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Journal

American Antiquity, 80(3)

Author

Schneider, Tsim D

Publication Date

2015

Peer reviewed

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ENVISIONING COLONIAL LANDSCAPES USING MISSION REGISTERS, RADIOCARBON, AND STABLE ISOTOPES: AN EXPERIMENTAL APPROACH FROM SAN FRANCISCO BAY

Tsim D. Schneider

The periodization used to distinguish sites and artifacts as "prehistoric" or "historic" translates to the selection of field methods and analytical techniques. This comes at the expense of developing new approaches to track continuities and adjustments in Native American site use, technologies, and other cultural traditions, such as mobility across an artificial divide between prehistory and history. To evaluate the mobility of Coast Miwok people in colonial San Francisco Bay, California, this article presents an experimental technique that compares radiocarbon and geochemical data from a Late period Phase 2 (A.D. 1500–1800) shellmound (CA-MRN-114) to baptismal records from Spanish missions (A.D. 1776–1830s). Supported by eyewitness accounts of native fugitivism, furlough, and foraging at the missions, Coast Miwok baptisms before 1817 are at their lowest during traditional times of mussel harvests. After 1817, a different pattern is examined vis-à-vis the colonial landscapes taking shape in the region. Radiocarbon, geochemical, and documentary evidence supports the conclusion that seasonally oriented Coast Miwok mobility involving the collection of shellfish continued even during missionization. With further refinement, the proposed methodological framework holds promise for documenting patterns that often go unseen in the historical record and enhancing the archaeology of colonialism in North America.

La periodización utilizada para distinguir sitios y artefactos como "prehistóricos" o "históricos" se traduce en la selección de métodos de campo y técnicas de análisis. Esto sucede a costa del desarrollo de nuevas estrategias para rastrear las continuidades y ajustes a través de una división artificial entre la prehistoria y la historia en el uso indígena de sitios, tecnologías y otras tradiciones culturales como la movilidad. Para evaluar la movilidad de los indígenas Coast Miwok en la época colonial en la Bahía de San Francisco, California, este artículo presenta una técnica experimental que compara los datos radiocarbonos y geoquímicos de un conchero (CA-MRN-114) de la Fase 2 del Período Tardío (d.C. 1500–1800) a los registros de bautismos de las misiones Españolas (d.C. 1776–1830s). Apoyado por relatos de testigos oculares de nativos fugitivos, con permiso de paseos, y aquellos buscando de alimentos salvajes afuera de las misiones; los bautizos de los Coast Miwok antes de 1817 están a los niveles mas bajos durante los tiempos tradicionales de las cosechas de mejillones. Después de 1817, un patrón diferente se examina en relación a los paisajes coloniales que están tomando forma en la región. La evidencia geoquímica, de radiocarbono y de documentos apoyan la conclusión de que la movilidad estacionalmente orientada de los Coast Miwok, involucrando la colecta de moluscos continuo incluso durante la época misional. Con mas refinamiento, el marco metodológico propuesto aquí, es prometedor para la documentación de patrones que frecuentemente son desapercibidos en el registro histórico y puede mejorar la arqueología de colonialismo en América del Norte.

A "Great Divide" between prehistory and history complicates archaeological endeavors to understand continuity and change in native North America before and after contact with European colonists (Scheiber and Mitchell 2010). This disciplinary issue also eschews methodological advances that might better track transformations and the persistence of social practices among indigenous groups confronting colonialism. The study of mobility, for example, is typically the domain of prehistorians, and isotope analysis is one method used to evaluate the seasonal movements of native groups to and from places on the landscape. The travels of native people to and from colonial institutions, on the other hand, are regularly the purview of historians and historical archaeologists who compare documents to archaeological remains, especially mixtures of

Tsim D. Schneider ■ Department of Anthropology, University of California, Santa Cruz, CA 95064 (tdschnei@ucsc.edu)

American Antiquity 80(3), 2015, pp. 511–529
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DOI: 10.7183/0002-7316.80.3.511

local and introduced materials found at colonial sites. As observed two decades ago by Lightfoot (1995:204), Native American components associated with Spanish missions are "excavated, analyzed, and interpreted in a very different methodological and theoretical context than contemporaneous native villages in the outlying hinterland." During the Mission period in San Francisco (A.D. 1776–1830s), contemporary observers noted Indians arriving and departing missions on a seasonal basis (e.g., Jackson 1984; Mahr 1932); yet, apart from archaeological and documentary evidence for mission stays, little information exists on where mission Indians went upon departure. To better envision native people's movements across the landscapes encircling Spanish missions, I present a methodological framework for the study of site seasonality that compares stable isotope data collected from a shellmound to insights derived from the baptismal registers of Spanish missions in the San Francisco Bay area of California (Figure 1).

Since the pioneering seasonality research conducted by Epstein et al. (1951, 1953) and Shackleton (1973), stable isotope analysis of marine shells has been an increasingly important component of the archaeological toolkit (Culleton et al. 2009; Eerkens et al. 2013; Eerkens et al. 2014; Finstad et al. 2013; Jones and Kennett 1999; Jones et al. 2008; Kennett 2005; Schweikhardt et al. 2011). Much of this recent research focuses on shellmounds, which for the San Francisco Bay area are best known for long records of prehistoric occupation that often extend several hundred years or more and have been recognized for decades as important sources of environmental and ecological data and as testing grounds for new archaeological field techniques (Cook and Treganza 1947; Gifford 1946; McGeein and Mueller 1955; Meighan 1950; Meighan et al. 1958a, 1958b; Treganza and Cook 1948). With improved sampling methods, the combination of stable isotope analysis and radiocarbon dating greatly facilitates the production of robust sequences of seasonal site use at shellmounds over discrete time spans in prehistory and in more recent periods.

Marriage, death, and baptism records maintained by Franciscan priests stationed at Alta (Upper) California missions have been scrutinized for many decades by historians, demographers, archaeologists, and tribal scholars seeking to document population sizes, birth and mortality rates, languages, ethnicities, and the novel social identities borne out of pluralistic social settings (Cook 1976; Milliken 1995; Peelo 2010). Whereas both data sets (i.e., isotopes and mission registers) are proven means to evaluate the lives of Native Californians before and after contact, an entrenched scholarly division between prehistoric and historical archaeology hinders the integration of methods and analyses that might serve to bridge disjunctures created from arbitrary divisions between prehistoric and historic time periods, places, and artifact assemblages (Lightfoot 1995). As I show, for instance, reduced numbers of baptisms at Spanish missions before 1817 seem to coincide with traditional times of shellfish harvest inferred from isotopic data, suggesting that Coast Miwok continued that seasonal practice during colonial times. By integrating seasonality and archival data sets, archaeologists can draw forth what typically goes unseen in the historical record and bring new analytical methods to bear on the study of colonialism in North America.

After first discussing the California mission system—including the observed seasonal movements of native people to and from the missions—I investigate the reuse of San Francisco Bay shellmounds during historic times as a continuation of precolonial traditions of seasonal mobility. In viewing two primary sites of Coast Miwok missionization—the Spanish missions at San Francisco and at San Rafael—as "ecological resources" (Ricklis 1996), I develop an experimental approach that compares seasonal interpretations from mission baptism records to stable isotope data and radiocarbon dates collected from a Late period Phase 2 (A.D. 1500–1800) shellmound (CA-MRN-114) on the Marin Peninsula. To do so, I use a methodology developed by Schweikhardt (2007) and subsequently applied by Finstad (2009), Schweikhardt et al. (2011), and Finstad et al. (2013) that subjects archaeological mussel (*Mytilus* spp.) shells collected from shellmounds to elemental and isotopic analyses to calculate the season of death of the mussels and to infer patterns of seasonal residence and mound construction by Native Americans. I then examine differences in the occurrences and frequencies of Coast Miwok baptisms at the two missions before and after 1817 vis-à-vis the

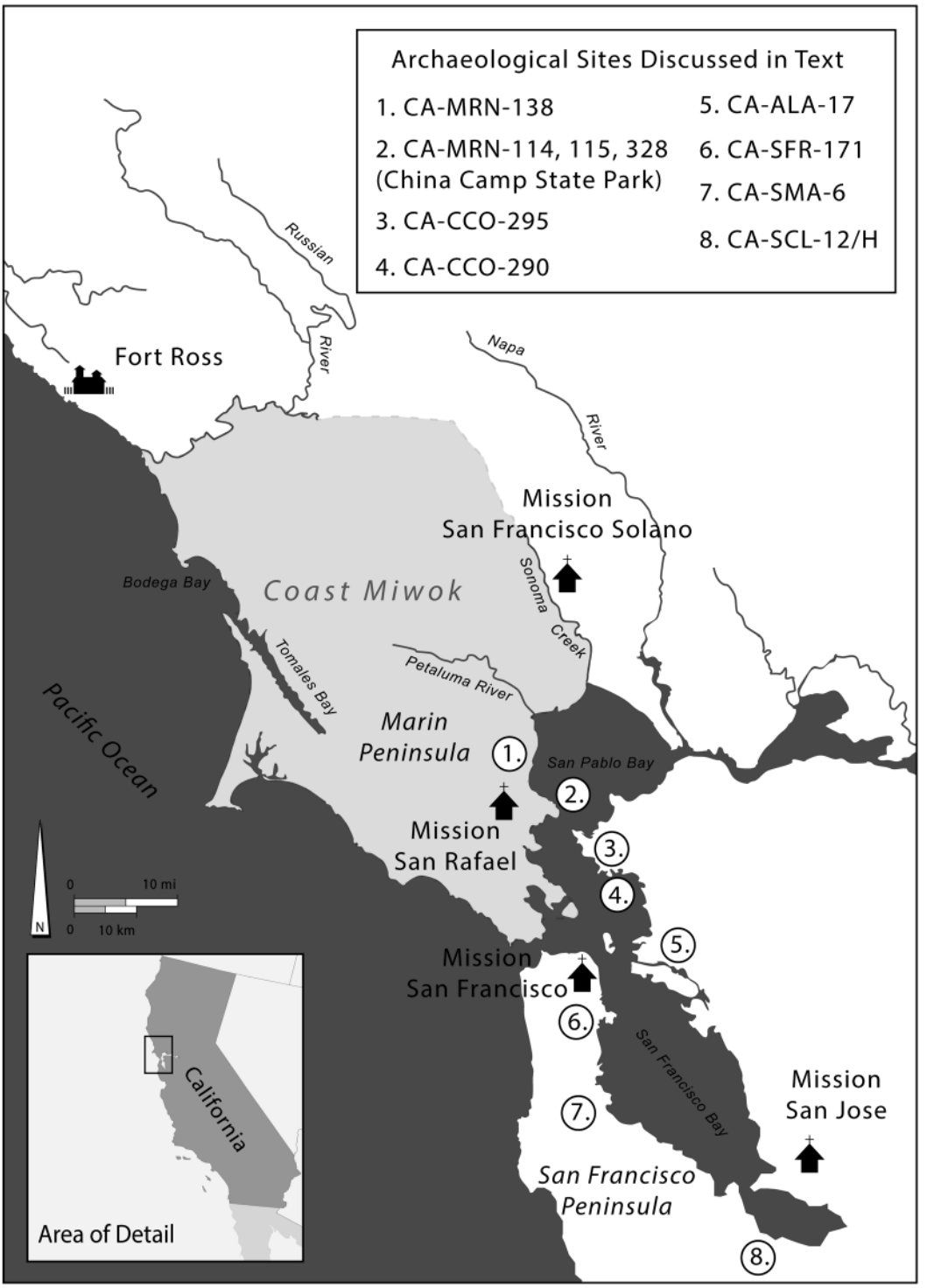

Figure 1. The San Francisco Bay region of California.

broader political and social landscapes taking shape in the foment of colonization.

Spanish Missions in Colonial San Francisco Bay

From A.D. 1776 to the 1830s, Spanish colonists established six missions, a fort, and two civilian towns in the greater San Francisco Bay area. As communities on the northwest frontier of New Spain, Alta California missions operated with minimum royal support and relied on indigenous labor to make them cost-effective (Hackel 2005:273–274). Rather than relocate reluctant families to the remote frontier, mission administrators instead applied a policy of *reduccíon* (reduction) and *congregación* (congregation) to grow a colonial citizenry out of California's indigenous population. Through this policy, Franciscan padres would ideally "reduce" Native Americans from outlying villages into a centrally located mission settlement, convert them to the Roman Catholic faith, and transform native people into loyal subjects of the Spanish Crown and participants in civilized society.

Many factors, however, complicated the mission program, and high mortality rates, crowd diseases, hunger, harsh punishments, and a persistent desire among some Indians to leave resulted in upswings of native fugitivism. "A neophyte taken sick at the mission might prefer to meet death in the company of his own people in their wilderness retreat rather than the last sacrament of a priest at whose hands he had suffered ill-treatment, hunger, flogging and overwork" (Heizer 1941:113). To the Franciscan padres, baptism represented a binding spiritual contract for Indians to remain at the missions, and fugitives were often captured to prevent backsliding. Rates of fugitivism varied by year and by mission depending on the personalities of the padres (Jackson 1994:138), as well as on the local environment, which impacted how much food could realistically be grown to support mission communities located within arid or temperate regions of California (Lightfoot 2005:65–66). One estimate suggests that between five and ten percent of baptized Indians illicitly fled the missions for the hinterlands throughout the mission era (Hackel 2005:94–95). Considering that for five decades Alta California missions baptized more than 70,000 Indians (Hackel 2005:52), upwards of 7,000 found a way out.

One measure adopted at missions to reduce the number of runaways involved the administration of periodic furloughs called *paseo*. Established by the provincial governor of California in 1783 to help distinguish enemies from allies, this system originally required Indians on leave from Spanish colonies to carry a pass (Milliken 1995:95). It is unclear whether mission Indians in authority positions or Franciscan priests at different missions instituted paseo, but it is clear that Indians had gained this concession, "by insisting on it time and time again, sometimes as a condition of accepting baptism" (Hackel 2005:286). It is also true that Indians chose when to absent themselves, as many planned the circumstances and locations of births, deaths, and other rituals to coincide with their furloughs (Newell 2009:152).

While on paseo, Indians could also hunt and gather or return to home villages for one or two weeks out of the year to relax with friends and family members residing in the mission hinterlands (Newell 2009). Louis Choris (in Mahr 1932:361), an artist who visited Mission San Francisco in 1816, noted that "once or twice a year the missionaries permit those Indians upon whose return they believe they can rely to visit their own country, but it often happens that few of these return." Just as approved liberties and running away speak to opportunities for Indians to leave the missions, archaeological evidence and historical documents also showcase continuities in native foodways, hunting and gathering practices, and cultural knowledge of the landscape at the missions (Lightfoot 2005), including the "sustained value" of shellfish for food and ornament production at many missions (Allen 1992, 1998:58; Ambro 2003; Arkush 2011).

Replies from Franciscan padres to a list of 36 questions delivered to the Alta California missions between 1813 and 1815 provide additional eyewitness testimony to the continuation of not just hunting and gathering but also engrained cultural knowledge of when, where, and how things could be procured across the landscape (Geiger and Meighan 1976). Colonial administrators drafted and circulated the questionnaire to elicit information about the successes and failures of the missions. For example, one question and a reply from

Fathers Ramón Abella and Juan Sainz de Lucio at Mission San Francisco in 1814 read:

> Question 16: How do they know and distinguish the seasons of the year? Do they have their own calendars or are they the same they had in their pagan state?
>
> Mission San Francisco: [The Indians] know spring by the appearance of flowers; they know summer because the grasses dry and the seeds mature; they know fall because wild geese and ducks appear and the acorns ripen.... They look for roots and seeds during the day but they prefer to go hunting for ducks and to go fishing at night because the sea is quieter and the ducks are congregated in greater number in the lagoons and estuaries [Geiger and Meighan 1976:84].

To the south of San Francisco, padres at Mission San Carlos replied that Indians continued to mark the year by the seasonal availability of native foods across the landscape, or from "acorn to acorn" and "seed to seed" (Geiger and Meighan 1976:83). At this same mission during the mid-1770s, Indians divided their time between wheat harvests and, as Father Junipero Serra admitted, gathering sardines during multiday shoreline excursions (Hackel 2005:85–86). One analysis of mission burial registers further demonstrates that customary duck hunts, fishing, and shellfish gathering trips were not entirely eliminated at the missions, as many Indians still practiced these activities and some even perished while doing them (Newell 2009:56–57).

Scholarly inquiries into seasonal trips away from the missions also explore the motivations that brought Native Americans to the missions. For example, Ricklis (1996) links historical accounts of Karankawa visiting and leaving Spanish missions in Texas to an archaeological record of seasonal mobility between the Gulf Coast and inland zones. In fact, as Ricklis (1996:165–168) argues, Karankawa even convinced missionaries to move Mission Nuestra Señora del Refugio to a location better suited to a Karankawan seasonal round. In a similar example from California, Jackson (1984:228) observes how trips to Mission San Francisco and Mission San Rafael fit into a cycle of "seasonal transhumance" that brought an influx of native groups to the missions during times of harvest to work in return for food. Louis Choris (in Mahr 1932:361) also witnessed seasonal mobility at Mission San Francisco in 1816, namely, visits to this mission by Indians during the winter followed by a spring sabbatical.

In a recent analysis of the "ecological hypothesis" that environmental factors such as drought conditions were primarily responsible for driving native groups to the California missions for baptism, Peelo (2009) shows, instead, that patterns of baptism were dynamic across the California province and were also geographically, temporally, and culturally contingent. While severe drought and landscape alterations from grazing livestock and water management may have factored into the decision to enter missions later in time, before 1790, Salinan Indians "either maintained their traditional methods for combating this environmental problem or invested in new methods—other than accepting missionization—to buffer against the few years of low rainfall conditions" (Peelo 2009:606). Moreover, Peelo reveals a more complicated picture of ever-changing variables that resulted in Native American conversion than can be explained by just environmental pressures alone. "Salinans became more or less responsive to environmental pressures as the ecological pressures themselves changed, or as other changes occurred in their economic and cultural lives" (Peelo 2009:592). Considering a system of approved furlough, the high frequency of native fugitivism, and archaeological and historical insights connecting the indigenous residents of missions to the seasonal availability of resources across the landscape—including both missions and extramural areas—systematic and critical evaluation of mission-era Native American hunting and gathering practices and the reoccupation of native places on the landscape around missions is necessary.

San Francisco Bay Shellmounds

Archaeologists have explored the antiquity of San Francisco Bay shellmounds for over a century (Moratto 1984:226), and the earliest dated components of some mounds reach back approximately 5,000 years (Lightfoot and Luby 2002:276). Only recently have shellmounds been studied as one

type of site for addressing the issue of Native American landscape use in historic times (Schneider 2010). Nels Nelson (1909) conducted the first systematic survey of San Francisco Bay shellmounds and identified over 400 individual mounded sites. This survey and site recordation provides some of the earliest and only glimpses of shellmounds in the region, and Nelson's field notes continue to offer important comparative details on mound size, composition, and site condition.

The latest systematic analysis of shellmounds advances a variety of shell-bearing site types in California—including large mounds, lateral middens, and other shell-bearing deposits—as extensions of a broader interregional pattern of Native American mound construction in North America (Luby et al. 2006:192). Some larger sites represent "classic accretional mounds … built up through the incorporation of many smaller micro-events over centuries of use, rather than through one or a few pulses of major construction" (Schweikhardt et al. 2011:2310). In addition to mollusk shells, diverse shellmound constituents often include mixtures of ash, earth, and fire-affected rock; bird, fish, and mammal bone; stone, shell, and bone artifacts; and features such as human burials, hearths, and house floors. Regrettably, the past 200 years of coastal erosion and cultural disturbances—including urban development, pothunting, archaeology, and quarrying midden soils for local gardens and roads—have greatly damaged or entirely erased many mounds (Lightfoot and Luby 2002).

Through the years, archaeologists put forward various interpretations to explain the development of shellmounds (Lightfoot 1997). Early discussions focus on the sheer quantity of shell and faunal bone as accumulated deposits of domestic refuse, or "midden" (Gifford 1916; Nelson 1909:335). The presence of human burials suggests that many shellmounds functioned as cemeteries (Leventhal 1993), or venues where ambitious aggrandizers gained and legitimated their power by controlling access to the mound and those buried within them (Luby 2004; Luby and Gruber 1999). In still another interpretation explored in this article, the occurrence of shellmound clusters—comprised of at least one large shellmound flanked by multiple smaller mounds—suggests the presence of mounded villages. Luby et al. (2006:210) argue, for example, that some larger shellmounds were not simply refuse dumps, but central nodes within mounded villages, or clusters of large and small mounds occupied for ecological and social reasons.

Research examining the seasonal occupation of shellmound clusters provides a baseline for investigating the continuation of native people's seasonal movements to and from Spanish missions. In one of the first attempts to explain the development of prehistoric mound clusters, Banks and Orlins (1981) put forward a "periodically mobile home base" model in which hunter-gatherer groups divided themselves between three to five villages. These groups relocated at different times of year between a key village and other scattered communities, depending on the availability of local resources not easily transported to other villages. Shellmound clusters on the Marin Peninsula are likewise interpreted as periodic residences for Coast Miwok-speaking hunter-gatherers who moved seasonally from inland summer camps to mounded communities along the bay during the winter months (King 1970:283). More recent studies employ stable isotope analysis to detail the variable timing and seasonal accretion of shellmound deposits throughout the San Francisco Bay (Table 1). Finstad et al. (2013), for instance, revisit the questions of when and how shellmound clusters were inhabited. Revising an earlier interpretation that mound clusters represented seasonally vacant ceremonial centers (Luby et al. 2006), isotopic and radiometric data collected from two shellmounds in an East Bay mound cluster—one large mound (CA-CCO-295) and a smaller mound (CA-CCO-290)—instead suggest contemporaneous, year-round, and late occupations extending into the late 1700s and up to Spanish colonization (Finstad et al 2013:2654).

Not solely a hallmark of prehistoric settlement patterning, site clustering is also documented in the ethnographic record among indigenous populations known to have encountered different waves of European colonization. Slaymaker (1977), for example, observed the conspicuous clustering of Coast Miwok villages on the Marin Peninsula, including the village of *Cotomko'tca* (or, CA-MRN-138), which is a large multicomponent mounded site a few miles northwest of the CA-MRN-114, CA-MRN-115, and CA-MRN-328

Table 1. Summary of Seasonality Studies for San Francisco Bay Shellmounds.

Site (CA-)	Shellmound location	Date	Seasonality estimates
CCO-290	East Bay	1100–239 cal B.P.[a]	Late spring, summer, fall
CCO-295	East Bay	3510–240 cal B.P.[b]	Summer, fall, and sometimes early spring and early winter
CA-ALA-17	East Bay	4000–1500 cal B.P.[c]	Winter, spring, summer
CA-MRN-114	West Bay (Marin Peninsula)	1240–70 cal B.P.[d]	Late spring, summer, fall
SMA-6, SFR-171	West Bay (SF Peninsula)	700–400 cal B.P.[e]	Late summer to early winter

[a]Finstad et al. (2013).
[b]Schweikhardt et al. (2011).
[c]Culleton et al. (2009).
[d]Schneider (2010).
[e]Eerkens et al. (2013).

mound cluster I researched. Excavations at CA-MRN-138 encountered house floors, human burials, and cooking features; stone, bone, and shell artifacts; as well as historic glass "trade" beads, metal implements, and a chipped obsidian cross suggesting a connection to Spanish missions (Slaymaker 1977). Slaymaker (1977) argued that ceremonies and dances were held seasonally at principal villages like CA-MRN-138, which consisted of a permanent population and permanent structures—such as sweathouses, multifamily houses, assembly or ceremonial houses—and was surrounded by other satellite sites. To Slaymaker (1977:12), the central village was also "a place of identity and importance" for Coast Miwoks. Considering this example of historical site clustering, to what extent can inferences derived for the seasonal occupation of prehistoric mound clusters at various points around the San Francisco Bay be extended forward in time to inform the ways we understand the mobility of native people negotiating colonial enterprises? This question is evaluated in an experimental undertaking involving historical records, geochemical analysis, and chronometric dating of archaeological shell specimens from a shellmound.

Thus far, three main ideas are presented. First, native people continued to dwell within the landscapes surrounding Spanish missions. While the archaeological and historical records are mostly silent on the question of where they went, native people frequently fled or sometimes departed the missions with a pass. In many ways, native groups also integrated the missions into their seasonal routines. Second, some shellmounds appear to have been occupied at the outset of Spanish missionization in California (A.D. 1769) and might still hold clues for understanding change and continuity in native mobility and other traditions at this time. Third, the continuation of purposeful seasonal occupations of native places beyond the missions might be illuminated through careful rereads of the documentary record and the integration of archaeometric techniques. As one example of an "integrated approach" to the archaeology of prehistory and history espoused by Lightfoot (1995), the following exploratory study compares seasonal inferences from baptism records compiled at Spanish missions to geochemical and radiometric data derived from archaeological specimens from the CA-MRN-114 shellmound.

Methods

China Camp State Park Shellmounds

CA-MRN-114, CA-MRN-115, and CA-MRN-328 comprise a shellmound cluster in present-day China Camp State Park on the East Marin Peninsula. CA-MRN-115 is the largest site at approximately 5.0 m tall, and it measures 30 m east-west and 45 m north-south. CA-MRN-114 and CA-MRN-328 are situated a few meters north and south of CA-MRN-115 on natural hill slopes. CA-MRN-114 measures approximately 490 m^2 and CA-MRN-328 measures approximately 824 m^2. CA-MRN-328 was first identified in the 1940s. Nelson (1907) recorded CA-MRN-114 and CA-MRN-115 during his shellmound survey in the early 1900s, and subsequent excavations took place at CA-MRN-115 in 1949 (Meighan 1953). Significantly, the 1949 fieldwork resulted in the hypothesis that the occupants of CA-MRN-115

Figure 2. Feature 1 cross section in north profile of excavation unit at CA-MRN-114.

had abandoned the site by the year 1800, at which point they were "taken to one of the Spanish missions" (Meighan 1953:5). Testing this hypothesis and addressing the topic of Native American refuge, archaeological field investigations took place at all three sites between 2007 and 2009 (Schneider 2010). This article focuses on CA-MRN-114.

Geophysical surveys successfully targeted near-surface archaeological features at CA-MRN-114 for excavation and radiocarbon dating. One stone-lined hearth feature, "Feature 1," was encountered at 20–45 cm below surface in an excavation unit (Figure 2). I collected one shell and one charcoal specimen from the bottom of Feature 1 (40–45 cm) for Accelerator Mass Spectrometry (AMS) radiocarbon dating. I also removed mussel (*Mytilus* spp.) shell specimens from each unit level for identification and geochemical analysis. An additional 29 auger units were excavated at CA-MRN-114 to varying depths to determine the vertical and horizontal extent of the site deposit and to track changes in material assemblages through time. Of these auger units, I collected six units in their entirety as archival samples. The remainder was excavated, and mussel shell fragments from the 20–40 cm and 80–100 cm levels in one auger unit were sampled and submitted for AMS radiocarbon dating.

Stable Isotope Analysis

I conducted geochemical analysis of archaeological mussel (*Mytilus* spp.) shell to understand the seasonal occupation of CA-MRN-114—an inference made possible by determining when mussels were harvested and their shells deposited in the mounds. Season of harvest is based on paleoenvironmental conditions in the San Francisco Bay, particularly as air and water temperatures and salinity—a measure of precipitation and freshwater runoff—change seasonally throughout the year and over time. Temperature and salinity shifts are reflected

in oxygen isotope ratios and relative proportions of magnesium and calcium (Schweikhardt et al. 2011:2304). As mussels grow, they add calcite material to the edges of their shell, "thereby incorporating seawater chemistry and recording there the last environmental conditions they experienced immediately prior to harvest" (Finstad et al. 2013:2651). The theoretical and methodological frameworks for shellfish isotopic analysis of archaeological mussel shell used in this study closely follow geochemical sampling and analytic standards developed by Schweikhardt (2007) and applied by Finstad (2009), Schweikhardt et al. (2011), and Finstad et al. (2013).

In preparation for elemental and isotopic analyses, I selected 10 mussel shell fragments from each of the five strata of the excavation unit, amounting to 50 shell samples total. Each stratum of 10 mussel shell samples included five edge fragments selected non-randomly and another five shell samples indiscriminately selected to comprise a random sample. Whereas sampling of edge fragments may be regarded as providing an estimate of harvest season (and, presumably, mound occupation), fragments not containing shell edges are viewed as random samples deposited at any time of year at the site. Cleaning of mussel shell fragments and shell carbonate sampling followed the protocol outlined in Schweikhardt (2007).

Oxygen isotope ($\delta^{18}O$) ratios for shell carbonate samples were measured using a GV Isoprime Mass Spectrometer in the Laboratory for Environmental and Sedimentary Isotope Geochemistry in the Department of Earth and Planetary Science at UC Berkeley. Following mass spectrometry, elemental analysis of each carbonate sample was conducted to measure Mg and Ca concentrations using a Perkin Elmer 5300 DV Inductively Coupled Plasma Optical Emissions Spectrometer in the College of Natural Resources at UC Berkeley. Inferences regarding the seasonal occupation of CA-MRN-114 were determined following Schweikhardt (2007) and Schweikhardt et al. (2011), with assistance from Kari Finstad (Department of Environmental Science, Policy, and Management, UC Berkeley). Accordingly, Mg/Ca concentrations are a function of water temperature (i.e., warm to cool, depending on the time of year), and $\delta^{18}O$ composition varies in response to water temperature and salinity (i.e., wet to dry, depending on rainfall and freshwater inflow into the bay). When the geochemical data are plotted as Cartesian pairs consisting of normalized $\delta^{18}O$ and Mg/Ca values (Figure 3), the resulting "seasonal map" gives an indication of site seasonality (Schweikhardt et al. 2011:2306).

Mission Register Data

Milliken (2009) compiled mission register data pertaining to the Coast Miwok as part of a study commissioned by the Golden Gate National Recreation Area (GGNRA) to identify past native communities in GGNRA parklands and to document cultural ties between present-day Coast Miwok people and those who entangled with Spanish missions. From the first Coast Miwok baptism on March 15, 1783, to the last recorded Coast Miwok baptism on April 10, 1832, a total of 2,828 Coast Miwoks entered missions at San Francisco, San Jose, San Rafael, and San Francisco Solano. By mission, this includes 1,694 Coast Miwok baptized at Mission San Francisco between 1783 and 1817, 390 baptisms at Mission San Jose primarily between 1815 and 1817, 725 baptisms at Mission San Rafael between 1817 and 1832, and 19 Coast Miwok baptisms at Mission San Francisco Solano between 1824 and 1825 (Milliken 2009:5). I examined baptism data from all four missions, but I focus my discussion on Mission San Francisco and Mission San Rafael as the primary and longest-lasting points of entry for Coast Miwok at the beginning and near the end of Spanish colonization in the San Francisco Bay area.

Maintained by the Franciscan padres who administered each mission, baptism registers contain the names of Coast Miwoks and their home villages. Each entry is usually accompanied by an assigned baptism entry number, date of baptism, age and sex information, as well as the names and home villages of the mother and father of the individual receiving the sacrament of baptism. As an example of an entry in Mission San Francisco's book of baptisms—and further evidence that baptized Indians were leaving and interacting with unbaptized hinterland communities—an eight-year-old girl named Genunhubac from a village near present-day San Rafael was registered on February 9, 1800, as baptism number 2,026 and given the name "Fulgencia." Her father Saquenela had been baptized and given the name "Casto" at

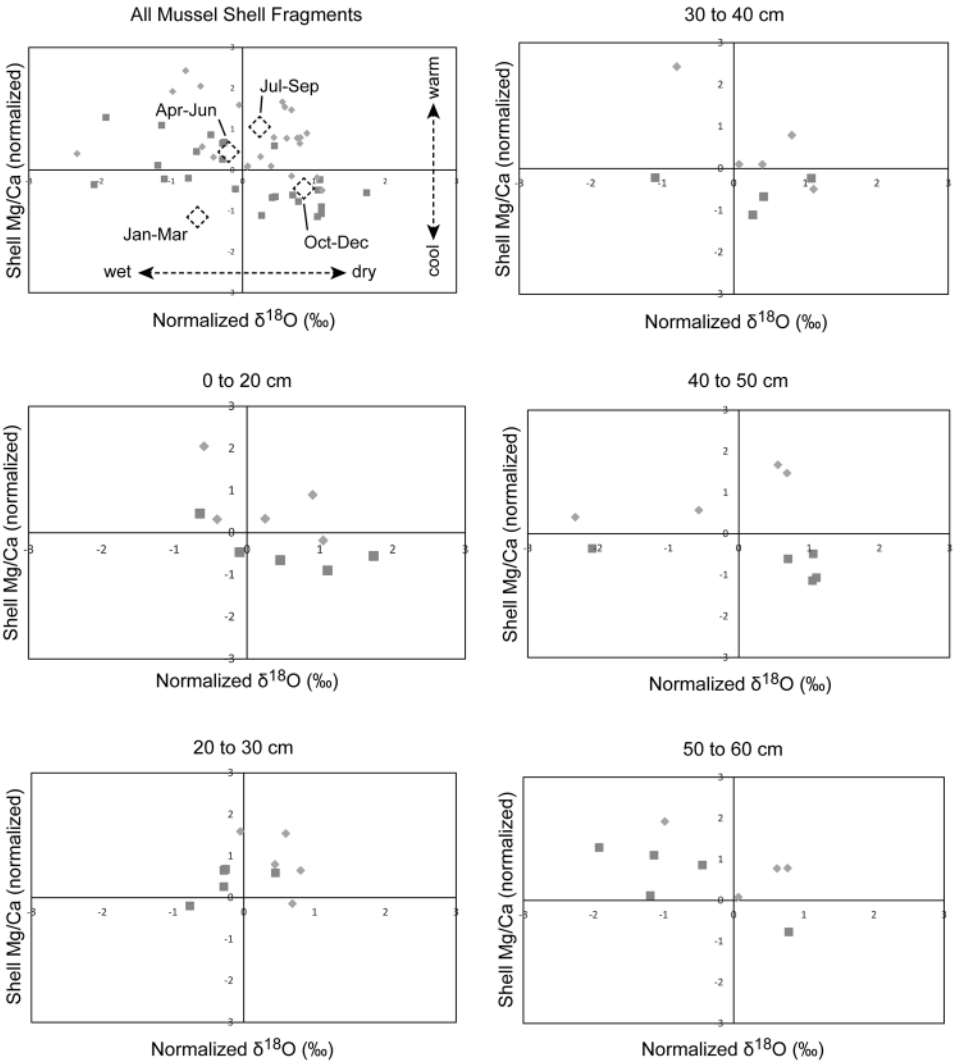

Figure 3. Mussel shell calcite samples (square = random sample; diamond = non-random sample) plotted as Cartesian pairs using normalized $\delta^{18}O$ and Mg/Ca values and showing consistent late spring, summer, and fall mussel harvests by depth. Dashed areas in upper left plot represent mean paleoenvironmental conditions for each season (Schweikhardt et al. 2011:2306).

Mission San Francisco five years earlier and likely returned to visit his unbaptized spouse and daughter at home during paseos. Genunhubac's mother Tolemaien was later baptized and renamed "Ciriaca" on April 12, 1800. For this exploratory study, baptism dates for each of the 2,828 Coast Miwok entries were first coded (i.e., January = 1, February = 2, and so forth) and then sorted and quantified by month, year, and mission location.

Results and Discussion

Radiocarbon, geochemical, and documentary evidence presented in this experimental approach can elucidate Native American landscape use during the mission period. AMS radiocarbon data for all three shellmounds are reported by Schneider (2010, 2011). Of the four AMS radiocarbon determinations from CA-MRN-114 (Table 2), two are from mussel shell specimens collected at 20–

Table 2. Radiocarbon and Geochemical Results for the CA-MRN-114 Shellmound.

Depth (cm)	Seasonal inference	Radiocarbon Sample No.	^{14}C age (B.P.)	2σ (95.4%) cal age ranges (B.P.)[a]
0–10	Late spring, summer, fall			
10–20				
20–30	Late spring, summer, fall	Beta-254228	870 ± 40[b]	300–70 (cal A.D. 1650–1880)
30–40	Late spring, summer, fall			
40–50	Late spring, summer, fall	Beta-254226; Beta-254227	380 ± 40; 1020 ± 40[b]	510–310 (cal A.D. 1440–1640); 470–270 (cal A.D. 1480–1680)
50–60	Late spring, summer, fall			
60–70				
70–80				
80–90		Beta-254229	1870 ± 40[b]	1240–1010 (cal A.D. 700–940)
90–100				

[a]2σ calibration following Vogel et al. (1993).
[b]ΔR of 300 ± 35 applied to shell sample following Ingram and Southon (1996).

40 cm (Beta-254228) and 80–100 cm (Beta-254229) in an auger unit, and two dates are derived from specimens collected from the bottom (40–45 cm) of Feature 1. By averaging known carbon reservoir (ΔR) values for San Pablo Bay (Ingram and Southon 1996), I applied a ΔR value of 300 ± 35 to the AMS-dated shell.

Additional radiocarbon determinations could help flesh out the full sequence of occupation at this site, but, importantly, three radiocarbon determinations for 20–50 cm below surface are within the realm of possibility for historic-era occupation and, at a minimum, fall within the accepted date range for the Late period Phase 2 (A.D. 1500–1800) of the Central California Taxonomic System (Milliken et al. 2007). The Late period Phase 2 is an arbitrary temporal designation established by archaeologists to describe a transitional time period that includes cultural patterns present during later prehistory and the first 25 years of Spanish colonization in the San Francisco Bay area. These data support the conclusion that CA-MRN-114 may have been occupied as Spanish colonists began constructing their missions beginning in 1776. Other shellmounds in the San Francisco Bay area have also produced late dates, notably the East Bay mounds discussed previously (Finstad et al. 2013; Schweikhardt et al. 2011) and another mound (CA-SCL-12/H) in the south San Francisco Bay in use up to 1864 (Bryne and Byrd 2009). CA-SCL-12/H is one mound in a cluster of at least three large shellmounds and small camp sites "occupied by Indians at the time the Spanish came," and at least one historic-era Native American burial at CA-SCL-12/H "might indicate a general custom of burial on the mounds at the time of the Spanish arrival" (Loud 1912:98).

Geochemical analysis of 50 mussel shell fragments reveals general consistency in mussel harvests throughout much of the occupation of CA-MRN-114, or from 0–60 cm below surface (Table 2; Figure 3). The general pattern suggests that, over time, native people returned to CA-MRN-114 to harvest and process mussels and deposit mussel shells in the mound during late spring (warm/wet), summer (warm/dry), and fall (cool/dry) conditions. Significantly, deposits dating to the Late period Phase 2 (i.e., 20–50 cm below surface) also indicate late spring, summer, and fall mussel harvests. This pattern of mussel use suggests continuity in seasonal shellfishing and provides a basis for what might have also happened during mission times. A site seasonality study for the Brooks Island shellmound (CA-CCO-290)—involving, admittedly, a much larger sample size of 18 radiocarbon determinations and geochemical analysis of 1,200 mussel shell fragments—produced complementary results, namely late spring, summer, and fall mussel harvests extending into the late 1700s (Finstad et al. 2013).

Connecting the radiocarbon and geochemical results to the historical record of Native American baptisms at Spanish missions, late spring, summer, and fall mussel harvests at CA-MRN-114 during the Late period Phase 2 appear to correlate negatively with a documentary record of seasonally timed Coast Miwok baptisms at Spanish missions. Of the 2,828 Coast Miwok baptized at the San

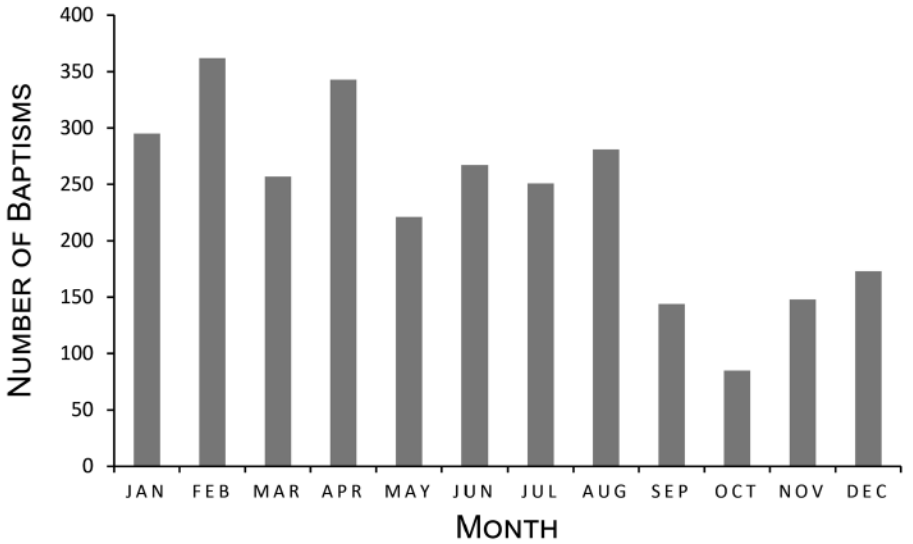

Figure 4. Total number of registered Coast Miwok baptisms (n = 2,828) at Missions San Francisco, San Jose, San Rafael, and San Francisco Solano per month from 1783 to 1832.

Francisco, San Jose, San Rafael, and San Francisco Solano missions between 1783 and 1832, numbers of baptisms generally increase from early October through March and then decrease after March through September (Figure 4). The same pattern is repeated when examining Coast Miwok baptisms at just Mission San Francisco between 1783 and 1817 (Figure 5), but not Mission San Rafael. Figure 5 shows a spike in summer baptisms, which may correspond to a reported increase in Coast Miwok baptisms at Mission San Francisco after 1800 (Milliken 2009:21). When using the month ranges applied to the geochemical seasonal map, however, the data suggest a gradual reduction in Coast Miwok baptisms from April to December and a peak in baptisms occurring between January and March (Figure 6).

Although one would expect a general decrease in baptisms attributed to the decimation of indigenous populations over the years, I posit that reduced baptisms at particular times of the year (i.e., late spring, summer, and fall) reflect fewer numbers of Coast Miwok going to the missions coinciding with the persistence of seasonally specific activities—such as shellfishing, acorn and seed gathering, and hunting—that kept them away from the missions. In this sense, native people's seasonal returns to shellmound clusters evidenced during later prehistory may very well have continued into colonial times. Replenishment of mission stores after fall grain harvests may partly explain the upswing in Native American baptisms during the winter. Louis Choris (in Mahr 1932:361) observed this very same pattern during his visit to Mission San Francisco in 1816: "In Winter, bands of Indians come from the mountains to be admitted to the mission, but the greater part of them leave in the spring." Hackel (2005:92) observes, however, that even though per capita agricultural production declined at Mission San Francisco following severe droughts in 1794 and 1795—and precipitated in the illicit flight of 280 baptized Indians from the mission during a single mass exodus in 1795—not one of the Indians who ran away and was recaptured "testified that there was not enough food. [Many Indians] especially those most recently baptized, did not consider the mission as their only source of food." The pattern might also speak to the emerging role of Mission San Francisco as a seasonal meeting place for Indians and, as Peelo's (2010) findings demonstrate at Mission San Carlos, a place of identity among some Coast Miwok.

Despite colonial pressures for native groups to relocate and discontinue some traditional practices, archaeologists working in other regions of North America demonstrate that Native American mobility and land use often endured and remained

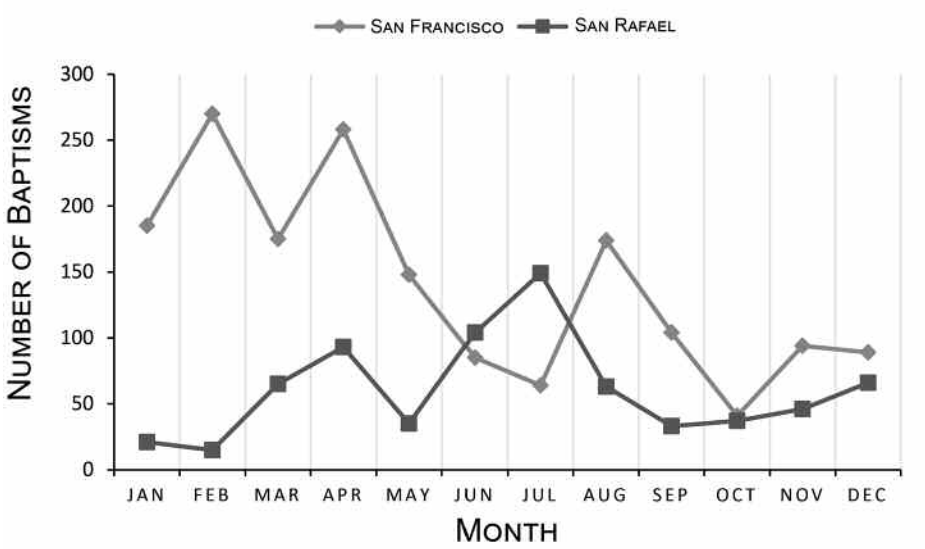

Figure 5. Number of registered Coast Miwok baptisms per month for Mission San Francisco from 1783 to 1817 (n = 1,694) and Mission San Rafael from 1817 to 1832 (n = 725).

firmly planted in a historically and culturally informed knowledge of the landscape (Kulisheck 2003, 2010; Scheiber and Finley 2011; see also Birmingham 2000). Kulisheck (2003, 2010), for example, argues that Pueblo people of the American Southwest employed long-practiced patterns of mobility involving village abandonment and coalescence to evade Spanish colonization of the northern and central Rio Grande region. Furthermore, he argues, "there is a need to perceive the process of [village] abandonment less as a consequence of crisis, and more as a strategy, consciously undertaken as a response to changing conditions" (Kulisheck 2003:48). In another example, Scheiber and Finley (2011) discuss interrelated strategies of resistance and mobility among the Mountain Shoshone of western Montana, as well as disciplinary priorities that restrict the ways archaeologists view and understand hunter-gatherers in contexts of colonialism and reduce mobility to a series of economic variables. Tracking changes in obsidian procurement, ceramic production, and landscape use, the authors argue that Shoshone decisions to restrict and modify mobility helped to instead structure their resistance to external colonial pressures (Scheiber and Finley 2011).

Complicating the picture of Spanish colonialism in the San Francisco Bay area, Coast Miwok also made practical choices to enter into and engage with the missions. Some native groups incorporated the missions partially into seasonal rounds as lucrative resources (Jackson 1984:228); others fully embraced them—an idea best exemplified by the obsidian cross found at CA-MRN-138. Moreover, since baptism occurs only once, it is important to consider other (unreported) reasons for visits to and departures from the missions. That is, Coast Miwok mobility was not solely motived by the search for food (but see Coombs and Plog 1977). Social mobility and protection may have been incentives to ally with the missions, and increased recruitment probably also took place during crop harvests when missions benefited from larger crews of Native American laborers. A near reversal of the pattern observed more generally for Coast Miwok baptisms in the Bay Area, and specifically at Mission San Francisco, is seen when examining the 725 Coast Miwok baptisms at Mission San Rafael registered between 1817 and 1832. At this mission, peak baptisms occur during the late spring and summer with a dip in Coast Miwok baptisms during the late summer before increasing again in December (Figure 5). Using the month ranges applied to the geochemical data, an increase in summer baptisms at Mission San Rafael is apparent (Figure 6).

Compared to the record of baptisms at Mission San Francisco before 1817, I speculate that the

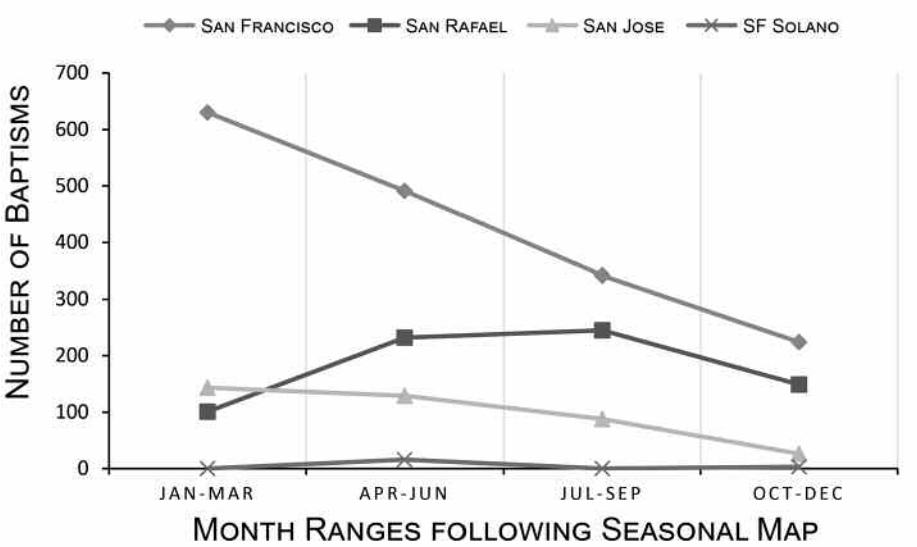

Figure 6. Total number of registered Coast Miwok baptisms for four missions following month ranges established by geochemical seasonal map: Mission San Francisco, 1783–1817 (*n* = 1,694); Mission San Jose, 1815–1817 (*n* = 390); Mission San Rafael, 1817–1832 (*n* = 725); and Mission San Francisco Solano, 1824–1825 (*n* = 19).

pattern of Coast Miwok recruitment to Mission San Rafael after 1817 reflects new obstacles to native mobility. After 1805, some missions report increased baptisms because reduced trade restrictions by the Spanish Crown resulted in the growth of the frontier hide-and-tallow industry and larger herds of grazing livestock that swiftly diminished native habitats (Peelo 2009:612). Mission San Rafael was established north of San Francisco on the Marin Peninsula in 1817 in part as an *asistencia*, or hospital mission, for baptized Indians to convalesce away from dreary conditions at Mission San Francisco. Mission San Rafael also bolstered Spanish claim to North Bay lands encroached upon by colonial Russia with the establishment of Fort Ross on the Sonoma coast in 1812 (Lightfoot 2005). Unlike an earlier missionizing strategy practiced at Mission San Francisco before 1817, the pattern of baptisms at Mission San Rafael is consistent with a missionizing approach documented at other Bay Area missions from 1814 to 1820, which involved proselytizing to as many Indians as possible from communities increasingly further afield (Milliken 2008:58–62). For Coast Miwoks recruited to the missions at this time, priests drew heavily from communities at Tomales and Bodega Bays to establish a buffer between Bay Area missions and Fort Ross (Lightfoot et al. 2009; Milliken 2009:32–34)—a strategy possibly achieved by co-opting labor during times of traditional resource collecting, thereby limiting the pool of workers available to the Russian colony. Reduced mobility on an increasingly "busy" landscape may have led to the gradual cessation of seasonal mussel harvests at nearby mounds like CA-MRN-114 after 1817 and could explain why geochemical data and the baptism record for Mission San Rafael do not correspond.

While the data at hand may not definitively link the occupants of CA-MRN-114 to the missions—indeed, the three shellmounds did not produce "colonial artifacts" such as glass beads, metal tools, and mission pottery—and, similarly, while Franciscan padres did not record precisely where Indians went during furlough or while absconding from missions, they do support the interpretation that native people continued to use places like CA-MRN-114 during particular seasons into colonial times. Lest archaeologists continue to perpetuate the false notion that "those who are hard to see and those who are unnamed and limited in power are those who matter the least in history" (Silliman 2010:50), future research examining these issues should not be dismissed outright because of missing artifact types or silences in the documentary record. In fact, as

Seymour (2010) explains, radiocarbon data relating to the ephemeral occupations of mobile groups during the Terminal Prehistoric and Historic periods (A.D. 1300–1800) are regularly masked by inadequate conceptual and methodological frameworks for identifying, collecting, and interpreting such data. The methodological innovation proposed in this article is designed to interrogate these themes and employ seemingly disparate lines of evidence as mission records and geochemical and radiometric data to better see Native Americans in the landscapes around colonial enterprises in North America.

Limitations to this exploratory approach include reduced excavations and small samples of radiocarbon dates and geochemical data from CA-MRN-114. Yet work was accomplished under the stewardship of a state agency and in consultation with a Native American tribe; limited sampling and excavation was thus necessary, appropriate, and reflective of local stakeholder priorities. An augmented sample size of dates and seasonality data could certainly enhance and strengthen annual and seasonal inferences for the shellmound, as well as help to discriminate and compare patterns of mound reuse on all sides of the bay during the Late period Phase 2. To this end, future archaeological work exploring the question of historic-era occupations at shellmounds—or using archived midden samples—should continue to refine sampling of individual strata to produce matched pairs of radiocarbon specimens and archaeological mollusk shell for isotopic and elemental analyses (e.g., Schweikhardt et al. 2011:2306–2307). Assuming depositional integrity, and with radiocarbon dates in hand, archaeologists might further evaluate the issue of site seasonality at shellmounds and other nonmounded sites at and away from missions on a yearly basis or by bracketing specific sequences within multiyear episodes. In this sense, the technique is analytically portable to other places, time periods, and seasonally sensitive archaeological remains. Recent advances in high-precision AMS radiocarbon dating and Bayesian chronological modeling can also assist in interpreting radiometric and geochemical data sets (e.g., Kennett et al. 2014), as well as connecting these data to annual trends revealed in the written records from different missions.

Archaeologists and ethnohistorians have already made important strides in peopling California's colonial landscapes by connecting Native Americans appearing on the marriage, baptismal, and death records of California missions to outlying communities (e.g., Johnson 1988, 1997; Johnson and Crawford 1999; Milliken 1995, 2008, 2009; Panich 2010). With additional fine-tuning, the method outlined in this article can further correlate geochemical and radiocarbon data gathered from the historic-era deposits of shellmounds and other shell-bearing sites back to individual missions, thereby completing the analytical loop and illuminating the multidirectional and transactional relationships between colonial enterprises and hinterlands. In making and defining these connections, archaeologists are well-positioned to marshal multiple lines of evidence to track the mobility of native groups during particular years and seasons, as well as the movement of resources and artifacts across time and between places on the landscape.

Conclusion

This article first considers the historical record documenting Native American returns to outlying landscapes by flight and furlough from San Francisco Bay missions, as well as eyewitness accounts supporting the continuation of seasonally timed resource-gathering among native people at the missions. I then examine shellmounds as sites of prehistoric and historic occupation and places—or clusters of places, as the case may be—often occupied on a seasonal basis. The method I present here considers not just the reorganizing power of colonialism that brought native people to the missions, sometimes by force or by choice, to be baptized, but also the simultaneous persistence of certain practices that are reflected in the travels of Native Americans to meaningful places away from the missions. Much more than a prosaic task, shellfish gathering was often resilient and an important structuring mechanism in the lives of indigenous populations confronting colonialism (Hunter et al. 2014; Marlett 2014). Use of multiple lines of evidence here opens up the possibility of a fuller and more nuanced understanding of post-baptismal life for native groups. This could include, for instance, not only tracking the seasonal

rhythms of food availability, but also considering the ways in which native mobility—and egress from missions—may have also been organized around gender, age, and kinship affiliations and ordered by childbirth, death, ritual celebrations, and other social "performances" that occur in people's lives (Meehan 1982:135–140).

Examining the CA-MRN-114 shellmound, AMS radiocarbon dates support the interpretation that the site was occupied during the Late period Phase 2 (A.D. 1500–1800), and—applying techniques developed by Schweikhardt (2007; see also Schweikhardt et al. 2011)—isotopic and elemental analyses on archaeological mussel (*Mytilus* spp.) shell fragments reveal a fairly consistent pattern of mussel harvests throughout this time period, taking place during the late spring, summer, and fall. Comparing archaeological and geochemical inferences from CA-MRN-114 to the records of Coast Miwok baptisms, I argue that an inverse correlation between when baptisms occurred throughout the year and the timing of seasonal mussel harvests reflects a continuation of precolonial mobility patterns that involved trips to shellmounds and other places in the mission hinterland. Generally, for Coast Miwok baptisms at San Francisco Bay missions, a gradual reduction in baptisms occurs from April to December (or late spring, summer, and fall) whereas baptisms peak between January and March (winter). This pattern is especially true at Mission San Francisco between 1783 and 1817 and is independently confirmed by the observations of Louis Choris, who visited Mission San Francisco in 1816 (Mahr 1932). A different pattern of predominantly summer baptisms is evident for Coast Miwok visiting Mission San Rafael from 1817 to 1832, however. Placed on the Marin Peninsula in 1817 in response to the establishment of a Russian mercantile colony to the north, Mission San Rafael may have used a different recruitment strategy to quickly bolster Spanish claim to North Bay lands, resulting in the cessation of seasonal mussel harvests at nearby mounds and other obstacles to native mobility on the Marin Peninsula. It may be that, later in time, Indians inhabited new and different sites across the landscape. To be certain, Coast Miwok likely occupied other non-mounded sites, which could provide added detail on native mobility in colonial times.

A growing movement in the archaeology of colonialism in North America examines the establishment and operation of colonial institutions within Native American landscapes (Panich and Schneider 2014). Viewing Spanish missions from the outside-in, or from the vantage of the dynamic landscapes that encircled the missions, archaeologists can begin to more fully interrogate the movements of people and materials across broad spaces. Simultaneously, in revisiting entrenched historical narratives of colonial domination and indigenous cultural loss at the Spanish missions, archaeologists are well-positioned to develop new methods to systematically reevaluate the timing and reuse of native sites traditionally written off as being abandoned at the outset of colonization. San Francisco Bay shellmounds are among those sites that have been undervalued as venues of historical significance for native people even as they engaged the missions. Seeking an integrative solution to the periodization and specialization that forestall productive dialogues across the artificial divide between prehistory and history, the experimental methodology presented in this article attempts to detail the lives of Native Americans beyond the confines of colonial institutions along archaeological, geochemical, and documentary axes.

Acknowledgments. Funding for this study was made possible by the Irving and Gladys Stahl Endowment Fund for Archaeological Research, the University of California Dissertation-Year Fellowship, and Kent Lightfoot. I thank the Federated Indians of Graton Rancheria, the California Department of Parks and Recreation, Doris Maldonado, the Laboratory for Environmental and Sedimentary Isotope Geochemistry in the Department of Earth and Planetary Science at UC Berkeley, especially B. Lynn Ingram, Kari Finstad, and Wenbo Yang, and also Paul D. Brooks of the Inductively Coupled Plasma Spectroscopy Facility in the College of Natural Resources, UC Berkeley. The article benefited from editorial guidance from Kenneth Sassaman and incisive feedback from K. Elizabeth Soluri, Lee Panich, and three anonymous reviewers.

Data Availability Statement. Records and artifacts from CA-MRN-114 are in the possession of the California Department of Parks and Recreation and available at the State Archaeological Collections Research Facility, 4940 Lang Avenue, McClellan, California 95652. Mission register data compiled by Randall Milliken are available at the Department of the Interior National Park Service, Golden Gate National Recreation Area, San Francisco, California.

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Submitted August 26, 2014; Revised November 9, 2014; Revised January 21, 2015; Accepted January 28, 2015.