press, New York.

Rubertone, P. E.

2000 The Historical Archaeology of Native Americans. *Annual Review of Anthropology* 29:425-446.

Rudo, M.

2002 Field Investigation Report, PORE, Home Bay, Archeological Human Remains, CA-Mrn-242. On file at Point Reyes National Seashore, Point Reyes Station, CA.

Sadin, P.

2007 *Managing a Land in Motion: An Administrative History of Point Reyes National Seashore*. National Park Service, Point Reyes Station, CA.

Sahlins, M.

1981a *Historical Metaphors and Mythical Realities: Structure in the Early History of the Sandwich Islands Kingdom*. Association for the Study of Anthropology in Oceania, Special Publication No. 1. University of Michigan Press, Ann Arbor.

1981b The Stranger King, or Dumézil among the Fijians. *Journal of Pacific History* 16(3):107-132.

1982 The Apotheosis of Captain Cook. In *Between Belief and Transgression: Structuralist Essays in Religion, History, and Myth*, edited by M. Izard and P. Smith, pp. 73-102. University of Chicago Press, Chicago.

1983 Other Times, Other Customs: The Anthropology of History. *American Anthropologist* 85(3):517-544.

1985 *Islands of History*. University of Chicago Press, Chicago.

1991 Return of the Event, Again; With Reflections on the Beginnings of the Great Fijian War of 1843 to 1855 Between the Kingdoms of Bau and Rewa. In *Clio in Oceania: Toward a Historical Anthropology*, edited by A. Biersack, pp. 37-99. Smithsonian Institution Press, Washington D.C.

- 1992 *Anahulu: The Anthropology of History in the Kingdom of Hawaii. Historical Ethnography*. Vol. 1. University of Chicago Press, Chicago.
- 1995 *How "Natives" Think: About Captain Cook, For Example*. University of Chicago Press, Chicago.
- 2000 Cosmologies of Capitalism: The Trans-Pacific Sector of "The World System". In *Culture in Practice: Selected Essays*, pp. 415-469. Zone Books, New York.
- 2003 Artificially Maintained Controversies: Global Warming and Fijian Cannibalism. *Anthropology Today* 19(3):3-5.
- 2004 *Apologies to Thucydides: Understanding History as Culture and Vice Versa*. University of Chicago Press, Chicago.
- 2005 Structural Work: How Microhistories Become Macrohistories and Vice Versa. *Anthropological Theory* 5(1):5-30.
- Salmond, A.
- 1991 *Two Worlds: First Meetings Between Maori and Europeans, 1642-1772*. University of Hawaii Press, Honolulu.
- 1993 Whose God, Or Not? *Social Analysis* 34:50-55.
- 1997 *Between Worlds: Early Exchanges Between Maori and Europeans, 1773-1815*. Viking, New York.
- 2003 *The Trial of the Cannibal Dog: Captain Cook in the South Seas*. Yale University Press, New Haven.
- Sanchez, J. P.
- 2001 From the Philippines to the California Coast in 1595: The Last Voyage of San Agustin Under Sebastian Rodriguez Cermeño. *Colonial Latin American Historical Review* 10(2):223-251.
- Saunders, R.
- 1998 Forced Relocation, Power Relations, and Culture Contact in the Missions of La Florida. In *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*, edited by J. G. Cusick, pp. 402-429. Occasional Paper No. 25. Center for Archaeological Investigations, Southern Illinois University at Carbondale, Carbondale, IL.
- Schieffelin, E. L.
- 1991 Introduction. In *Like People You See in a Dream: First Contact in Six Papuan Societies*, edited by E. L. Schieffelin and R. Crittenden, pp. 1-11. Stanford University Press, Stanford.

- Schneider, T. D.
2009 Shell Mounds of China Camp and Tomales Bay State Parks, Marin County. In *Proceedings of the Society for California Archaeology, Volume 21*, edited by S. A. Waechter and D. Laylander, pp. 63-68, San Jose, CA.
- Schurz, W. L.
1939 *The Manila Galleon*. E. P. Dutton & Co., Inc., New York.
- Sewell, W. H.
2005 *Logics of History: Social Theory and Social Transformation*. University of Chicago Press, Chicago.
- Shangraw, C. and E. P. Von der Porten
1981 *The Drake and Cermeno Expeditions' Chinese Porcelains at Drakes Bay, California, 1579 and 1595*. Santa Rosa Junior College and Drake Navigators Guild, Santa Rosa and Palo Alto, CA.

1997 *Kraak Plate Design Sequence 1550-1655*. Drake Navigators Guild, San Francisco, CA.
- Shipley, W. F.
1978 Native Languages of California. In *Handbook of North American Indians*, edited by R. F. Heizer, pp. 80-90. vol. 8, California. Smithsonian Institution, Washington D.C.
- Silliman, S. W.
2004 *Lost Laborers in Colonial California: Native Americans and the Archaeology of Rancho Petaluma*. University of Arizona Press, Tucson, AZ.

2005 Culture Contact or Colonialism? Challenges in the Archaeology of Native North America. *American Antiquity* 70(1):55-74.

2009 Change and Continuity, Practice and Memory: Native American Persistence in Colonial New England. *American Antiquity* 74(2):211-230.
- Slaymaker, C. M.
1982 *A Model for the Study of Coast Miwok Ethnogeography*. Ph.D. Dissertation, University of California, Davis.
- Smith, M. E.
1992 Braudel's Temporal Rhythms and Chronology Theory in Archaeology. In *Archaeology, Annales, and Ethnohistory*, edited by A. B. Knapp, pp. 23-34. Cambridge University Press, Cambridge.
- Spate, O. H. K.
1979 *The Spanish Lake*. Australian National University Press, Canberra.

- Spikins, P., C. Conneller, H. Ayestaran and B. Scaife
2002 GIS Based Interpolation Applied to Distinguishing Occupation Phases of Early Prehistoric Sites. *Journal of Archaeological Science* 29:1235-1245.
- Staniforth, M.
1997 The Archaeology of the Event - The Annales School and Maritime Archaeology. In *Underwater Archaeology*, edited by D. C. Lakey, pp. 17-21.

2003a *Annales*-Informed Approaches to the Archaeology of Colonial Australia. *Historical Archaeology* 37(1):102-113.

2003b *Material Culture and Consumer Society: Dependent Colonies in Colonial Australia*. Kluwer Academic/Plenum Publishers, New York.
- Stein, G. J. (editor)
2005a *The Archaeology of Colonial Encounters: Comparative Perspectives*. School of American Research Press, Santa Fe.
- Stein, G. J.
1998 World System Theory and Alternative Modes of Interaction in the Archaeology of Culture Contact. In *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*, edited by J. G. Cusick, pp. 220-255. Occasional Paper No. 25. Center for Archaeological Investigations, Southern Illinois University at Carbondale, Carbondale, IL.

2002 From Passive Periphery to Active Agents: Emerging Perspectives in the Archaeology of Interregional Interaction. *American Anthropologist* 104(3):903-916.

2005b Introduction: The Comparative Archaeology of Colonial Encounters. In *The Archaeology of Colonial Encounters: Comparative Perspectives*, edited by G. J. Stein, pp. 3-32. School of American Research Press, Santa Fe.
- Stewart, S.
2003 An Overview of Research Issues for Indigenous Archaeology for the PRNS-GGNRA. In *Archaeological Research Issues for the Point Reyes National Seashore - Golden Gate National Recreation Area*, edited by S. Stewart and A. Praetzelis, pp. 49-246. Anthropological Studies Center, Sonoma State University, Rohnert Park, CA.
- Taylor, A. S.
1860 The Indianology of California, or, Fragmentary Notes, Selected and Original, on the Indian Tribes of the Countries Formerly called Alta and Baja California, in Four Series of 150 Separate Numbers, Published in the California Farmer from 1860 to 1863. The Bancroft Library, University of California, Berkeley, CA.

Thomas, N.

1990 Taking People Seriously: Cultural Autonomy and the Global System. *Critique of Anthropology* 9(3):59-69.

1991 *Entangled Objects: Exchange, Material Culture, and Colonialism in the Pacific*. Harvard University Press, Cambridge.

1996 *Out of Time: History and Evolution in Anthropological Discourse*. Second ed. University of Michigan Press, Ann Arbor.

1997a Tin and Thatch. In *In Oceania: Visions, Artifacts, Histories*, pp. 172-185. Duke University Press, Durham.

1997b Partial Texts: Representation, Colonialism, and Agency in Pacific History. In *In Oceania: Visions, Artifacts, Histories*, pp. 23-49. Duke University Press, Durham.

2002a Colonizing Cloth: Interpreting the Material Culture of Nineteenth-Century Oceania. In *The Archaeology of Colonialism*, edited by C. L. Lyons and J. K. Papadopoulos, pp. 182-198. Getty Research Institute, Los Angeles.

2002b 'The Pelew Islands' in British Culture. In *An Account of the Pelew Islands*, edited by K. L. Nero and N. Thomas, pp. 27-39. Leicester University Press, London.

Thompson, S.

1946 A Progress Report on the Drake's Bay Faunal Identification. In *Notes on Various Marin County Sites (Manuscript No. 112)*. Collection of Manuscripts from the Archaeological Archives of the Phoebe Hearst Museum of Anthropology, Phoebe Hearst Museum of Anthropology, University of California, Berkeley.

Thorne, R. M. and J. E. Ehrenhard

2003 Point Reyes National Seashore: In-Situ Conservation and Treatment of Selected Archaeological Sites. On file at Point Reyes National Seashore, Point Reyes Station, CA.

Tilley, C.

2001 Ethnography and Material Culture. In *Handbooks of Ethnography*, edited by P. Atkinson, A. Coffey, S. Delamont, J. Lofland and L. Lofland, pp. 258-271. SAGE Publications, London.

Torrence, R. and A. Clarke (editors)

2000 *The Archaeology of Difference: Negotiating Cross-Cultural Engagements in Oceania*. Routledge, London.

Townsend, C.

2003 Burying the White Gods: New Perspectives on the Conquest of Mexico. *American Historical Review* 108(3):659-687.

Treganza, A. E.

1958 Letter to Robert F. Heizer, November 18, 1958. In *Robert Fleming Heizer papers, BANC FILM 2106 (Originals: BANC MSS 78/17 c), Series 1: Correspondence, 1931-1979, Reel 34, Frames 440-467, Treganza A.E., 1946-1967*. The Bancroft Library, University of California, Berkeley, CA.

1959 The Examination of Indian Shellmounds in the Tomales and Drake's Bay Areas With Reference to Sixteenth Century Historic Contacts (Manuscript No. 283). In *Collection of Manuscripts from the Archaeological Archives of the Phoebe Hearst Museum of Anthropology*. Phoebe Hearst Museum of Anthropology, University of California, Berkeley.

1964 San Francisco State College Archaeological Field Specimen Inventory Record, MRN-216 and MRN-298, Spring 1964. PORE 6679, Box 3, Folder 7 and PORE 6679, Box 1, Folder 3 on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.

1965 San Francisco State College Archaeological Field Specimen Inventory Record, MRN-216, Fall 1965. PORE 6679, Box 1, Folder 3 on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.

1966 San Francisco State College Archaeological Field Specimen Inventory Record, MRN-216, Spring and Fall 1966. PORE 6679, Box 1, Folders 3 and 4 on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.

1967 San Francisco State College Archaeological Field Specimen Inventory Record, MRN-216, Spring and Fall 1967. PORE 6679, Box 1, Folder 4 on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.

Treganza, A. E. and T. F. King (editors)

1968 *Archaeological Studies in Point Reyes National Seashore*. San Francisco State College Archaeological Survey and Santa Rosa Junior College.

Trigger, B. G.

1986 Ethnohistory: The Unfinished Edifice. *Ethnohistory* 33(3):253-267.

1989 *A History of Archaeological Thought*. Cambridge University Press, Cambridge.

1991 Early Native American Responses to European Contact: Romantic versus Rationalistic Interpretations. *Journal of American History* 77(4):1195-1215

Turgeon, L.

1997 The Tale of the Kettle: Odyssey of an Intercultural Object. *Ethnohistory* 44(1):1-29.

- 2004 Beads, Bodies and Regimes of Value: From France to North America, c. 1500-c. 1650. In *The Archaeology of Contact in Settler Societies*, edited by T. Murray, pp. 19-47. Cambridge University Press, Cambridge.
- Turner, D. H.
1974 *Tradition and Transformation: A Study of Aborigines in the Groote Eylandt Area, Northern Australia*. Australian Aboriginal Studies No. 53. Australian Institute of Aboriginal Studies, Canberra.
- Upson, W. F.
1967 Excavations at MRN-298W: 1966-1967 Season. Manuscript No. 6680, Box 4, Folder 2, on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.

1969 Excavations at 4-Mrn-298W: Fall 1968. Manuscript No. 6680, Box 4, Folder 4, on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.

1977 *A Description of Fifteen Archaeological Sites at Point Reyes National Seashore*. A Report Prepared in Satisfaction of Purchase Order PX 8000 70579, Western Region Office, U.S. National Park Service. On file at Point Reyes National Seashore.
- Upton, D.
1996 Ethnicity, Authenticity, and Invented Traditions. *Historical Archaeology* 30(2):1-7.
- Vaux, W. S. W. (editor)
1854 *The World Encompassed by Sir Francis Drake*. The Hakluyt Society, London.
- Von der Porten, E. P.
1961-1962 Archaeological Site Survey Records, Site Maps, and Excavation Records for DNG-1, Pits 1-13. Manuscript No. 6680, Box 1, Folder 3 on file at Point Reyes National Seashore Archives, Point Reyes Station, CA.

1951-1962 Artifact's From Drake's Cove. Manuscript No. PORE 6680, Box 1, Folder 1 on File at Point Reyes National Seashore Archives, Point Reyes Station, CA.

1972 Drake and Cermeño in California: Sixteenth Century Chinese Ceramics. *Historical Archaeology* 6:1-22.

1952-1973 Drake Navigators Guild Archaeological Field Specimen Inventory Record. Manuscript No. PORE 6680, Box 1, Folder 2 on File at Point Reyes National Seashore Archives, Point Reyes Station, CA.

1965 *Drake-Cermeño: An Analysis of Artifacts*. Unpublished manuscript by Drake Navigators Guild, Point Reyes, CA.

- 1963 Drakes Bay Shellmound Archaeology 1951-1962. Unpublished manuscript by Drake Navigators Guild, Point Reyes, CA.
- 1968 *The Porcelains and Terra Cottas of Drakes Bay*. Unpublished manuscript by Drake Navigators Guild, Point Reyes, CA.
- 1970 The Porcelains and Terra Cottas of Drakes Bay. In *Contributions to the Archaeology of Point Reyes National Seashore: A Compendium in Honor of Adan E. Treganza*, edited by R. E. Schenk, pp. 223-256. Treganza Museum Papers No. 6, San Francisco State College.
- 1976 *Two Oriental Porcelain Sherds from Olompali, Marin County, California*. Unpublished manuscript by Drake Navigators Guild, Point Reyes, CA.
- Von der Porten, E. P. and R. K. Peron
 1973 Archaeology in the Point Reyes National Seashore. Unpublished manuscript by Drake Navigators Guild, Point Reyes, CA.
- Voss, B. L.
 2008 *The Archaeology of Ethnogenesis: Race and Sexuality in Colonial San Francisco*. University of California Press, Berkeley, CA.
- Wagner, H. R.
 1924 The Voyage to California of Sebastian Rodriguez Cermeño in 1595. *California Historical Society Quarterly* 3(1):3-24.
- 1926 *Sir Francis Drake's Voyage Around the World: Its Aims and Achievements*. John Howell, San Francisco.
- 1929 *Spanish Voyages to the Northwest Coast of America in the Sixteenth Century*. California Historical Society, San Francisco.
- Wagner, M. J.
 1998 Some Think It Impossible to Civilize Them at All: Cultural Change and Continuity Among the Early Nineteenth-Century Potawatomi. In *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*, edited by J. G. Cusick, pp. 430-456. Occasional Paper No. 25. Center for Archaeological Investigations, Southern Illinois University at Carbondale, Carbondale, IL.
- Walker, P. L. and J. R. Johnson
 1992 Effects of Contact on the Chumash Indians. In *Disease and Demography in the Americas*, edited by J. W. Verano and D. H. Ubelaker, pp. 127-139. Smithsonian Institution, 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. Milner, pp. 109-120. John Wiley and Sons, New York.
- Wallerstein, I.
1974 *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. Academic Press, New York.
- Watson, P. J., S. A. LeBlanc and C. L. Redman
1971 *Explanation in Archeology: An Explicitly Scientific Approach*. Columbia University Press, New York.
- 1984 *Archeological Explanation: The Scientific Method in Archeology*. Columbia University Press, New York.
- Weiner, A.
1992 *Inalienable Possessions: The Paradox of Keeping-while-Giving*. University of California Press, Berkeley.
- Wheatley, D. and M. Gillings
2002 *Spatial Technology and Archaeology*. Taylor & Francis, London.
- Wheeler, T.
1996 *Archaeological Assessment of Bay Miwok Occupation in Tomales Bay State Park*. Report on file, Resource Management Division, California State Parks.
- Wilkie, L. A.
2000 Culture Bought: Evidence of Creolization in the Consumer Goods of an Enslaved Bahamian Family. *Historical Archaeology* 34(3):10-26.
- Wilkie, L. A. and P. Farnsworth
1999 Trade and the Construction of Bahamian Identity: A Multiscalar Exploration. *International Journal of Historical Archaeology* 3(4):283-320.
- 2005 *Sampling Many Pots: An Archaeology of Memory and Tradition at a Bahamian Plantation*. University Press of Florida, Gainesville.
- Williams, I., W. F. Limp and F. L. Briuer
1990 Using Geographic Information Systems and Exploratory Data Analysis for Archaeological Site Classification and Analysis. In *Interpreting Space: GIS and Archaeology*, edited by K. M. S. Allen, S. W. Green and E. B. W. Zubrow, pp. 239-273. Taylor & Francis, London.

Williamson, C.

2004a Contact Archaeology and the Writing of Aboriginal History. In *The Archaeology of Contact in Settler Societies*, edited by T. Murray, pp. 176-199. Cambridge University Press, Cambridge.

2004b Finding Meaning in the Patterns: The Analysis of Material Culture from a Contact Site in Tasmania. In *After Captain Cook: The Archaeology of the Recent Indigenous Past in Australia*, edited by R. Harrison and C. Williamson, pp. 75-101. AltaMira Press, Walnut Creek.

Wilson, S. C.

1970 Faunal Analysis of 4-Mrn-298E: A Perspective on 4-Mrn-216. In *Contributions to the Archaeology of Point Reyes National Seashore: A Compendium in Honor of Adan E. Treganza*, edited by R. E. Schenk, pp. 211-221. Treganza Museum Papers No. 6, San Francisco State College.

Wilson, S. M. and J. D. Rogers

1993 Historical Dynamics in the Contact Era. In *Ethnohistory and Archaeology: Approaches to Postcontact Change in the Americas*, edited by J. D. Rogers and S. M. Wilson, pp. 3-15. Plenum Press, New York.

Wolf, E. R.

1982 *Europe and the People Without History*. University of California Press, Berkeley.

Wood, W. R.

1990 Ethnohistory and Historical Method. In *Archaeological Method and Theory*, edited by M. B. Schiffer, pp. 81-109. vol. 2. University of Arizona Press, Tucson.

Wylie, A.

1999 Why Should Historical Archaeologists Study Capitalism? The Logic of Question and Answer and the Challenge of Systemic Analysis. In *Historical Archaeologies of Capitalism*, edited by M. P. Leone and P. B. J. Potter, pp. 23-50. Kluwer Academic/Plenum Press, New York.

Appendix A

Nearest Neighbor Statistics and Ripley's-K Function

CA-MRN-232

Nearest Neighbor Statistics

<u>Artifact Categories</u>	<u>Observed Mean Distance</u>	<u>Expected Mean Distance</u>	<u>Nearest Neighbor Ratio</u>	<u>Z Score</u>	<u>p-value</u>	<u>Description</u>
Combined Indigenously-Manufactured Artifacts	0.57882	0.603023	0.959864	-1.13887	0.254757	While somewhat clustered the pattern may be due to random chance.
Combined Introduced Artifacts	1.021572	1.012739	1.008721	0.147351	0.882855	The pattern is neither clustered nor dispersed.
16th-Century Ceramics	1.339426	1.490712	0.898514	-1.164896	0.244061	While somewhat clustered the pattern may be due to random chance.
16th-Century Iron Fasteners	1.47092	1.380131	1.065783	0.815583	0.414739	The pattern is neither clustered nor dispersed.
Food Processing Objects	1.532309	1.304656	1.174493	2.288532	0.022107	There is less than 5% likelihood that this dispersed pattern could be the result of random chance.
Craft Production Objects	1.23422	1.154701	1.068866	1.0205	0.307492	While somewhat dispersed the pattern may be due to random chance.
Symbolic Objects	2.31497	2.480695	0.933194	-0.460805	0.644939	The pattern is neither clustered nor dispersed.
Ornamentation Objects	2.198588	2.169305	1.013499	0.106477	0.915204	The pattern is neither clustered nor dispersed.
Lithic Production Objects	3.050137	2.696799	1.131021	0.831321	0.405792	The pattern is neither clustered nor dispersed.
Hunting and Fishing Objects	1.009315	1.164445	0.866778	-1.957642	0.050272	There is a 5-10% likelihood that this clustered pattern is the result of random chance.
Mean Center Points (Combined)	0.860938	2.828427	0.304387	-4.208219	0.000026	There is less than 1% likelihood that this clustered pattern could be the result of random chance.

Ripley's K-function

<u>Artifact Categories</u>	<u>ExpectedK</u>	<u>ObservedK</u>	<u>LwConfEnv</u>	<u>HiConfEnv</u>
Combined Indigenously-Manufactured Artifacts	1.0	1.19451069619828	0.90872369415687	0.98866192437446
	2.0	2.24350576317333	1.74329874383213	1.86474095461149
	3.0	3.18516590058401	2.53393984044499	2.71688256796347
	4.0	4.06946131406907	3.23677568325000	3.49946320476607
	5.0	4.90452007085959	3.93613799370297	4.25701682059445
	6.0	5.70016368271434	4.56027876959716	4.94501391760364
	7.0	6.40813825652924	5.16613439365929	5.61477058249874
	8.0	7.05767310367721	5.70558138821946	6.24655508523323
	9.0	7.61289605281287	6.21047880845180	6.82006247563855
	10.0	8.08768602580268	6.67646613095549	7.30447937751676
Combined Introduced Artifacts	1.0	1.32822378741706	0.79816316180387	1.19211733266621
	2.0	2.55297066135300	1.82546898999283	2.13482105638225
	3.0	3.53500549863015	2.60051609870016	3.19265264721547
	4.0	4.52593324788289	3.49316964047010	4.14146528789827
	5.0	5.38162886280511	4.26389948459368	5.12987929417313
	6.0	6.15474055318561	4.97960921410458	5.93587092454315
	7.0	6.71815189024223	5.63952273571651	6.65586061768190
	8.0	7.30187595997133	6.26521907482067	7.26487013061446
	9.0	7.77953219170478	6.84103306066255	7.88278406923023
	10.0	8.21461045496774	7.34536976384905	8.26516238105590
16th-Century Ceramics	1.0	1.55282150539010	0.66212531464313	1.404579899993831
	2.0	2.56440031671520	1.81330485362625	2.43280374998316
	3.0	3.68655773059765	2.64850125857253	3.53478189854779
	4.0	4.49075237409037	3.59626097531761	4.36701637902471
	5.0	5.46002521933793	4.23967065040929	5.17136402410112
	6.0	6.35088291269777	5.08588104512726	6.01405183000858

16th-Century Ceramics (cont.)	7.0	6.91279123218314	5.92222885266192	6.84907751125402
	8.0	7.52029795058503	6.48747666662175	7.77821127613508
	9.0	8.05510210854633	7.02289949969153	8.21675906747028
	10.0	8.45345012190150	7.47644744294618	8.82143769357920
	1.0	1.27876722004633	0.95313681047401	1.47659319744924
	2.0	2.59281244369048	2.04425071495905	2.95318639489847
	3.0	3.56631138751623	3.21816026420041	4.36782158164592
	4.0	4.4908288696873	4.02128860873652	5.34096911390525
	5.0	5.42534983712298	4.70814853411889	6.08814971915172
	6.0	6.11792079996132	5.44206898257147	6.65832751061794
16th-Century Iron Fasteners	7.0	6.76660009796800	6.10305341273556	7.20863866387326
	8.0	7.33358104511360	6.61726857328334	7.82501521640630
	9.0	7.74332005316307	7.33358104511360	8.50377530551302
	10.0	8.09885906029342	7.89436678096267	8.90048115388744
	1.0	0.97318428810185	1.03221781419154	1.45977643215278
	2.0	1.97654663283194	1.94636857620371	2.33361394343576
	3.0	3.03876696563442	2.85808170903085	3.15347751147638
	4.0	3.78479865203563	3.59222345470577	4.1009828422412
	5.0	4.64179321311701	4.37932929645834	5.04509472905102
	6.0	5.46198327040296	5.02157434580494	5.85934532388656
Food Processing Objects	7.0	6.15495786698272	5.66414993051531	6.47368742629869
	8.0	6.94140364996143	6.12603856275443	7.18444690941154
	9.0	7.56959730407126	6.57349788347150	7.77025342162531
	10.0	8.14951054112502	7.02616141324395	8.13497081403835
	1.0	1.14315302415618	0.83176599967768	1.23992354443491
	2.0	2.21804266580716	1.77530034413625	2.21804266580716
	3.0	3.19746448513394	2.68809018848084	3.06238524942056
	4.0	4.12169684429685	3.36154226671682	3.93077275866242
	5.0	4.95969417773965	4.07480456921256	4.70517902985998
	Craft Production Objects	7.0	6.91279123218314	5.92222885266192
8.0		7.52029795058503	6.48747666662175	7.77821127613508
9.0		8.05510210854633	7.02289949969153	8.21675906747028
10.0		8.45345012190150	7.47644744294618	8.82143769357920
1.0		1.27876722004633	0.95313681047401	1.47659319744924
2.0		2.59281244369048	2.04425071495905	2.95318639489847
3.0		3.56631138751623	3.21816026420041	4.36782158164592
4.0		4.4908288696873	4.02128860873652	5.34096911390525
5.0		5.42534983712298	4.70814853411889	6.08814971915172
6.0		6.11792079996132	5.44206898257147	6.65832751061794

Craft Production Objects (cont.)	6.0	5.78926132021694	4.72962168280305	5.48937553483665
	7.0	6.37687266419557	5.32590103240874	6.24901784759161
	8.0	6.92583600416397	5.82236199774378	6.90360212333859
	9.0	7.46532831539218	6.31631219758355	7.43954126660947
	10.0	7.96837808820708	6.84208641859637	7.90542425168884
	1.0	0.00000000000000	0.00000000000000	1.92524198486339
	2.0	1.92524198486339	1.92524198486339	3.60179794699571
	3.0	2.72270332584390	3.60179794699571	5.27249231882848
	4.0	4.08405498876585	4.71586049429839	6.52881321935527
	5.0	4.90842322460326	5.09371150556890	7.45643014479521
Symbolic Objects	6.0	5.61299669983744	5.27249231882848	8.28077888578080
	7.0	6.80675831460974	5.77572595459016	8.71690382852504
	8.0	7.07379074144759	6.66923386929627	9.23313620101298
	9.0	7.45643014479521	7.20359589399141	9.72199546683489
	10.0	7.93797605846554	7.82036991162386	10.00385080000000
	1.0	0.00000000000000	0.00000000000000	1.49673864688954
	2.0	2.11670809375915	1.05835404687957	2.80014160710215
	3.0	2.80014160710215	2.36655159308472	3.510163268885375
	4.0	4.09898759795581	3.34680935899607	4.23341618751829
	5.0	5.29177023439786	4.09898759795581	5.07568770085064
Ornamentation Objects	6.0	6.17121153506964	4.61325833683537	6.17121153506964
	7.0	6.94009159935904	5.49936894477466	6.94009159935904
	8.0	7.48369323444771	5.98695458755817	7.48369323444771
	9.0	7.84896368127986	6.35012428127744	8.12937168692856
	10.0	8.26600935163568	6.94009159935904	8.72741104916877
	1.0	0.00000000000000	0.00000000000000	2.60678997054129
	2.0	2.12843509814365	0.00000000000000	4.51509267363848
	3.0	3.36535138098897	2.60678997054129	4.99162276404715
	4.0	4.51509267363848	4.51509267363848	5.63130995142945
	Lithic Production Objects			

Lithic Production Objects (cont.)	5.0	5.21357994108257	4.99162276404715	6.38530529443094
	6.0	5.82895957719499	6.02012356485131	7.37311546119529
	7.0	6.38530529443094	6.56027756170367	8.37965736105309
	8.0	7.37311546119529	7.05922061116575	8.64574423954705
	9.0	8.64574423954705	7.67418188285415	9.27763350069324
	10.0	8.90388282844461	8.10483938900960	9.75371494904403
	1.0	1.23992354443491	0.87675834642279	1.20852797908937
	2.0	2.16543337647093	1.79681992188769	2.12963862388197
	3.0	3.06238524942056	2.68809018848084	3.28052934330852
	4.0	3.87166002658154	3.46291800208198	4.38379173211393
Hunting and Fishing Objects	5.0	4.88158387602657	4.27728695704696	5.26055007853672
	6.0	5.61399261835129	5.01364737245451	6.06802925052728
	7.0	6.37084252321171	5.70230040214748	6.69443896414656
	8.0	6.98661434991213	6.29192480073737	7.39809503177458
	9.0	7.59801029029664	6.74021343898702	7.91514204792273
	10.0	8.09281674520534	7.18727968755075	8.46423797253197
	1.0	4.25687019628730	2.60678997054129	3.98193745361905
	2.0	6.89691798222963	4.51509267363848	6.89691798222963
	3.0	8.2439368859370	7.05922061116575	8.77576272691815
	4.0	8.90388282844461	7.96387490723810	10.09605410000000
Mean Center Points (Combined)	5.0	9.51865113029126	9.27763350069324	10.09605410000000
	6.0	9.75371494904403	10.09605410000000	10.09605410000000
	7.0	9.98324552809429	10.09605410000000	10.09605410000000
	8.0	10.09605410000000	10.09605410000000	10.09605410000000
	9.0	10.09605410000000	10.09605410000000	10.09605410000000
	10.0	10.09605410000000	10.09605410000000	10.09605410000000

Appendix B

Nearest Neighbor Statistics and Ripley's-K Function

CA-MRN-242

Nearest Neighbor Statistics

<u>Artifact Categories</u>	<u>Observed Mean Dist.</u>	<u>Expected Mean Dist.</u>	<u>Nearest Neighbor Ratio</u>	<u>Z Score</u>	<u>p-value</u>	<u>Description</u>
Combined Indigenously-Manufactured Artifacts	0.571454	0.541103	1.056091	1.130539	0.258249	While somewhat dispersed the pattern may be due to random chance.
Combined Introduced Artifacts	4.790324	2.850439	1.680557	2.603906	0.009217	There is less than 1% likelihood that this dispersed pattern could be the result of random chance.
16th-Century Ceramics	n/a	n/a	n/a	n/a	n/a	n/a
16th-Century Iron Fasteners	3.524365	3.291403	1.070779	0.234529	0.814575	The pattern is neither clustered nor dispersed.
Food Processing Objects	2.100734	1.244033	1.688648	6.037227	0	There is less than 1% likelihood that this dispersed pattern could be the result of random chance.
Craft Production Objects	1.436122	1.307871	1.098061	0.817717	0.413519	The pattern is neither clustered nor dispersed.
Symbolic Objects	3.816013	2.327373	1.639622	2.997299	0.002724	There is less than 1% likelihood that this dispersed pattern could be the result of random chance.
Ornamentation Objects	1.086884	2.327373	0.467	-2.497661	0.012502	There is less than 5% likelihood that this clustered pattern could be the result of random chance.
Lithic Production Objects	7.534691	2.850439	2.643345	6.287667	0	There is less than 1% likelihood that this dispersed pattern could be the result of random chance.
Hunting and Fishing Objects	0.813861	0.783076	1.039314	0.547535	0.584011	The pattern is neither clustered nor dispersed.
Mean Center Points (Combined)	2.29017	2.015564	1.136242	0.737205	0.460998	The pattern is neither clustered nor dispersed.

Ripley's K-function

<u>Artifact Categories</u>	<u>ExpectedK</u>	<u>ObservedK</u>	<u>LwConfEnv</u>	<u>HiConfEnv</u>
Combined Indigenously-Manufactured Artifacts	1.0	1.25221731930304	0.90535162605900	0.96258711038894
	2.0	2.12463601447712	1.68848948889640	1.81070325211799
	3.0	2.85882097407172	2.40028941462023	2.60213706230472
	4.0	3.47578750005757	3.08467205175108	3.31842959285923
	5.0	4.00608735489271	3.69286715265752	3.99420864125726
	6.0	4.51361802091961	4.26461996672816	4.58412716975062
	7.0	4.93118915495652	4.72450301662315	5.11912217392407
	8.0	5.35391413192106	5.18025162980472	5.59584199943863
	9.0	5.71556393900770	5.55749927301518	5.98660212723684
	10.0	6.04288976888861	5.88756051932928	6.33183558336150
Combined Introduced Artifacts	1.0	0.00000000000000	0.00000000000000	0.00000000000000
	2.0	7.51409441546963	0.00000000000000	7.51409441546963
	3.0	7.51409441546963	0.00000000000000	7.51409441546963
	4.0	7.51409441546963	0.00000000000000	7.51409441546963
	5.0	7.51409441546963	0.00000000000000	7.51409441546963
	6.0	7.51409441546963	0.00000000000000	7.51409441546963
	7.0	7.51409441546963	7.51409441546963	7.51409441546963
	8.0	7.51409441546963	7.51409441546963	7.51409441546963
	9.0	7.51409441546963	7.51409441546963	7.51409441546963
	10.0	7.51409441546963	7.51409441546963	7.51409441546963
16th-Century Ceramics	1.0	n/a	n/a	n/a
	2.0	n/a	n/a	n/a
	3.0	n/a	n/a	n/a
	4.0	n/a	n/a	n/a
	5.0	n/a	n/a	n/a
	6.0	n/a	n/a	n/a

16th-Century Ceramics (cont.)	7.0	n/a	n/a	n/a	n/a
	8.0	n/a	n/a	n/a	n/a
	9.0	n/a	n/a	n/a	n/a
	10.0	n/a	n/a	n/a	n/a
16th-Century Iron Fasteners	1.0	0.0000000000000000	0.0000000000000000	0.0000000000000000	7.51409441546963
	2.0	7.51409441546963	7.51409441546963	0.0000000000000000	7.51409441546963
	3.0	7.51409441546963	7.51409441546963	0.0000000000000000	7.51409441546963
	4.0	7.51409441546963	7.51409441546963	0.0000000000000000	7.51409441546963
	5.0	7.51409441546963	7.51409441546963	7.51409441546963	7.51409441546963
	6.0	7.51409441546963	7.51409441546963	7.51409441546963	7.51409441546963
	7.0	7.51409441546963	7.51409441546963	7.51409441546963	7.51409441546963
	8.0	7.51409441546963	7.51409441546963	7.51409441546963	7.51409441546963
	9.0	7.51409441546963	7.51409441546963	7.51409441546963	7.51409441546963
	10.0	7.51409441546963	7.51409441546963	7.51409441546963	7.51409441546963
Food Processing Objects	1.0	1.11600931847580	0.0000000000000000	0.0000000000000000	1.28865656088027
	2.0	1.70473239273048	1.28865656088027	1.28865656088027	1.93298484132040
	3.0	2.23201863695160	2.23201863695160	2.23201863695160	2.88152366977938
	4.0	3.09008987869667	3.09008987869667	2.57731312176054	3.52913138635576
	5.0	3.70138417192448	3.70138417192448	3.09008987869667	3.97190627445409
	6.0	4.27399029606963	4.27399029606963	3.52913138635576	4.82171134003236
	7.0	4.82171134003236	4.82171134003236	4.27399029606963	5.19474067142635
	8.0	5.07344595363411	5.07344595363411	4.99094539927020	5.76304733955875
	9.0	5.42920659408175	5.42920659408175	5.27405427629646	6.14650005293416
	10.0	6.07858084052270	6.07858084052270	5.61712372180776	6.47541907759405
Craft Production Objects	1.0	1.57827551392323	0.0000000000000000	0.0000000000000000	1.44076183488969
	2.0	2.03754492705054	1.93298484132040	1.93298484132040	3.28544247512393
	3.0	3.58746803779813	2.95268311751765	2.95268311751765	4.07508985410109
	4.0	3.86596968264081	3.81189751359122	3.81189751359122	5.23454769548870
	5.0	4.64631730671689	4.64631730671689	4.64631730671689	6.00989410629004

Craft Production Objects (cont.)	6.0	5.50514324129451	5.35219266955699	6.69605591085480
	7.0	5.94041322660890	5.94041322660890	7.11683847104476
	8.0	6.28013523999438	6.41098544410445	7.26121095188794
	9.0	6.53921785050925	6.84930357234721	7.40276834384895
	10.0	6.84930357234721	7.20380917444844	7.51409441546963
	1.0	0.00000000000000	0.00000000000000	2.74375934038421
	2.0	1.94013083552960	0.00000000000000	3.36040518046833
	3.0	1.94013083552960	2.74375934038421	4.75233058128712
	4.0	2.74375934038421	3.88026167105920	5.82039250658881
	5.0	2.74375934038421	4.75233058128712	6.43468602565041
Symbolic Objects	6.0	3.36040518046833	5.13310370173929	7.25930487206724
	7.0	3.36040518046833	5.13310370173929	7.51409441546963
	8.0	4.75233058128712	6.13523239899907	7.51409441546963
	9.0	5.48751868076842	6.13523239899907	7.51409441546963
	10.0	5.82039250658881	6.43468602565041	7.51409441546963
	1.0	3.36040518046833	1.94013083552960	3.88026167105920
	2.0	4.75233058128712	2.74375934038421	6.13523239899907
	3.0	5.13310370173929	4.75233058128712	7.51409441546963
	4.0	5.48751868076842	5.48751868076842	7.51409441546963
	5.0	6.13523239899907	6.99524120861077	7.51409441546963
Ornamentation Objects	6.0	7.25930487206724	7.51409441546963	7.51409441546963
	7.0	7.51409441546963	7.51409441546963	7.51409441546963
	8.0	7.51409441546963	7.51409441546963	7.51409441546963
	9.0	7.51409441546963	7.51409441546963	7.51409441546963
	10.0	7.51409441546963	7.51409441546963	7.51409441546963
	1.0	0.00000000000000	0.00000000000000	0.00000000000000
	2.0	0.00000000000000	0.00000000000000	4.33826443348766
	3.0	0.00000000000000	0.00000000000000	4.33826443348766
	4.0	4.33826443348766	0.00000000000000	7.51409441546963
	0.00000000000000			
Lithic Production Objects	6.0	5.50514324129451	5.35219266955699	6.69605591085480
	7.0	5.94041322660890	5.94041322660890	7.11683847104476
	8.0	6.28013523999438	6.41098544410445	7.26121095188794
	9.0	6.53921785050925	6.84930357234721	7.40276834384895
	10.0	6.84930357234721	7.20380917444844	7.51409441546963
	1.0	0.00000000000000	0.00000000000000	2.74375934038421
	2.0	1.94013083552960	0.00000000000000	3.36040518046833
	3.0	1.94013083552960	2.74375934038421	4.75233058128712
	4.0	2.74375934038421	3.88026167105920	5.82039250658881
	5.0	2.74375934038421	4.75233058128712	6.43468602565041

Lithic Production Objects (cont.)	5.0	4.33826443348766	0.00000000000000	7.51409441546963
	6.0	4.33826443348766	0.00000000000000	7.51409441546963
	7.0	4.33826443348766	4.33826443348766	7.51409441546963
	8.0	4.33826443348766	4.33826443348766	7.51409441546963
	9.0	4.33826443348766	4.33826443348766	7.51409441546963
	10.0	4.33826443348766	4.33826443348766	7.51409441546963
	1.0	1.44541912380567	0.75798418318087	1.14270415119771
	2.0	2.31943610429726	1.51596836636174	1.97922164789430
	3.0	2.86360839511846	2.40782705579331	2.91781399460493
	4.0	3.35885051687345	2.96222771956264	3.65665328383267
Hunting and Fishing Objects	5.0	3.92531766492099	3.50346458599856	4.39012598804951
	6.0	4.34227577455129	4.12007840982889	4.99663641857047
	7.0	4.75562661491508	4.67252831282915	5.56533289878884
	8.0	5.19647775245515	5.01229171463957	5.99892471520129
	9.0	5.55593992517631	5.38891330085556	6.38688825318075
	10.0	5.90237390333315	5.76358043676535	6.66697122647749
	1.0	2.31889988047682	0.00000000000000	2.84006073588456
	2.0	3.27941966075567	2.31889988047682	4.01645241065125
	3.0	5.18521776576231	2.84006073588456	5.18521776576231
	4.0	5.68012147176911	4.01645241065125	6.13523239899907
Mean Center Points (Combined)	5.0	6.55883932151134	5.43830227242058	6.35056886566594
	6.0	6.95669964143046	6.13523239899907	7.14732944734720
	7.0	7.14732944734720	6.55883932151134	7.51409441546963
	8.0	7.33300528819898	7.33300528819898	7.51409441546963
	9.0	7.33300528819898	7.51409441546963	7.51409441546963
	10.0	7.51409441546963	7.51409441546963	7.51409441546963

Appendix C

Nearest Neighbor Statistics and Ripley's-K Function

CA-MRN-271

Nearest Neighbor Statistics

<u>Artifact Categories</u>	<u>Observed Mean Distance</u>	<u>Expected Mean Distance</u>	<u>Nearest Neighbor Ratio</u>	<u>Z Score</u>	<u>p-value</u>	<u>Description</u>
Combined Indigenously-Manufactured Artifacts	0.649112	0.683917	0.949109	-0.542063	0.587775	The pattern is neither clustered nor dispersed.
16th-Century Ceramics	1.466697	1.269296	1.15552	0.892564	0.372091	The pattern is neither clustered nor dispersed.
Food Processing Objects	0.890346	0.923548	0.964049	-0.283571	0.776739	The pattern is neither clustered nor dispersed.
Craft Production Objects	4.057797	2.198484	1.845725	2.802339	0.005073	There is less than 1% likelihood that this dispersed pattern could be the result of random chance.
Symbolic Objects	n/a	n/a	n/a	n/a	n/a	n/a
Ornamentation Objects	n/a	n/a	n/a	n/a	n/a	n/a
Lithic Production Objects	2.305862	2.692582	0.856376	-0.388574	0.697591	The pattern is neither clustered nor dispersed.
Hunting and Fishing Objects	1.790638	1.439246	1.24415	1.235769	0.216545	While somewhat dispersed, the pattern may be due to random chance.
Mean Center Points (Combined)	0.603161	1.346291	0.448017	-2.986768	0.002819	There is less than 1% likelihood that this clustered pattern could be the result of random chance.

Ripley's K-function

<u>Artifact Categories</u>	<u>ExpectedK</u>	<u>ObservedK</u>	<u>LwConfEnv</u>	<u>HiConfEnv</u>
Combined Indigenously-Manufactured Artifacts	1.0	1.27013727251650	0.74290030824188	1.31932195835650
	2.0	2.08093707690624	1.73615316647506	2.07071128000045
	3.0	2.74896280442541	2.29440301654415	2.76436327677069
	4.0	3.19865487575635	3.00710549405638	3.34146361621425
	5.0	3.51483835478950	3.38563974588815	3.70878252081800
	6.0	3.72591324717727	3.59249071373682	3.94722510662500
	7.0	3.92565540906009	3.81041181754951	4.13629386136459
	8.0	4.08984616963334	4.03761099686988	4.22765861206392
	9.0	4.20247876562729	4.16697136840348	4.26763736082790
	10.0	4.25268937318118	4.23267660624813	4.29737735381315
16th-Century Ceramics	1.0	1.01290155606626	0.71622955896886	1.75439695817234
	2.0	1.89496529466507	1.43245911793772	2.58240239986518
	3.0	2.86491823587543	2.14868867690657	3.28217616893963
	4.0	3.43491629683122	2.95309012381815	3.58114779484429
	5.0	3.78993058933014	3.35941441103892	4.05160622426504
	6.0	3.92295085799220	3.72163795805013	4.17630010401368
	7.0	4.05160622426504	4.05160622426504	4.29737735381315
	8.0	4.17630010401368	4.11442557079891	4.29737735381315
	9.0	4.23727121387402	4.29737735381315	4.29737735381315
	10.0	4.29737735381315	4.29737735381315	4.29737735381315
Food Processing Objects	1.0	1.24054598601671	0.87719847908617	1.51935233409939
	2.0	1.61747407516093	1.84002705293395	2.48109197203342
	3.0	2.66067472264875	2.57245090851416	3.18702034298282
	4.0	3.01327573019643	3.01327573019643	3.68005410586789
	5.0	3.44237540723709	3.39737510081921	4.05793192089484
	6.0	3.65908496591333	3.65908496591333	4.18856532896561

Food Processing Objects (cont.)	7.0	3.82361952376419	3.90328682008888	4.27943415497001
	8.0	4.05793192089484	4.01982842991251	4.29737735381315
	9.0	4.17015396366496	4.13308519292624	4.29737735381315
	10.0	4.20689611820342	4.20689611820342	4.29737735381315
	1.0	0.00000000000000	0.00000000000000	0.00000000000000
	2.0	0.00000000000000	0.00000000000000	3.50879391634467
	3.0	0.00000000000000	2.48109197203342	4.29737735381315
	4.0	2.48109197203342	2.48109197203342	4.29737735381315
	5.0	2.48109197203342	2.48109197203342	4.29737735381315
	6.0	2.48109197203342	3.50879391634467	4.29737735381315
Craft Production Objects	7.0	3.50879391634467	4.29737735381315	4.29737735381315
	8.0	3.50879391634467	4.29737735381315	4.29737735381315
	9.0	4.29737735381315	4.29737735381315	4.29737735381315
	10.0	4.29737735381315	4.29737735381315	4.29737735381315
	1.0	n/a	n/a	n/a
	2.0	n/a	n/a	n/a
	3.0	n/a	n/a	n/a
	4.0	n/a	n/a	n/a
	5.0	n/a	n/a	n/a
	6.0	n/a	n/a	n/a
Symbolic Objects	7.0	n/a	n/a	n/a
	8.0	n/a	n/a	n/a
	9.0	n/a	n/a	n/a
	10.0	n/a	n/a	n/a
	1.0	n/a	n/a	n/a
	2.0	n/a	n/a	n/a
	3.0	n/a	n/a	n/a
	4.0	n/a	n/a	n/a
	5.0	n/a	n/a	n/a
	6.0	n/a	n/a	n/a
Ornamentation Objects	7.0	n/a	n/a	n/a
	8.0	n/a	n/a	n/a
	9.0	n/a	n/a	n/a
	10.0	n/a	n/a	n/a
	1.0	n/a	n/a	n/a
	2.0	n/a	n/a	n/a
	3.0	n/a	n/a	n/a
	4.0	n/a	n/a	n/a
	5.0	n/a	n/a	n/a
	6.0	n/a	n/a	n/a

Ornamentation Objects (cont.)	6.0	n/a	n/a	n/a	n/a
	7.0	n/a	n/a	n/a	n/a
	8.0	n/a	n/a	n/a	n/a
	9.0	n/a	n/a	n/a	n/a
	10.0	n/a	n/a	n/a	n/a
	1.0	n/a	n/a	n/a	n/a
	2.0	n/a	n/a	n/a	n/a
	3.0	n/a	n/a	n/a	n/a
	4.0	n/a	n/a	n/a	n/a
	5.0	n/a	n/a	n/a	n/a
Lithic Production Objects	6.0	n/a	n/a	n/a	n/a
	7.0	n/a	n/a	n/a	n/a
	8.0	n/a	n/a	n/a	n/a
	9.0	n/a	n/a	n/a	n/a
	10.0	n/a	n/a	n/a	n/a
	1.0	1.32619944348920	0.93776461969704	1.87552923939407	1.87552923939407
	2.0	2.29704481709286	1.87552923939407	3.11021338520540	3.11021338520540
	3.0	2.65239888697840	2.65239888697840	3.63194675474916	3.63194675474916
	4.0	3.24851193371155	2.96547210736424	3.75105847878815	3.75105847878815
	5.0	3.63194675474916	3.24851193371155	4.19381087307363	4.19381087307363
Hunting and Fishing Objects	6.0	3.86650257897806	3.86650257897806	4.29737735381315	4.29737735381315
	7.0	3.97859833046759	3.97859833046759	4.29737735381315	4.29737735381315
	8.0	4.08762121008724	4.29737735381315	4.29737735381315	4.29737735381315
	9.0	4.29737735381315	4.29737735381315	4.29737735381315	4.29737735381315
	10.0	4.29737735381315	4.29737735381315	4.29737735381315	4.29737735381315
	1.0	1.40664692954556	0.00000000000000	1.40664692954556	1.40664692954556
	2.0	2.14868867690657	1.81597337737458	2.81329385909111	2.81329385909111
	3.0	2.69352380277827	2.43638395028366	3.89482898388785	3.89482898388785
	4.0	3.24851193371155	3.24851193371155	4.29737735381315	4.29737735381315
	Mean Center Points (Combined)	6.0	n/a	n/a	n/a
7.0		n/a	n/a	n/a	n/a
8.0		n/a	n/a	n/a	n/a
9.0		n/a	n/a	n/a	n/a
10.0		n/a	n/a	n/a	n/a
1.0		1.32619944348920	0.93776461969704	1.87552923939407	1.87552923939407
2.0		2.29704481709286	1.87552923939407	3.11021338520540	3.11021338520540
3.0		2.65239888697840	2.65239888697840	3.63194675474916	3.63194675474916
4.0		3.24851193371155	2.96547210736424	3.75105847878815	3.75105847878815
5.0		3.63194675474916	3.24851193371155	4.19381087307363	4.19381087307363

Mean Center Points (Combined, cont.)	5.0	3.72163795805013	3.80921789246378	4.29737735381315
	6.0	3.97859833046759	4.06063991713944	4.29737735381315
	7.0	4.21994078863667	4.21994078863667	4.29737735381315
	8.0	4.29737735381315	4.29737735381315	4.29737735381315
	9.0	4.29737735381315	4.29737735381315	4.29737735381315
	10.0	4.29737735381315	4.29737735381315	4.29737735381315

Appendix D

Nearest Neighbor Statistics and Ripley's-K Function

CA-MRN-307

Nearest Neighbor Statistics

<u>Artifact Categories</u>	<u>Observed Mean Distance</u>	<u>Expected Mean Distance</u>	<u>Nearest Neighbor Ratio</u>	<u>Z Score</u>	<u>p-value</u>	<u>Description</u>
Combined Indigenously-Manufactured Artifacts	0.398821	0.450826	0.884645	-3.572053	0.000354	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Combined Introduced Artifacts	1.520591	1.355067	1.122152	1.258431	0.208236	While somewhat dispersed, the pattern may be due to random chance.
16th-Century Ceramics	1.853088	1.555781	1.191099	1.714745	0.086392	There is a 5-10%likelihood that this dispersed pattern is the result of random chance.
16th-Century Iron Fasteners	2.650159	2.758105	0.960862	-0.198096	0.84297	The pattern is neither clustered nor dispersed.
Food Processing Objects	0.706523	0.782348	0.90308	-1.729426	0.083733	There is a 5-10%likelihood that this clustered pattern is the result of random chance.
Craft Production Objects	0.861919	0.796196	1.082545	1.447313	0.147809	While somewhat dispersed, the pattern may be due to random chance.
Symbolic Objects	1.916968	2.307596	0.830721	-1.024082	0.305797	While somewhat clustered the pattern may be due to random chance.
Ornamentation Objects	1.322337	1.719981	0.768809	-1.876451	0.060593	There is a 5-10%likelihood that this clustered pattern is the result of random chance.
Lithic Production Objects	1.780449	2.023896	0.879714	-0.829696	0.406711	The pattern is neither clustered nor dispersed.
Hunting and Fishing Objects	1.042954	1.100103	0.948051	-0.659229	0.509749	The pattern is neither clustered nor dispersed.
Mean Center Points (Combined)	0.959689	2.307596	0.415883	-3.533711	0.00041	There is less than 1% likelihood that this clustered pattern could be the result of random chance.

Ripley's K-function

<u>Artifact Categories</u>	<u>ExpectedK</u>	<u>ObservedK</u>	<u>LwConfEnv</u>	<u>HiConfEnv</u>
Combined Indigenously-Manufactured Artifacts	1.0	1.17479865759266	0.94970593555008	1.03607502952090
	2.0	2.23020021086730	1.86618969275481	1.94973613186997
	3.0	3.15429924500199	2.70488802132437	2.81957402903771
	4.0	3.98722681127282	3.52325075878421	3.67105687050679
	5.0	4.76951705375551	4.22816816212159	4.42702612740206
	6.0	5.43953301102413	4.89025169341546	5.15734333663608
	7.0	6.03211179818164	5.49158714453846	5.79305469496043
	8.0	6.56978163171637	6.02206831502768	6.35591782395310
	9.0	7.03661550668763	6.51457369985608	6.84533255910737
	10.0	7.42383042661732	6.93872556731894	7.24821158146435
Combined Introduced Artifacts	1.0	0.79191012519842	0.64659190962656	1.44582346362638
	2.0	1.71072139261822	1.88512316031431	2.37573037559526
	3.0	3.06705472658651	2.85527256196201	3.35979011770854
	4.0	3.98586022190840	3.54152974402807	4.33747039087914
	5.0	4.88166186486605	4.45632720249979	4.98756707291980
	6.0	5.59965019618090	5.15248966008199	5.80133849696418
	7.0	6.28559175596712	5.76519273387838	6.44973404185432
	8.0	6.85814285935946	6.43350827013203	6.94898314663136
	9.0	7.30105060544720	6.84288557047288	7.21464459627204
	10.0	7.67785352561684	7.31535238331676	7.54049264125722
16th-Century Ceramics	1.0	0.76694806632686	0.54231417851763	1.21265136832738
	2.0	1.87863142171502	1.62694253555289	2.36389269980762
	3.0	3.34304911606269	2.71157089258815	3.25388507110578
	4.0	4.20074756362187	3.59730529726559	4.27018611183606
	5.0	5.05836990889840	4.33851342814104	5.20169486574858
	6.0	5.76487879395581	5.20169486574858	5.96545596369392

16th-Century Ceramics (cont.)	7.0	6.43962407436928	5.99005588646656	6.53032747204008
	8.0	7.05008432072918	6.59753672947299	7.09167809942287
	9.0	7.41603485410998	7.05008432072918	7.43583738563420
	10.0	7.78367276120841	7.37627030557662	7.78367276120841
	1.0	0.00000000000000	0.00000000000000	3.36497098449870
	2.0	0.00000000000000	0.00000000000000	3.36497098449870
	3.0	0.00000000000000	0.00000000000000	5.8283007114682
	4.0	0.00000000000000	0.00000000000000	5.8283007114682
	5.0	4.75878760327001	3.36497098449870	6.72994196899741
	6.0	4.75878760327001	4.75878760327001	7.52430386365349
16th-Century Iron Fasteners	7.0	5.8283007114682	4.75878760327001	8.24246191129259
	8.0	5.8283007114682	4.75878760327001	8.24246191129259
	9.0	6.72994196899741	4.75878760327001	8.24246191129259
	10.0	6.72994196899741	4.75878760327001	8.24246191129259
	1.0	1.2643594157388	0.93467835867018	1.13249898585839
	2.0	2.20680471883109	1.87432181696812	2.12528117340016
	3.0	3.09697792031733	2.71991163184919	2.99320717365666
	4.0	3.89932927333336	3.53688378827842	3.81986563432122
	5.0	4.68729186337267	4.26148083986335	4.61737308661961
	6.0	5.42785067793818	4.95898940460038	5.40898307227202
Food Processing Objects	7.0	6.08190730160716	5.61800473935121	6.01892841065244
	8.0	6.62462427720907	6.12606242176490	6.51998115670576
	9.0	7.10784558684788	6.61339133266818	6.98119231538179
	10.0	7.49232710373848	7.02498693678159	7.35840183609311
	1.0	1.08530544080889	0.95830750693536	1.14788384068072
	2.0	2.29576768136143	1.84766839270307	2.07178748037966
	3.0	3.22201565483913	2.72519412694927	2.97391011123681
	4.0	4.09998266154494	3.52104661300543	3.81495780235275
	5.0	4.91697551849211	4.35270345946653	4.64771623823314
	Craft Production Objects			

Craft Production Objects (cont.)	6.0	5.62345938730795	5.02143273752160	5.41732189257502
	7.0	6.23460509535524	5.66413913314515	6.13453504269908
	8.0	6.76593781234995	6.24740060413676	6.62731044415434
	9.0	7.20880135703705	6.72895307148726	7.05342403498946
	10.0	7.55101053061025	7.11682370819478	7.43645336755658
	1.0	1.73766354445795	0.00000000000000	2.45742735141374
	2.0	2.45742735141374	1.73766354445795	3.47532708891591
	3.0	2.45742735141374	2.45742735141374	3.88553380743121
	4.0	4.25638902855802	3.68614102712061	5.06611626858035
	5.0	4.75878760327001	4.59742560093877	6.01944309092279
Symbolic Objects	6.0	4.91485470282748	5.21299063337386	6.50174163684889
	7.0	4.91485470282748	6.14356837853436	7.26916813606744
	8.0	5.49497460752839	6.84118821572260	7.77106761486243
	9.0	6.14356837853436	7.57429978816692	8.05721439241695
	10.0	6.26523500904765	7.77106761486243	8.24246191129259
	1.0	1.33272710099568	0.94238037058513	1.99909065149351
	2.0	2.74748730376420	1.99909065149351	3.26450136381807
	3.0	3.82796716120434	2.90461137627904	4.10774080175700
	4.0	4.61670210309698	3.99818130298703	5.07487360660942
	5.0	5.69341267119662	5.03093447995786	5.96013678656512
Ornamentation Objects	6.0	6.17960134662094	5.92276878943748	6.66363550497838
	7.0	6.66363550497838	6.32167970786939	7.29964696213798
	8.0	7.02057564156683	6.89291816382823	7.62687943838128
	9.0	7.45017098320640	7.32999905547622	7.94063814585176
	10.0	7.71371577852720	7.56843505651855	8.13400373944964
	1.0	0.93327503269682	0.00000000000000	2.63970041732806
	2.0	2.08686641481342	1.86655006539363	3.23295954813278
	3.0	2.95127478669006	2.95127478669006	5.19625546776836
	4.0	3.84799153756075	3.61455865906595	6.79434479495469
	Lithic Production Objects			

Lithic Production Objects (cont.)	5.0	4.84943932219917	4.17373282962684	7.52430386365349
	6.0	5.67689039935104	4.57209523957297	7.97390537477294
	7.0	6.46591909626557	5.36125689177669	8.02833539486786
	8.0	6.92135288553029	5.97587598205192	8.18945517555678
	9.0	7.40764092402435	6.79434479495469	8.18945517555678
	10.0	7.69598307512150	7.34861495607336	8.24246191129259
	1.0	1.56261086345292	0.92832918424594	1.31285572270736
	2.0	2.52817064321753	1.95096426883189	2.30529888698267
	3.0	3.60537686948738	2.81065618340126	3.28213930676841
	4.0	4.36248872678128	3.57537321163175	4.22024069645361
Hunting and Fishing Objects	5.0	5.02070771146260	4.25413875664364	5.16176627210214
	6.0	5.58285367782513	5.04923468940732	5.98634377901797
	7.0	6.05196585075596	5.58928183617530	6.56427861353682
	8.0	6.42606779541718	6.26192269847564	7.12055312968412
	9.0	6.92627310588450	6.79542881152175	7.53701921512125
	10.0	7.41695707445230	7.21075373897475	7.83600019432714
	1.0	3.25087081842445	2.45742735141374	3.68614102712061
	2.0	6.38458354283703	4.59742560093877	6.50174163684889
	3.0	7.05842268475613	5.89270377908045	7.77106761486243
	4.0	7.57429978816692	6.01944309092279	8.24246191129259
Mean Center Points (Combined)	5.0	8.15036447419623	7.16457033558531	8.24246191129259
	6.0	8.15036447419623	8.05721439241695	8.24246191129259
	7.0	8.24246191129259	8.24246191129259	8.24246191129259
	8.0	8.24246191129259	8.24246191129259	8.24246191129259
	9.0	8.24246191129259	8.24246191129259	8.24246191129259
	10.0	8.24246191129259	8.24246191129259	8.24246191129259

Appendix E

Nearest Neighbor Statistics and Ripley's-K Function

CA-MRN-216

Nearest Neighbor Statistics

<u>Artifact Categories</u>	<u>Observed Mean Distance</u>	<u>Expected Mean Distance</u>	<u>Nearest Neighbor Ratio</u>	<u>Z Score</u>	<u>p-value</u>	<u>Description</u>
Combined Indigenously-Manufactured Artifacts	0.32918	0.431319	0.763193	-15.382991	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Combined Introduced Artifacts	0.7516	1.035616	0.725752	-7.41976	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
16th-Century Ceramics	0.747003	1.059734	0.704897	-7.802281	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
16th-Century Iron Fasteners	4.660084	4.88194	0.954556	-0.260814	0.79423	The pattern is neither clustered nor dispersed.
Food Processing Objects	1.217898	1.299606	0.937128	-1.355466	0.17526	While somewhat clustered, the pattern may be due to random chance.
Craft Production Objects	0.55916	0.695844	0.803571	-7.909318	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Symbolic Objects	3.064115	3.122499	0.981302	-0.167779	0.86675	The pattern is neither clustered nor dispersed.
Ornamentation Objects	0.886947	1.415865	0.626435	-7.392459	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Lithic Production Objects	2.012839	2.44097	0.824606	-2.013242	0.04408	There is less than 5% likelihood that this clustered pattern could be the result of random chance.
Hunting and Fishing Objects	0.70728	0.833172	0.8489	-5.081287	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Mean Center Points (Combined)	1.636391	5.178079	0.316023	-3.700987	0.00021	There is less than 1% likelihood that this clustered pattern could be the result of random chance.

Ripley's K-function

<u>Artifact Categories</u>	<u>ExpectedK</u>	<u>ObservedK</u>	<u>LwConfEnv</u>	<u>HiConfEnv</u>
Combined Indigenously-Manufactured Artifacts	1.0	1.49080174934966	0.98073765407071	0.99962448975002
	2.0	2.78037289175101	1.91953075242908	1.95811373701949
	3.0	3.98961221963752	2.83719440541717	2.87432823912235
	4.0	5.13482285574962	3.70457055305951	3.75759861273698
	5.0	6.16968180016548	4.55522108784703	4.62384427533140
	6.0	7.07802699303355	5.36463509849364	5.45455836029003
	7.0	7.90652970606268	6.14503873094823	6.24966176640144
	8.0	8.63665200952058	6.89167236669396	7.01669095712033
	9.0	9.28424707687478	7.59815979978626	7.73781404589042
	10.0	9.86338260080083	8.27224732967787	8.42861018120060
Combined Introduced Artifacts	1.0	1.76983494598372	0.88937552374044	1.06725062848853
	2.0	2.95508317943905	1.90749799010418	2.05520809425728
	3.0	4.19423311302123	2.85432739344218	3.06286262043061
	4.0	5.46803232253071	3.73325903838291	3.93944167263902
	5.0	6.63166483742276	4.60246462879201	4.81742794903948
	6.0	7.71350628495461	5.42300326483941	5.65435833622874
	7.0	8.64480329007878	6.21163704254446	6.51979595589956
	8.0	9.53002290491930	6.94624489605311	7.38556627354216
	9.0	10.35349240000000	7.66619002448961	8.15805120738485
	10.0	11.06691960000000	8.37431005986682	8.83844194885588
16th-Century Ceramics	1.0	1.75965534114252	0.89705670103442	1.15304903069114
	2.0	2.96046439203838	1.85641082409473	2.09545259167768
	3.0	4.21795027284673	2.79010780751462	3.03919061998478
	4.0	5.48376603386687	3.70102364680545	3.96570883421870
	5.0	6.61979962556539	4.55302624867539	4.85788191420967
	6.0	7.70770030224022	5.42120237301586	5.67502622956409

16th-Century Ceramics (cont.)	7.0	8.64179692021794	6.19949062167882	6.41854269839351
	8.0	9.53676075099956	6.94227447852605	7.14346947803741
	9.0	10.36310250000000	7.67813828037031	7.86385845721911
	10.0	11.09519030000000	8.33261907128953	8.55124047695873
	1.0	2.71999671272682	0.00000000000000	2.71999671272682
	2.0	2.71999671272682	0.00000000000000	3.84665624074851
	3.0	2.71999671272682	2.71999671272682	5.43999342545364
	4.0	2.71999671272682	2.71999671272682	7.19643486878837
	5.0	4.71117250286318	4.71117250286318	7.19643486878837
	6.0	5.43999342545364	5.43999342545364	9.02120852711497
16th-Century Iron Fasteners	7.0	7.19643486878837	7.19643486878837	10.53450200000000
	8.0	8.15999013818047	8.60138484038746	11.53996870000000
	9.0	9.42234500572637	9.80708761683005	13.04464600000000
	10.0	9.80708761683005	10.53450200000000	13.04464600000000
	1.0	1.53229119565526	0.83488780924230	1.14921839674144
	2.0	2.76900960529851	1.79677069318503	2.11558867993373
	3.0	3.76309317375076	2.73568697636459	2.96726914115653
	4.0	4.75380841717672	3.66430708156279	3.84506638482577
	5.0	5.64951213076996	4.50823142080921	4.70727736164094
	6.0	6.53473242427647	5.28376687157685	5.61368321160277
Food Processing Objects	7.0	7.38595748534028	5.95613532170465	6.48966476636656
	8.0	8.08092954579548	6.64606466636963	7.23794740437895
	9.0	8.83146900950025	7.33111667785215	8.012542425259287
	10.0	9.44179259092815	8.11264624007156	8.68274871289399
	1.0	1.59690299096757	0.95898922573515	1.04996759350460
	2.0	2.95261169046132	1.93754248846338	2.03039780732054
	3.0	4.23700766137591	2.85825138111532	2.96144158397826
	4.0	5.45020538230329	3.74565042404414	3.85632295629113
	5.0	6.51042296945480	4.62337271187778	4.71778770091066
	Craft Production Objects	7.0	8.64179692021794	6.19949062167882
8.0		9.53676075099956	6.94227447852605	7.14346947803741
9.0		10.36310250000000	7.67813828037031	7.86385845721911
10.0		11.09519030000000	8.33261907128953	8.55124047695873
1.0		2.71999671272682	0.00000000000000	2.71999671272682
2.0		2.71999671272682	0.00000000000000	3.84665624074851
3.0		2.71999671272682	2.71999671272682	5.43999342545364
4.0		2.71999671272682	2.71999671272682	7.19643486878837
5.0		4.71117250286318	4.71117250286318	7.19643486878837
6.0		5.43999342545364	5.43999342545364	9.02120852711497

Craft Production Objects (cont.)	6.0	7.39581174799294	5.43848220502049	5.54832961917981
	7.0	8.20687453988020	6.22032637547112	6.34980298183834
	8.0	8.90422175014153	6.94655359101261	7.11980067304743
	9.0	9.51731528127743	7.64236116125716	7.82986722893830
	10.0	10.05161610000000	8.30910652687117	8.51993787908870
	1.0	1.12618563178632	0.00000000000000	1.95061073300796
	2.0	2.75858015353038	1.12618563178632	2.75858015353038
	3.0	4.06052004109638	2.75858015353038	3.90122146601592
	4.0	4.64338231390795	3.56131166460049	4.90892936062408
	5.0	5.16083090423248	4.36169819664649	5.63092815893160
Symbolic Objects	6.0	5.95921422360152	5.16083090423248	6.75711379071792
	7.0	6.94227447852605	6.06469523059623	7.88329942250424
	8.0	7.88329942250424	6.94227447852605	8.27574046059115
	9.0	8.65039597690621	7.63816257702923	9.21822668278508
	10.0	9.28676462781591	8.57677424676861	10.19804460000000
	1.0	2.38386957627987	0.99311479820044	1.28210569143414
	2.0	4.23011616364299	1.86425649903332	2.26257536851168
	3.0	5.70912485858366	2.96353874254346	3.17767177061482
	4.0	7.15489154229174	3.98426444674061	4.17423370721895
	5.0	8.24658399547235	4.89891896835559	5.13299967228405
Ornamentation Objects	6.0	9.14836862450183	5.78674800818356	6.06416049575142
	7.0	9.94296374820831	6.65143355928494	6.95518070860657
	8.0	10.56140300000000	7.44441901163785	8.00381406485445
	9.0	11.06310440000000	8.18082755281456	8.77630544880089
	10.0	11.47159670000000	8.82965734111544	9.48362111774818
	1.0	1.33810792349863	0.66905396174931	1.49605013908701
	2.0	3.54030079294242	1.63884081667340	2.59123485156919
	3.0	4.91652245002019	2.31767090951011	3.60296584888633
	4.0	5.79417727377529	3.27768163334679	4.58680287078323
	Lithic Production Objects			

Lithic Production Objects (cont.)	5.0	6.75711379071792	4.43800191124654	5.75541980017110
	6.0	7.51011209438908	5.43542008002527	6.55536326669358
	7.0	8.16684439401998	6.34720319006102	7.29851705787977
	8.0	8.82542789044514	7.20593169777265	8.05647655872006
	9.0	9.39061984830040	8.16684439401998	9.00120046858052
	10.0	9.71857016168262	8.82542789044514	9.78741567517928
	1.0	1.44785729466996	0.95941003116395	1.06222179052309
	2.0	2.65163813975466	1.92962170812438	2.05914775988197
	3.0	3.77759409846626	2.84398276157051	3.03098343395204
	4.0	4.84631512111413	3.70777953922680	3.91272983920274
Hunting and Fishing Objects	5.0	5.86327387470656	4.57333570293294	4.77533691723276
	6.0	6.80677474514166	5.40586366139469	5.63341350515341
	7.0	7.69266920105093	6.20669429049841	6.44006901062988
	8.0	8.49847312557760	6.94496239398425	7.22203929745527
	9.0	9.24836339717256	7.68610466523606	7.95864614270386
	10.0	9.92032426566980	8.38663235421703	8.67688376235159
	1.0	5.34196749690074	3.08418637233787	6.89645038382596
	2.0	6.16837274467574	4.36169819664649	10.22908900000000
	3.0	8.72339639329299	8.72339639329299	13.08509460000000
	4.0	12.33674550000000	10.68393500000000	16.31998030000000
Mean Center Points (Combined)	5.0	13.79290080000000	12.33674550000000	16.31998030000000
	6.0	14.46611640000000	12.71642620000000	16.31998030000000
	7.0	15.72632650000000	14.13351750000000	16.31998030000000
	8.0	15.72632650000000	15.10936580000000	16.31998030000000
	9.0	16.02590250000000	15.72632650000000	16.31998030000000
	10.0	16.02590250000000	16.31998030000000	16.31998030000000

Appendix F

Nearest Neighbor Statistics and Ripley's-K Function

CA-MRN-298E

Nearest Neighbor Statistics

<u>Artifact Categories</u>	<u>Observed Mean Distance</u>	<u>Expected Mean Distance</u>	<u>Nearest Neighbor Ratio</u>	<u>Z Score</u>	<u>p-value</u>	<u>Description</u>
Combined Indigenously-Manufactured Artifacts	0.261095	0.323217	0.807802	-10.999979	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Combined Introduced Artifacts	0.855458	0.875439	0.977176	-0.482282	0.62960	The pattern is neither clustered nor dispersed.
16th-Century Ceramics	0.861874	0.879049	0.980462	-0.411158	0.68095	The pattern is neither clustered nor dispersed.
16th-Century Iron Fasteners	n/a	n/a	n/a	n/a	n/a	n/a
Food Processing Objects	1.545731	1.510128	1.023576	0.288799	0.77273	The pattern is neither clustered nor dispersed.
Craft Production Objects	0.363025	0.445549	0.814781	-7.690027	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Symbolic Objects	1.679777	2.218345	0.757221	-2.024505	0.04291	There is less than 5% likelihood that this clustered pattern could be the result of random chance.
Ornamentation Objects	0.591749	0.690681	0.856762	-3.836354	0.00012	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Lithic Production Objects	1.406674	1.568606	0.896766	-1.21743	0.22344	While somewhat clustered, the pattern may be due to random chance.
Hunting and Fishing Objects	0.727834	0.851356	0.854912	-3.152506	0.00161	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Mean Center Points (Combined)	0.999418	3.418699	0.292339	-3.82914	0.00012	There is less than 1% likelihood that this clustered pattern could be the result of random chance.

Ripley's K-function

<u>Artifact Categories</u>	<u>ExpectedK</u>	<u>ObservedK</u>	<u>LwConfEnv</u>	<u>HiConfEnv</u>
Combined Indigenously-Manufactured Artifacts	1.0	1.20391299253311	0.96440963867911	0.98979925414682
	2.0	2.22896316289768	1.90149884530557	1.92288587606275
	3.0	3.17703045029868	2.79005294122665	2.83156208587780
	4.0	4.08101003097540	3.63708540748095	3.69092366570201
	5.0	4.94966459833907	4.44143695625772	4.50910031088343
	6.0	5.77126342367035	5.19344694501204	5.29687087757079
	7.0	6.52656203837588	5.89269125760295	6.02011444144224
	8.0	7.21537655613570	6.56242449587864	6.69866116223919
	9.0	7.84341676636389	7.18045104260152	7.329688392361372
	10.0	8.41935865445088	7.75537612774936	7.91212555764566
Combined Introduced Artifacts	1.0	1.17188576925700	0.86721055130396	1.09246383127258
	2.0	2.31570140569754	1.91794830123635	2.09711273431083
	3.0	3.26489662753658	2.79842320975158	2.91573002624043
	4.0	4.31526528428726	3.58245270647489	3.84441136678438
	5.0	5.26262398109911	4.31905226639763	4.67357123349955
	6.0	6.03806896293484	4.99321836604563	5.44583249213754
	7.0	6.80203488899202	5.62888691577668	6.22077890774025
	8.0	7.46112293054647	6.22077890774025	6.92116889954647
	9.0	8.10192861269046	6.80083300986099	7.57313031043705
	10.0	8.63526507470086	7.34852074050567	8.16524552216728
16th-Century Ceramics	1.0	1.15321381227760	0.90253256689553	1.09403468278892
	2.0	2.29196712072183	1.85502605791455	2.08696654671586
	3.0	3.25157218431042	2.85114478181310	2.98223410760055
	4.0	4.30721885336097	3.75016195303006	3.90009682347352
	5.0	5.24680601931651	4.52553779026852	4.79486000827042
	6.0	6.02961015091611	5.31292499525173	5.61711022210176

16th-Century Ceramics (cont.)	7.0	6.79197901820340	5.97560635415579	6.34529636671625
	8.0	7.45363401938828	6.67719760050224	7.07372365824018
	9.0	8.09511740626355	7.34693142441110	7.71985995430596
	10.0	8.62986195847640	7.89656789782844	8.27887850588859
	1.0	n/a	n/a	n/a
	2.0	n/a	n/a	n/a
	3.0	n/a	n/a	n/a
	4.0	n/a	n/a	n/a
	5.0	n/a	n/a	n/a
	6.0	n/a	n/a	n/a
16th-Century Iron Fasteners	7.0	n/a	n/a	n/a
	8.0	n/a	n/a	n/a
	9.0	n/a	n/a	n/a
	10.0	n/a	n/a	n/a
	1.0	1.03208547585868	0.87227143116547	1.29378761362923
	2.0	2.06417095171736	1.82969199002477	2.30781328261023
	3.0	3.07158466843753	2.73064150088383	3.55390400317957
	4.0	4.16503899759726	3.70073426407439	4.58253920983965
	5.0	4.84090998145242	4.63208161407960	5.43334786715754
	6.0	5.62598168362662	5.40526836204220	6.27793086061819
Food Processing Objects	7.0	6.33823897784943	6.16789044012399	7.04328799039981
	8.0	6.84608054999730	6.80148020193762	7.72342048905747
	9.0	7.47308081066004	7.44247420774025	8.33920685053139
	10.0	8.03247855449415	7.99449971972646	8.95513122130179
	1.0	1.26241647889232	0.97808667801919	1.00774902691128
	2.0	2.32463915256337	1.91930094570449	1.94835086626748
	3.0	3.31084592034049	2.82226936273098	2.85741584932397
	4.0	4.21215729566641	3.66338918513515	3.74292209870648
	5.0	5.07971121637107	4.46313296235883	4.54978972699559
	Craft Production Objects	7.0	6.79197901820340	5.97560635415579
8.0		7.45363401938828	6.67719760050224	7.07372365824018
9.0		8.09511740626355	7.34693142441110	7.71985995430596
10.0		8.62986195847640	7.89656789782844	8.27887850588859
1.0		n/a	n/a	n/a
2.0		n/a	n/a	n/a
3.0		n/a	n/a	n/a
4.0		n/a	n/a	n/a
5.0		n/a	n/a	n/a
6.0		n/a	n/a	n/a

Craft Production Objects (cont.)	6.0	5.90336158476403	5.23954134293665	5.33986575081872
	7.0	6.66102905123839	5.96055124699042	6.07555990249181
	8.0	7.33630062706460	6.61468689399168	6.75203237758686
	9.0	7.94738641202200	7.21500880076140	7.38217634462326
	10.0	8.50851248136721	7.78409004576741	7.96123718009239
	1.0	1.44303385415713	0.00000000000000	1.44303385415713
	2.0	2.04075804751253	1.66627196829472	2.76319945876028
	3.0	3.53469662424676	2.49940795244208	3.81790871154680
	4.0	4.40854124470593	3.63155556112564	4.56327371986775
	5.0	4.71292883232901	4.48657458138773	5.52639891752055
Symbolic Objects	6.0	4.99881590488416	5.13579512705532	6.56011929929889
	7.0	6.12227414253758	5.71169254247950	7.45179478021873
	8.0	6.66508787317888	6.81951193718727	8.28959837628083
	9.0	7.21516927078563	7.31073859074797	8.97314916277546
	10.0	7.99115963196014	7.81550830024155	9.35192822781644
	1.0	1.34899324168777	0.94728092828179	1.06278894310737
	2.0	2.36985782759711	1.89952361588517	1.99302446561233
	3.0	3.27765059655394	2.83188883907862	2.93846141196148
	4.0	4.24524728344151	3.67649199280722	3.81963842449614
	5.0	5.14535729474078	4.46849074335162	4.65556014414799
Ornamentation Objects	6.0	5.97959813012133	5.22943040834106	5.47849116226310
	7.0	6.73705367591869	5.96856904333288	6.20921043207446
	8.0	7.45174307250220	6.63238584795800	6.92174021853103
	9.0	8.10248308026618	7.25893406421584	7.59189783796438
	10.0	8.66316058491090	7.83153588584042	8.16382110478126
	1.0	1.29938032140592	0.41090013624443	1.48152151032445
	2.0	2.21276495295030	1.48152151032445	2.36044157412716
	3.0	3.20923265593309	2.63104462155120	3.26141872255599
	4.0	4.21047346582281	3.58214433955317	4.34855829674132
	Lithic Production Objects			

Lithic Production Objects (cont.)	5.0	5.01567536558024	4.48239129415513	5.26208924310239
	6.0	5.85442577534603	5.30999999701234	6.14979012002163
	7.0	6.63829485885090	6.03897401423371	6.92461217962835
	8.0	7.12885092505616	6.60003347469914	7.63213129329971
	9.0	7.53192390963115	7.25794348650475	8.45096822804872
	10.0	8.17680946937221	7.93579976393080	9.09566224984142
	1.0	1.24028358091717	0.93647033188036	1.03838818341578
	2.0	2.28130520256459	1.91844383109896	2.11110557459618
	3.0	3.11285616567672	2.81707652420152	2.98314545861512
	4.0	4.02344714875054	3.67419246142715	3.83501372427799
Hunting and Fishing Objects	5.0	4.97849111484562	4.52146219368409	4.67159291824749
	6.0	5.72276570004891	5.24428868671717	5.47366183409177
	7.0	6.43465622602860	5.98913883464226	6.20952660802744
	8.0	7.06511058423150	6.67590199680243	6.93469183654221
	9.0	7.65595657365626	7.31603246069009	7.56623338919247
	10.0	8.21574410616838	7.87807534363404	8.18857585562541
	1.0	5.04325069789636	2.05889847579687	6.17669542739062
	2.0	8.23559390318750	5.44733334168847	8.23559390318750
	3.0	9.43505811356838	7.70369269058298	10.29449240000000
	4.0	9.43505811356838	8.73516644406370	10.89466670000000
Mean Center Points (Combined)	5.0	9.65708985875409	9.43505811356838	10.89466670000000
	6.0	10.49836350000000	10.49836350000000	10.89466670000000
	7.0	10.89466670000000	10.89466670000000	10.89466670000000
	8.0	10.89466670000000	10.89466670000000	10.89466670000000
	9.0	10.89466670000000	10.89466670000000	10.89466670000000
	10.0	10.89466670000000	10.89466670000000	10.89466670000000

Appendix G

Nearest Neighbor Statistics and Ripley's-K Function

CA-MRN-298W

Nearest Neighbor Statistics

<u>Artifact Categories</u>	<u>Observed Mean Distance</u>	<u>Expected Mean Distance</u>	<u>Nearest Neighbor Ratio</u>	<u>Z Score</u>	<u>p-value</u>	<u>Description</u>
Combined Indigenously-Manufactured Artifacts	0.246308	0.288675	0.853237	-6.632307	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
16th-Century Ceramics	0.508255	0.58048	0.875578	-2.796185	0.00517	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Food Processing Objects	0.894874	1.028017	0.870486	-1.643514	0.10027	While somewhat clustered, the pattern may be due to random chance.
Craft Production Objects	0.351164	0.409719	0.857085	-4.550388	0.00001	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Symbolic Objects	1.874663	1.891276	0.991216	-0.060589	0.95168	The pattern is neither clustered nor dispersed.
Ornamentation Objects	0.52594	0.622495	0.84489	-3.250577	0.00115	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Lithic Production Objects	1.248925	1.152637	1.083537	0.945465	0.34442	The pattern is neither clustered nor dispersed.
Hunting and Fishing Objects	0.246308	0.288675	0.853237	-6.632307	0	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
Mean Center Points (Combined)	0.75172	2.577374	0.291661	-3.585263	0.00033	There is less than 1% likelihood that this clustered pattern could be the result of random chance.

Ripley's K-function

<u>Artifact Categories</u>	<u>ExpectedK</u>	<u>ObservedK</u>	<u>LwConfEnv</u>	<u>HiConfEnv</u>
Combined Indigenously-Manufactured Artifacts	1.0	1.06317171626408	0.94908314661931	0.99670853826423
	2.0	1.95790021819875	1.82147804604726	1.89585445861529
	3.0	2.75930032496402	2.61299963713799	2.68874192977098
	4.0	3.43426032012121	3.29050312809481	3.37511982339608
	5.0	4.00058453201786	3.87482896678615	3.95538361070747
	6.0	4.46579261102356	4.34788606340186	4.43171828851539
	7.0	4.84852590928867	4.73338626661244	4.82135358496492
	8.0	5.17971214970804	5.04306625089718	5.15299111702106
	9.0	5.45643751169347	5.31054724322659	5.44167059009438
	10.0	5.71732301581517	5.55204900404436	5.70212822267923
16th-Century Ceramics	1.0	1.12054037655733	0.93517631553679	1.04256731525913
	2.0	2.08513463051826	1.78490279443586	1.96482429244434
	3.0	2.89753783667328	2.49060069913290	2.86174430528431
	4.0	3.60636636584278	3.20172311898833	3.61674442000496
	5.0	4.17101816456433	3.79788183192241	4.19491248486451
	6.0	4.57731721316162	4.34558806021294	4.65177203049110
	7.0	4.96487160569295	4.76651684261436	5.03793885947683
	8.0	5.28897514433106	5.09710924264590	5.35704108147238
	9.0	5.53765630173542	5.39596386759720	5.66093494426820
	10.0	5.78374609130120	5.64214432441524	5.95352452707868
Food Processing Objects	1.0	1.32204962661133	0.86548464091922	1.19820922854144
	2.0	2.09034399993348	1.88628004347673	2.34374348715010
	3.0	2.74828284727808	2.75961602050271	3.23834699983478
	4.0	3.61195129288885	3.34268350027845	4.05178709074197
	5.0	4.40604508412834	3.91067553412484	4.89592046885427
	6.0	5.02180014305540	4.47632136950578	5.52488409782803

Food Processing Objects (cont.)	7.0	5.53617090039474	4.89592046885427	6.00665462632602
	8.0	5.93872159343444	5.18689405328875	6.35016487140902
	9.0	6.28594529553335	5.51923204100541	6.61968460914291
	10.0	6.53904051073207	5.78430436415037	6.83312776371459
	1.0	1.11306894711097	0.94492818212047	1.00743623526237
	2.0	1.98902238982018	1.82371469501957	1.89556961180290
	3.0	2.80823052567145	2.61185711730989	2.71196433214734
	4.0	3.47144286344848	3.29074243530587	3.40086035311917
	5.0	3.99857326154113	3.87915072325356	3.97629691405366
	6.0	4.43611250103972	4.36821015486871	4.46007570529018
Craft Production Objects	7.0	4.79474519651217	4.75462651539067	4.86463310234521
	8.0	5.11946542138800	5.06165593286875	5.20267527964571
	9.0	5.38175517595644	5.33186562520225	5.48510272663999
	10.0	5.63362526546500	5.57989830494538	5.73095141107390
	1.0	1.50704991349317	0.00000000000000	1.74019134647496
	2.0	2.13129042683524	1.74019134647496	2.46100220330919
	3.0	3.01409982698633	2.30205676821970	3.79265911085417
	4.0	3.58749636515105	3.25559990296907	4.43663481653057
	5.0	4.68560859835849	3.79265911085417	4.92200440661839
	6.0	5.07348601456080	4.26258085367047	5.43374573778318
Symbolic Objects	7.0	5.50296821937611	4.76571027419813	6.09066971266238
	8.0	5.63886444105874	5.29258535894356	6.51119980593814
	9.0	6.02819965397267	5.77156175968081	6.68333168072696
	10.0	6.27434912883421	5.96507540501959	6.90617030465909
	1.0	1.20648392104896	0.96244122192417	1.01676411704415
	2.0	2.11330453204006	1.82791453840110	1.92917427179373
	3.0	2.93561476905446	2.56418153712769	2.73734352737243
	4.0	3.63541162785653	3.21014186609487	3.47608439833584
	5.0	4.21485213153109	3.83900832884815	4.05279677224628
	Ornamentation Objects			

Ornamentation Objects (cont.)	6.0	4.70971460821855	4.32907547188508	4.50507975322510
	7.0	5.05036061110986	4.70971460821855	4.90076085458877
	8.0	5.34164168060314	5.00016433516261	5.24713335745136
	9.0	5.56161607355997	5.29108259467835	5.50631984741289
	10.0	5.77822673270166	5.53851863324417	5.74737103254422
	1.0	1.07604199828520	1.02596578982201	1.29775547890046
	2.0	2.12748794311646	1.74715678331018	2.31695696757924
	3.0	3.09494956294192	2.88367575065094	3.22812599485560
	4.0	3.90676133483143	3.37166763788471	3.92020977850961
	5.0	4.57677347675340	3.99995102328184	4.47208119736402
Lithic Production Objects	6.0	5.05750145682706	4.53054225637057	4.92035907666881
	7.0	5.36060988987849	4.85575637385425	5.35078291573061
	8.0	5.72154178859392	5.23141958258105	5.64747339941663
	9.0	5.95590593642375	5.39973894852493	6.04362650446012
	10.0	6.17287048529616	5.62880401477449	6.27434912883421
	1.0	0.99681982111608	0.90736420341444	1.09196140358708
	2.0	1.89882308649164	1.77518709589769	2.02892803918463
	3.0	2.74287224471524	2.60484324523709	2.79414532210642
	4.0	3.44485370998461	3.27154816093129	3.49395148785136
	5.0	4.00858279825306	3.85698798851208	4.07182464318471
Hunting and Fishing Objects	6.0	4.47697834186518	4.33522495155235	4.59588455124428
	7.0	4.82197099587042	4.66942337348989	4.94119358039305
	8.0	5.12729300297625	4.98694634894636	5.25580281312029
	9.0	5.37860603589954	5.27467469722609	5.54494025601925
	10.0	5.68649294838696	5.56283132891667	5.84892653326287
	1.0	3.35378068072874	1.67689034036437	4.43663481653057
	2.0	5.80891853646511	5.03067102109310	6.04611410551399
	3.0	6.70756136145747	5.80891853646511	7.11444318586717
	4.0	6.91399599590024	6.91399599590024	7.68447691685998
	Mean Center Points (Combined)			

Mean Center Points (Combined, cont.)	5.0	7.49928158373497	7.49928158373497	7.68447691685998
	6.0	7.68447691685998	7.68447691685998	7.68447691685998
	7.0	7.68447691685998	7.68447691685998	7.68447691685998
	8.0	7.68447691685998	7.68447691685998	7.68447691685998
	9.0	7.68447691685998	7.68447691685998	7.68447691685998
	10.0	7.68447691685998	7.68447691685998	7.68447691685998