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Re-visualizing Indigenous Persistence during Colonization from the Perspective of Traditional Settlements in the San Francisco Bay-Delta Area

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This study integrates several lines of evidence to assess temporal trends in the persistence of indigenous village communities in the San Francisco Bay-Delta area after the arrival of the Spanish in 1776 C.E. Baptismal records indicate that more than half of the Native American village communities in the region persisted as independent entities for at least another 25 years or longer. Archaeological evidence and radiocarbon and obsidian hydration results from post-contact native settlements are spatially patterned in a manner consistent with the archival record. Material indicators of the Mission Period (such as European material culture and non-native plant and animal resources) are also present at many radiocarbon-dated post-contact native settlements, indicating at least a limited movement of goods but also highlighting how these data sets are poor indicators of indigenous persistence during the early colonial era. The results provide a foundation for future research into initial reactions to the colonial intrusion from the perspective of traditional native communities.

The Spanish colonization of western California is an enduring research topic for scholars from a variety of disciplines (e.g., Bolton 1921; Hackel 1997; Kroeber 1925; Lightfoot 2005). Prior discussion of the forced movement of native groups into the Spanish colonial mission system has largely concentrated on its devastating impacts, including the depopulation of indigenous communities throughout the Spanish territories, deprivation, disease, and exceedingly high death rates (e.g., Castillo 2015; Cook 1976; Milliken 1995; Preston 1996). Archaeologists have tended to focus attention (often with an emphasis on acculturation or ethnogenesis) on events within the Spanish missions, exploring how Native Californians coped with, reacted to, and modified their lives to survive these very challenging and unprecedented changes (Allen 1998; Arkush 2011; Hoover and Costello 1985; Lightfoot 2005, 2014; Newell 2009).

More recently, archaeologists have begun focusing on a more regional/landscape scale to highlight how native people persisted during the colonial period, and how they strove to maintain strong connections to their homelands (e.g., Lightfoot et al. 2009, 2013; Panich and Schneider 2104, 2015). The present study embraces both Panich's (2013:107–108) perspective that persistence in colonial Native American contexts involved changes and adjustments to ensure continued existence, and Silliman's (2009) call to stress continuity rather than discontinuity in the colonial indigenous archaeological record. Such theoretical orientations are needed to counter the inaccurate yet popular and pervasive terminal/extinction narratives imposed upon Native Americans. Important research on this topic in California has framed consideration of persistence and indigenous landscapes within the context of—or in juxtaposition to—the Spanish missions and their interconnected outposts (Lightfoot

2014; Panich 2013; Panich and Schneider 2015; Schneider 2015a). This has included consideration of how Native Californians, after being brought into the mission system, continued to look outward for food and other resources (such as raw materials), as well as for social and spiritual needs (e.g., Hylkema and Allen 2009; Panich 2014, 2015, 2016a, 2016b; Panich et al. 2018a; Schneider 2015b). In doing so, these important new studies have highlighted the importance of *paseos* (approved leaves of absence from the missions) and the unsanctioned departures by runaways or fugitives when considering the contexts in which native individuals re-occupied abandoned villages or created new settlements, often in difficult-to-access hinterlands (Bernard et al. 2014; Lightfoot 2013; Schneider 2015b; Schneider and Panich 2014).

Although these are very important aspects of this complex, multi-layered topic, much less archaeological attention has been focused on the initial persistence (the lived decision-making taking place while missions continued to operate) of indigenous communities outside the missions but within what ultimately became the Spanish Empire's landholdings in western California (however, see Gamble 2008; Green 2001; Reddy 2015). As noted previously (Lightfoot 2014:208; Lightfoot et al. 2009:6; Schneider 2015a), this situation has led to an uneven appreciation of the time span during which native communities continued to persist—often for decades—despite the very real and imminent Spanish threat to their lives, lifeways, and autonomy in their hinterlands.

This paper addresses these lacunae by providing an empirical framework for assessing temporal trends in the persistence of indigenous village communities in the San Francisco Bay-Delta area after the arrival of the Spanish in 1776 C.E. (Common Era; note that throughout this paper we use C.E. to refer to historical events and cal B.P. to discuss radiocarbon dates from archaeological sites). To do so, after summarizing the study area context and the Spanish mission-records research conducted by Milliken (2006, 2008, 2010) that underlies the archival aspect of the study, we draw on three main lines of evidence. First, mission baptismal records are tracked as a proxy for regional trends in village persistence. Next, the results of radiocarbon dating of Native American settlements are examined to see if archaeological evidence of occupational continuity is present. Finally, other archaeological evidence from native villages with post-1776 C.E. radiocarbon dates is explored to confirm the chronological evidence and provide a glimpse at the degree of material interaction with nearby colonial settlements.

We reach four primary conclusions based on these results. First, baptismal records demonstrate that more than half of the Native American village communities persisted as independent entities for at least another 25 years, and a significant number continued for 30–40 years. Second, radiocarbon dating and obsidian hydration results corroborate the continued occupation of many traditional settlements throughout the region after 1776 C.E. Third, the spatial distribution of the evidence for the persistence of native communities is well-correlated with those tribal communities that persisted for longer periods of time after the Spanish intrusion. Fourth, material indicators of the Mission Period are present at many of these native settlements with post-1776 C.E. radiocarbon dates, indicating that there was at least a limited movement of goods during the early colonial era, but also highlighting the fact that these data sets are poor indicators of initial indigenous persistence due to a variety of potential factors. We then conclude with a consideration of the broader context and implications of these results while emphasizing the need to tailor future field investigations so as to better discern post-contact occupation at persistent native settlements.

STUDY AREA CONTEXT

The baseline insights for this study were developed during the preparation of a Caltrans District 4 archaeological research design for the San Francisco Bay-Delta region (Byrd et al. 2017). The study area is oriented around the San Francisco Bay and the western portion of the Sacramento-San Joaquin Delta. It is generally defined as the area within 20 kilometers of the historic-era bay margin, and it covers almost 2 million acres. As a result, this Bay-Delta area is a fairly well-defined geo-topographic and archaeological region.

When the Spanish (led by Juan Bautista de Anza) arrived in 1776 C.E. to establish a colonial outpost, they found the San Francisco Bay-Delta area to be densely inhabited, with an overall Native American population of around 15,000 (Fig. 1; Milliken 1995; Milliken et al. 2009). Moreover, the region was home to

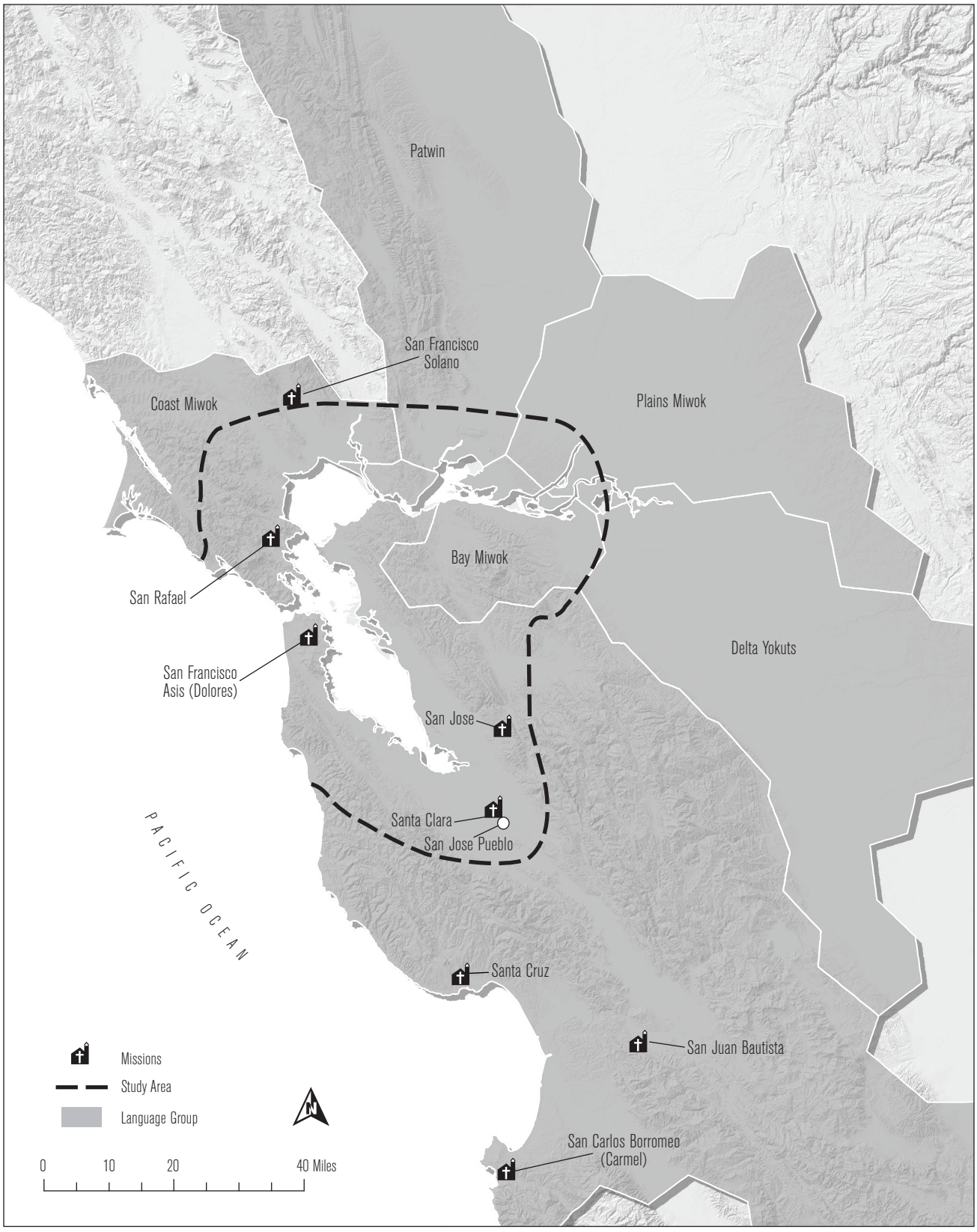


Figure 1. San Francisco Bay-Delta area showing approximate extent of Native American groups and the location of Spanish missions.

several Native American tribes, including the Ohlone in the southern and central portion of the Bay; the Coast Miwok in the northwest portion of the Bay; and the Bay Miwok, Plains Miwok, Patwin, and Delta Yokuts in the eastern Bay-Delta area (Johnson 1978; Kelly 1978; Kroeber 1925; Levy 1978a, 1978b; Wallace 1978). Each of these native groups lived in villages within well-defined tribal territories, interacted and traded extensively with neighboring groups, and spoke unique languages.

In the Bay-Delta study area, traditional native lifeways were profoundly altered by the establishment of Spanish missions in the late eighteenth century (e.g., Arkush 2011; Lightfoot 2005; Milliken 1995; Panich and Schneider 2014, 2015). For 47 years, between 1776 and 1823, the Spanish colonial effort in the area included the establishment of seven main outposts, and an active, coercive recruitment of the region's indigenous communities. Five missions were founded within or in close proximity to the study area: San Francisco de Asis in 1776 (along with the nearby San Francisco Presidio in the same year), Santa Clara de Asis in 1777 (along with the nearby pueblo of San Jose, also in 1777), San José in 1797, San Rafael Arcángel in 1817, and San Francisco Solano in 1823 (see Fig. 1). It also should be noted that initial contact between coastal California populations and Europeans occurred during sporadic, ocean-based colonial explorations between 1542 and 1603 C.E. (Lightfoot and Simmons 1998).

Spanish colonization and occupation greatly reduced and displaced native populations, and dramatically altered traditional lifeways. As a result, these groups are not as well-known ethnographically as groups in some other regions of California, and much of what we know comes from early European accounts in conjunction with data from twentieth-century interviews conducted by a few anthropologists who gathered subjective information on remembered lifeways (e.g., Bean 1994; Harrington 1921–1929; Kroeber 1925). As Warren and Barnes (2018) have pointed out, any description of native lifeways at contact is a reconstruction based on incomplete data and is subject to the varying biases and perspectives of the observers, which must be taken into account. The same stricture also applies to the way in which different tribes and the various communities within them dealt with Spanish colonization, including coercive mission recruiting, disease, depopulation, the restrictions and hardships imposed by mission life, and escape and capture. For the purposes of this study, Spanish mission and governance records provide the most useful information regarding tribal group sizes and territorial extents, and on the timing and nature of the interactions between tribal communities and colonizers (e.g., Milliken 1995, 2010). Early explorer/expedition accounts from the Bay-Delta region are less useful for this study, although they do provide unique insights into the varied character of these brief, initial encounters (Cook 1957; Galvin 1971; Stranger and Brown 1969).

SPANISH MISSION RECORDS AS A WINDOW INTO NATIVE AMERICAN LIFEWAYS

Recent interpretations of the colonization process in central California are often based on detailed research using mission records, particularly work carried out by Milliken (1995, 2006, 2008, 2009, 2010; Milliken and Johnson 2005). The Franciscan mission records of baptisms, marriages, and deaths represent the only systematic archival sources available for reconstructing native life just prior to and during the Mission Period. Since the Spanish missionaries were required to record basic information about each individual they baptized, their registers provide a systematic tally of Bay-Delta area groups. Each mission's baptismal records include a unique sequential identification number for each person, the date baptized, the individual's native name, their new Spanish name (through which their gender can be determined), and their approximate age. Notably, these mission records also typically contain information regarding the original village communities—referred to in these records as *rancherias*—occupied by the vast majority of native people in the study area. As Milliken (2006:7) notes, the Spanish missionaries' use of the term *rancheria* "can signify either an inhabited place or a community of people with a shared identity who live in a given region." Unfortunately, the mission records rarely if ever documented where individual *rancherias* were located, and considerable research has been conducted to determine those locations and better understand the nature of landholding groups (for the history of this work see Milliken 2006:7–18 and the references therein).

Most recently, Milliken (2006, 2008, 2010) used the mission records to carry out a comprehensive and detailed

ethno-geographic study to develop what he referred to as the Community Distribution Model (CDM). This involved constructing a database of mission records (including dates of baptism) which tracked the vital statistics of those individuals who moved to the Franciscan missions and determining each individual's home village or community through familial reconstitution, kinship network analysis, the domino effect (in which groups closest to the missions generally went into the missions earlier than those located farther away), and the creation of mapping regions using GIS polygons to represent the relative placement of communities on the landscape (Bennyhoff 1977; Milliken 2006:19–29). Milliken (2006, 2010) thus effectively combined mission register and available ethnographic data to reconstruct the local-level tribal landscape just prior to colonization. The CDM identifies mapping "regions" that represent the lands of territorial communities/tribelets throughout the Bay-Delta area (see Kroeber 1936). However, as Milliken clearly states (2008:20–21):

> It must be emphasized that the mapped regional boundaries of the CDM are not intended to represent actual ethnographic group boundaries…. Where fixed boundaries did exist, they were not documented by ethnographers. This study attempts to reconstruct the general placement of ethnographic groups on the landscape. Such inferential reconstruction is hampered because territorial groups did not consistently follow simple rules of boundary definition.

One important contribution of Milliken's pioneering GIS-based geospatial analysis is its potential for reconstructing indigenous population densities at the territorial-tribelet-community level (Fig. 2). This involves taking into account a variety of factors used in estimating regional population densities, notably the application of a time-transgressive mortality factor to estimate the impact of post-contact diseases on the total population of native communities that enrolled in the missions later in time (Milliken 2010:Table B1).

BAY-DELTA COMMUNITY PERSISTENCE BASED ON SPANISH MISSION BAPTISMAL DATA

Over the course of several decades, starting in 1777 C.E., the vast majority of the Bay-Delta region's Native American inhabitants were first baptized and then pressed to take up residence at one of the area's five Spanish missions. Milliken's (2010) geospatial database of Franciscan mission records provides a unique archival tool with which to explore this process, track the tempo of the mission baptisms, and by inference the persistence and then decline of traditional village populations. These trends are examined here based on the baptismal data from 9,561 residents that can be assigned to one of the 45 native communities defined by the CDM that encircled the Bay-Delta (see Fig. 2). In doing so, it is important to keep in mind that this should be viewed as a general set of patterns, as some individuals in the mission records lack baptismal dates, others cannot be confidently assigned to a village community, and still others avoided being baptized at all.

This study used the CDM data to identify temporal patterns in the cumulative baptismal rates for each community region. Table 1 lists the cumulative percentage of total baptisms for each of these communities, broken down by five-year time segments. Each village community starts out with 0% of its inhabitants baptized and reaches 100% once all baptisms have been accounted for in the community. It is important to stress that a 100% baptismal rate does not imply the end of Native American culture or society, or even that a community's ties to its homeland ended, but rather that the practice and context of indigenous persistence as well the use of the traditional landscape took new forms. The time span during which baptisms occurred varies greatly between community regions, ranging from 2 to 36 years, with a mean of 18.1 years.

It should be noted that as part of this overall study, the region's spatial-temporal trends were also depicted as an animated web application that shows the movement of individuals from each village community to specific missions, with the size of the dot varying depending on the number of individuals that were baptized on a given day (Byrd and DeArmond 2018). As part of this visualization, the running totals of baptisms by mission are also tracked, and by category, the percentage of each community's total baptisms over time is depicted as a sequence where color lightens at set intervals until the last baptism occurs. We consider this visualization to be the most effective way to represent the pace of these trends in a spatial context, and we encourage readers to experience it for themselves. It also allows the viewer to see which mission specific tribal communities went to when they were baptized.

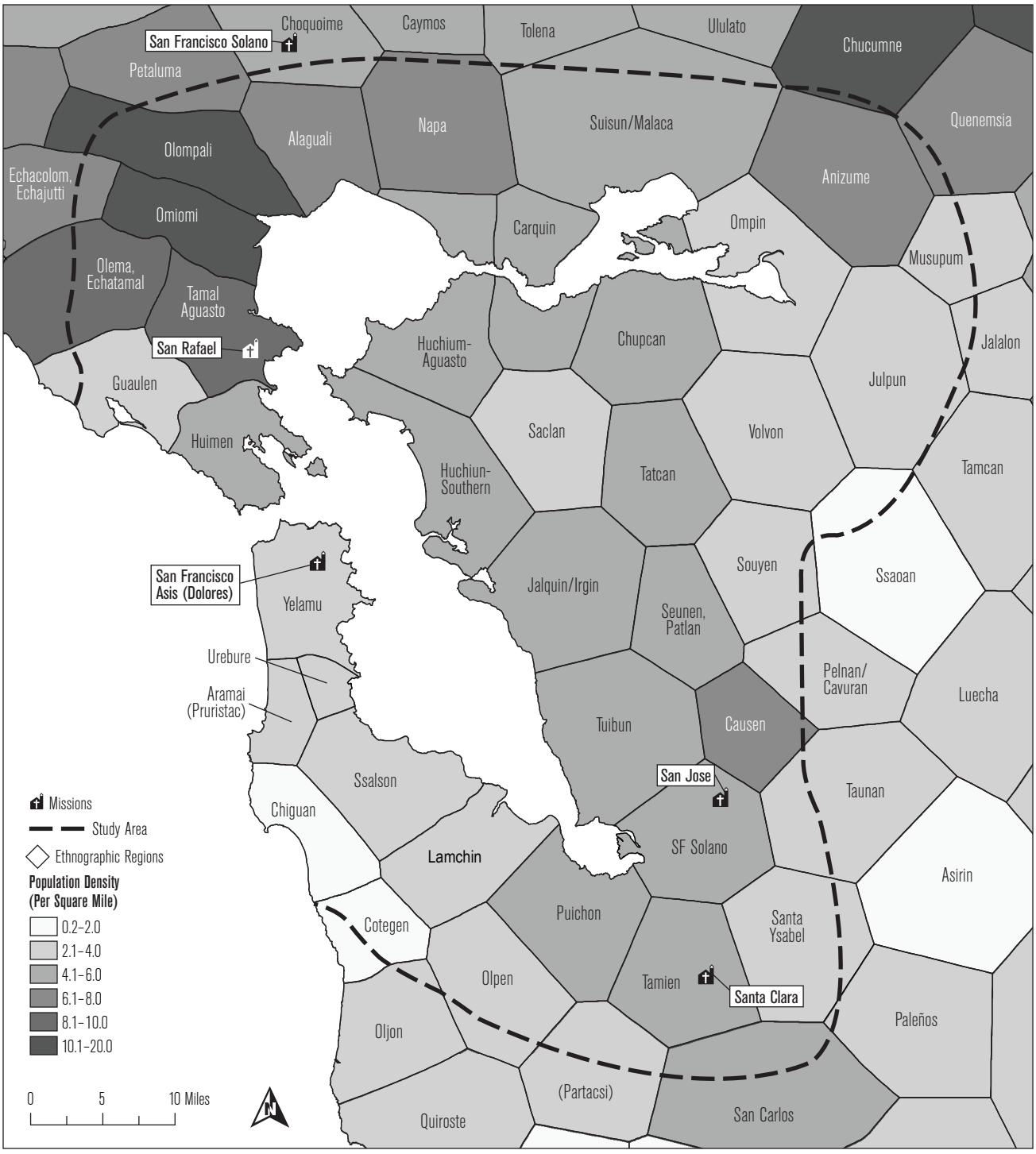


Figure 2. San Francisco Bay-Delta area tribal communities and estimated population density at time of Spanish mission founding (after Milliken 2010).

During the period of time that Bay-Delta baptisms took place, there were strong spatial and temporal trends in the pace of interaction with the missions. Communities on the San Francisco Peninsula and at the south end of the Bay were impacted first; then those along the east Bay and in southern-most Marin were affected (Figs. 3 and 4). Subsequently, those in northern Marin and inland east Bay were baptized, and finally those in

Table 1

CUMUMLATIVE BAPTISM PERCENTAGES BY 5-YEAR PERIOD FOR EACH SAN FRANCISCO BAY-DELTA TRIBAL COMMUNITY (BASED ON DATA FROM MILLIKEN 2010)

Tribal Community	Tribal Affiliation	Contact Population Estimate	Percentage of Baptisms During 5-Year Periods Ending In[a]													Time Span of Baptisms (Years)	Total Baptisms
			1780	1785	1790	1795	1800	1805	1810	1815	1820	1825	1830	1835	1840		
Chupcan	Bay Miwok	331	0.6	0.6	1.3	2.6	2.6	14.3	40.3	100.0						36	154
Julpun	Bay Miwok	407							5.0	73.6	91.2	96.9	100.0			23	159
Ompin	Bay Miwok	260							1.1	100.0						2	95
Saclan	Bay Miwok	249				83.2	91.3	96.5	99.4	99.4	100.0					23	173
Tatcan	Bay Miwok	294				5.6	5.6	88.9	99.4	100.0						17	162
Volvon	Bay Miwok	223						68.5	100.0							5	108
Alaguali	Coast Miwok	392								9.2	100.0					7	153
Choquoime	Coast Miwok	400								82.0	97.0	100.0				8	140
Guaulen	Coast Miwok	177			0.9	1.8	14.4	96.4	98.2	100.0						27	111
Huimen	Coast Miwok	240		3.0	14.0	43.9	48.8	94.5	98.2	100.0						31	164
Napa	Coast Miwok	649							0.9	92.0	99.1	99.6	99.6	99.6	99.6	34	224
Olema, Echatamal	Coast Miwok	728						32.5	89.4	92.3	100.0					18	378
Olompali	Coast Miwok	953								10.7	96.1	100.0				11	355
Omiomi	Coast Miwok	786						2.9	12.3	84.2	98.2	100.0				20	342
Tamal Aguasto	Coast Miwok	486			0.0	4.8	17.3	74.8	95.2	98.3	99.7	100.0				27	294
(Partacsi)	Ohlone	184			18.0	82.0	98.8	100.0								19	161
Aramai (Pruristac)	Ohlone	52	21.3	80.9	100.0											7	47
Carquin	Ohlone	333			0.7	2.6	2.6	13.1	98.7	100.0						27	153
Causen	Ohlone	304				0.9	43.4	99.5	100.0							12	212
Chiguan	Ohlone	48	2.3	34.1	81.8	100.0										12	44
Cotegen	Ohlone	54		4.5	45.5	100.0										11	44
Huchiun-Aguasto	Ohlone	456			0.4	4.0	10.5	83.7	99.3	100.0						23	276
Huchiun-Southern	Ohlone	360	4.3	8.9	16.8	100.0										15	280
Lamchin	Ohlone	231	4.3	12.8	53.5	100.0										18	187
Oljon	Ohlone	152			32.6	100.0										8	135
Olpen	Ohlone	264		1.0	10.3	97.5	99.5	100.0								20	203
Pelnan/Cavuran	Ohlone	240					3.1	97.7	100.0							9	128
Puichon	Ohlone	411	1.3	19.6	56.4	89.9	97.6	99.8	100.0							29	454
San Carlos	Ohlone	665	0.1	10.4	51.9	89.7	98.7	99.9	100.0							28	817
Santa Ysabel	Ohlone	301	5.3	16.4	39.1	63.3	87.2	96.1	100.0							31	281
Seunen, Patlan	Ohlone	282					5.7	98.1	100.0							11	159
SF Solano	Ohlone	393	12.6	38.7	63.8	91.4	97.2	100.0								24	326
Souyen	Ohlone	228					10.4	98.5	100.0							10	134
Ssalson	Ohlone	198	15.3	33.5	81.3	98.3	100.0									22	176
Ssaoan	Ohlone	225						99.0	99.0	100.0						9	116
Tamien	Ohlone	342	34.2	61.4	77.9	94.2	98.7	100.0								26	448
Taunan	Ohlone	256				2.0	47.0	98.0	100.0							13	168
Tuibun	Ohlone	567	0.2	4.7	18.7	50.9	82.7	100.0								24	450
Urebure	Ohlone	39	40.0	100.0												8	40
Yelamu	Ohlone	137	67.4	92.6	100.0											10	135
Jalquin/Irgin	Ohlone & Bay Miwok	385	0.4	0.9	0.9	1.3	7.7	100.0								27	235
Suisun/Malaca	Patwin	1,045							4.8	71.9	91.6	94.5	97.1	99.5	100.0	26	416
Anizume	Plains Miwok	622								80.9	99.2	100.0				11	241
Musupum	Plains Miwok	191									14.8	68.5	98.1	98.1	100.0	22	54
Jalalon	Yokuts, Delta	94								24.1	86.2	100.0				14	29

[a]Date shows baptisms during a five year period through end of that year (e.g., 1800 shows baptisms from 1796 through 1800); data from Milliken 2010.

Note: 100% baptized does not imply the end of Native American society or their ties to traditional homelands, but rather that the practice and context of indigenous persistence changed.

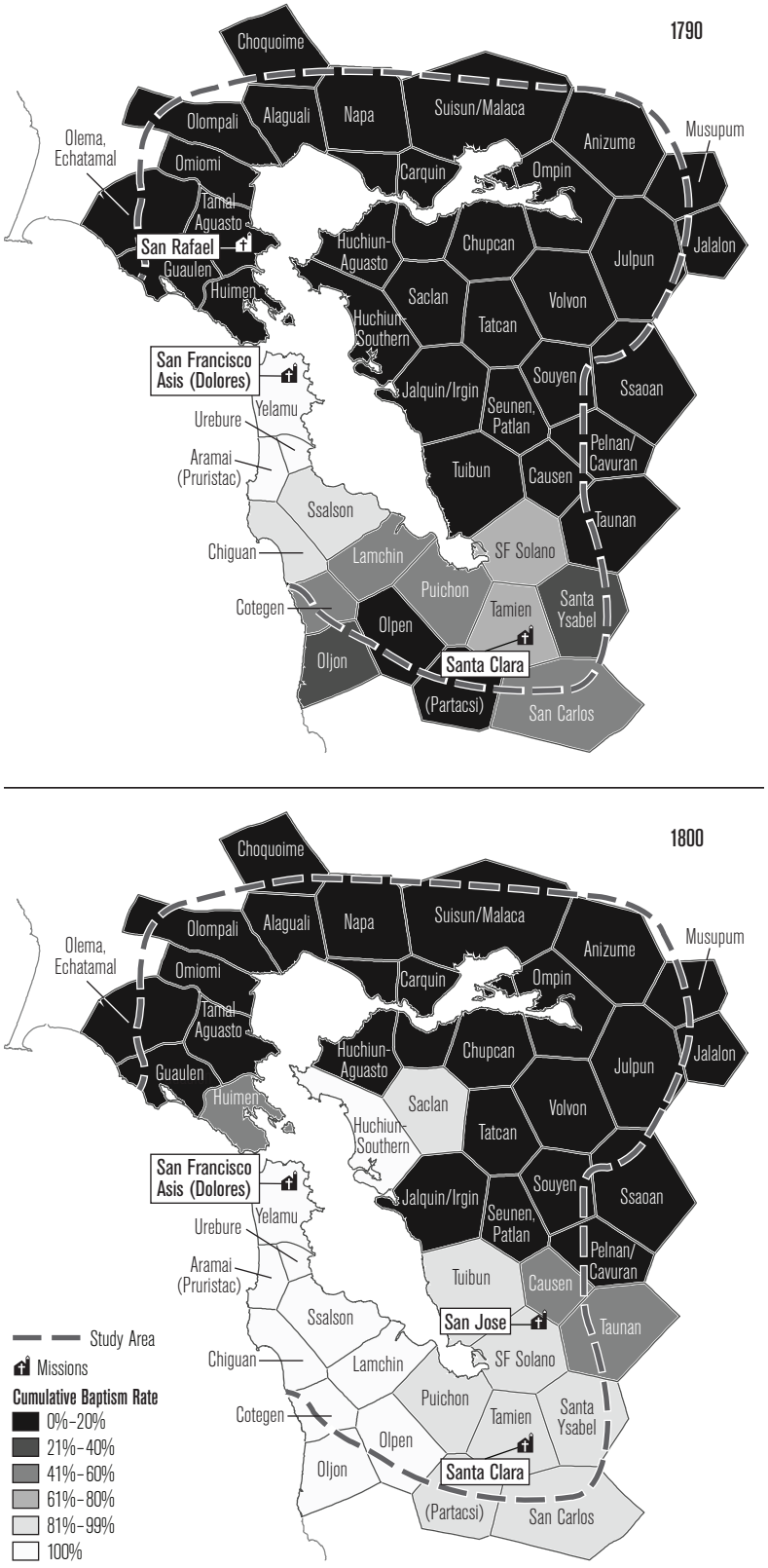


Figure 3. Cumulative baptismal trends by Bay-Delta tribal community at end of 1790 C.E. and 1800 C.E.

the delta region were affected. It is notable that this was clearly a protracted process, and traditional communities closest to the missions generally persisted for shorter periods than more distant communities. Until 1780 C.E., baptisms were mainly from the native communities in the immediate vicinity of the two early missions, with groups living in the northern San Francisco peninsula going to San Francisco Asis and those in the south Bay going to Santa Clara. In 1780 C.E., baptisms begin from the east Bay-shore community of Huchiun-Southern, and initial baptisms from southern-most Marin (notably the Huimen) date to 1783 C.E.

In general, only a limited number of people had been baptized from most communities by 1790 C.E. (Fig. 3a). Indeed, even by the end of 1800 C.E., almost a generation after Spanish incursion, few if any people had been baptized from half of the Bay-Delta communities, and 60% of these communities had had less than 50% of their members baptized (Fig. 3b). Clearly, native communities were not as easily or quickly dismantled during the Mission Period as is sometimes assumed. By the end of 1810 C.E., however, only those communities in the northern and eastern-most portions of the Bay-Delta area had experienced minimal baptisms (Fig. 4a), and by 1820 C.E. more than 80% of the people had been baptized from all of these communities as well (Fig. 4b). Thus, by the end of 1821 C.E., 45 years after the establishment of the first Bay-Delta area mission, 99% of the region's inhabitants had been baptized. Although Bay-Delta area baptisms continued for some time, most of the remainder occurred during the next seven years and only five were recorded after 1832 C.E.

In addition to the broad trends in regional baptisms, there was also a temporal trend in the number of persons baptized

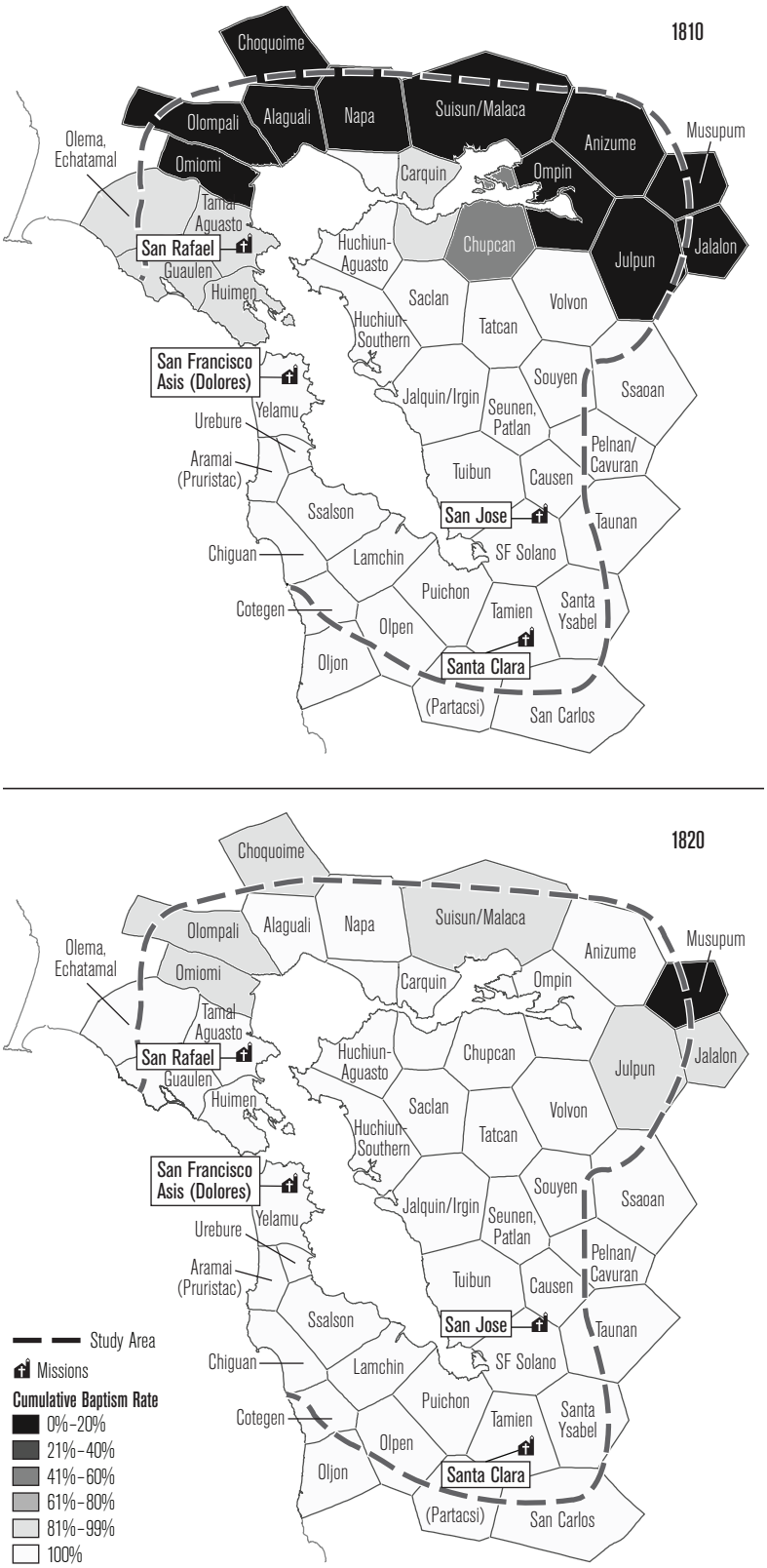


Figure 4. Cumulative baptismal trends by Bay-Delta tribal community at end of 1810 C.E. and 1820 C.E.

per event (Fig. 5). Up until 1792 C.E., baptisms typically involved a small number of individuals; subsequently, larger groups were more frequently baptized on a single day. Although this trend has been generally considered to be a reflection of the collapse of indigenous communities and a response to disease episodes (e.g., Milliken 1995), it is open to alternative interpretations. Perhaps these larger baptismal events reflect concerted and planned efforts by native communities to maintain themselves as coherent groups (particularly with respect to traditional social interaction) within these new mission contexts. If so, this trend may reflect the social agency of local communities as they strived to better position themselves collectively in the face of novel social dynamics within the mission system.

ARCHAEOLOGICAL IMPLICATIONS OF THE BAPTISMAL TRENDS

Temporal trends in the cumulative rate of baptisms by tribal community provide strong insight into the span of time within the Mission Period that traditional native settlements remained occupied. Indeed, perhaps the best way to conceptualize this is to invert the rates: 0% baptized = 100% of the population remaining outside the mission system, with the community members continuing to maintain a hunting/gathering/fishing subsistence system focused around their main settlements. Once 100% of the community is baptized, then everyone who was willing to go or could be coerced into the mission system had done so, and traditional settlements were no longer occupied in the same manner.

It is more difficult, however, to discern precisely when—between these two extremes—regional settlement structures

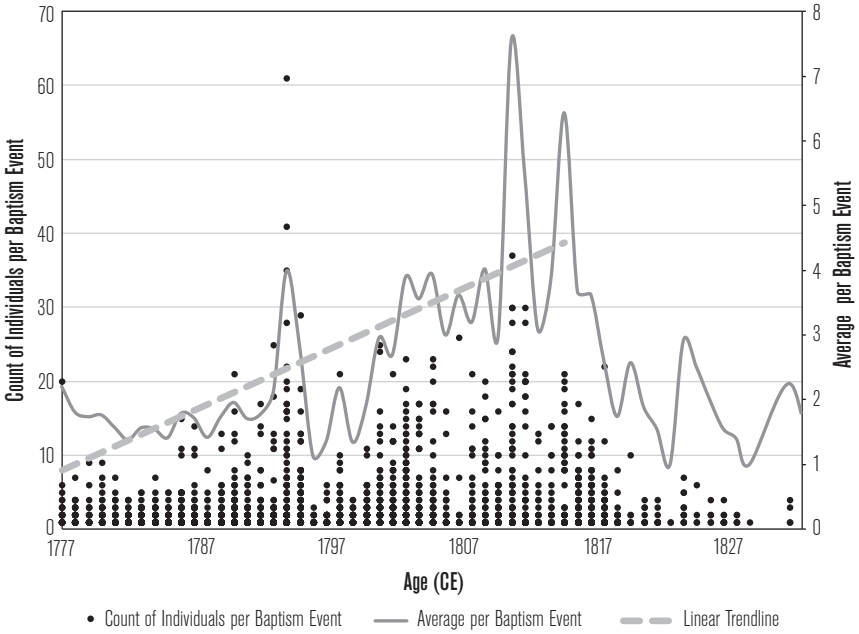


Figure 5. Temporal trends in number of baptisms per event in the Bay-Delta area.

broke down and traditional villages ceased to be occupied as they were before Spanish colonization. It seems reasonable to assume that even if only 50% of the community remained unbaptized (i.e., was fully outside the mission system), traditional settlements continued to be occupied. Although this may seem like an intellectual exercise, having a sense of this is helpful in estimating the length of time after the founding of local Spanish missions in 1776 C.E. during which significant archaeological evidence of indigenous persistence should have continued to accrue at native villages. This also provides a basis for considering where in the Bay-Delta area village persistence should have created the most robust archaeological record, and where the post-1776 C.E. record at pre-contact villages should be least robust. In these contexts, archaeologists will have to turn to different forms of evidence to be able to detect native persistence.

It is also worthwhile to ask ourselves whether post-1776 C.E. village persistence is even discernible archaeologically, or is everything just occurring too quickly? In order to assess the question of whether there is any archaeological evidence of native community persistence, we delve into the archaeological record from Native American settlements for evidence of post-1776 C.E. occupation, first examining the radiocarbon record, and then other indications of post-contact occupation.

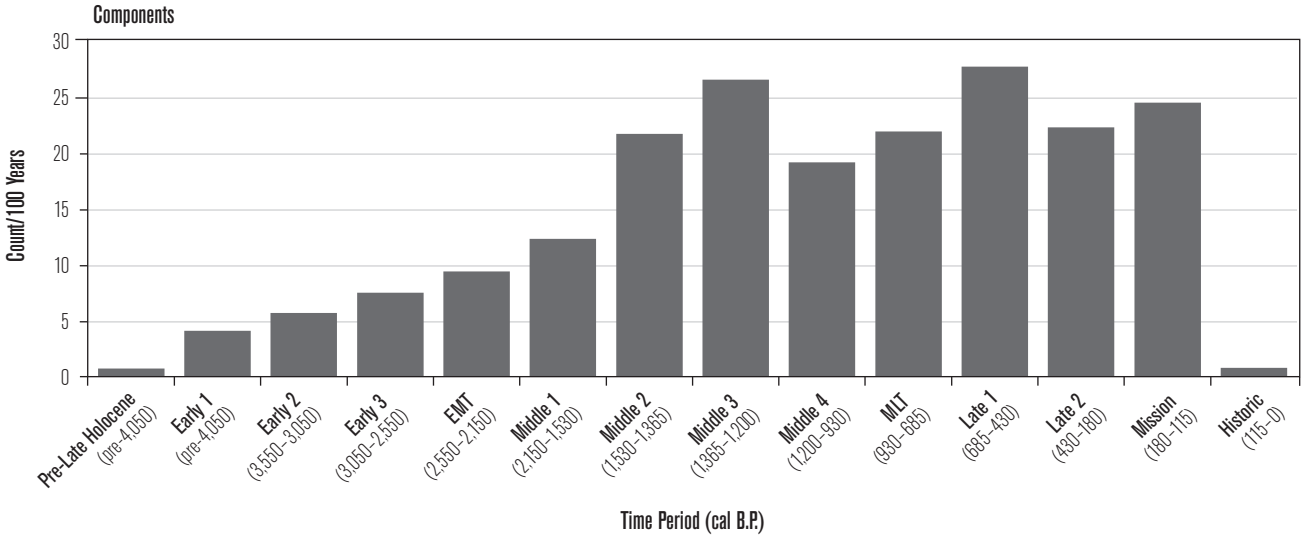
RADIOCARBON RECORD OF INDIGENOUS SETTLEMENT OCCUPATION

As part of our recent overview, all known radiocarbon dates from archaeological sites in the Bay-Delta study area were compiled and analyzed (Byrd et al. 2017:6-1 to 7-9). This consisted of 1,587 dates from 211 sites. These dates were calibrated to obtain median intercepts (the point in the probability distribution for a given date where the estimated age is just as likely to be older than the value as it is to be younger). The number of site components was also calculated, based upon the presence or absence of occupational evidence at each site within a single archaeologically-defined time period. This eliminated redundant dates from the same site falling within the same time interval and reduced sampling bias.

Using the current Central California Scheme D chronology (Groza et al. 2011), 593 components were distinguished across 13 cultural periods. In order to standardize dated components for comparison, we divided the number of site components within a time period by its length. The resulting values represent the number of components per year for each period. It should be noted that Groza et al. (2011:Table 1) define the Mission Period as lasting from 180–115 cal B.P. (1770–1835 C.E.), with the onset consistent with both the founding of Mission San Carlos Borroméo del río Carmelo and a presidio at Monterey (in Ohlone territory some 65 km. south of the study area) and with the initial production of such Native American artifacts in mission contexts as Class H needle-drilled *Olivella* disk beads; note that the mission at Monterey was only preceded by Mission San Diego de Alcalá in 1769 C.E.

As can be seen in Figure 6, the temporal component analysis demonstrates that there was considerable continuity in the indigenous occupation of the Bay-Delta area rather than a sudden collapse in native settlements at Spanish contact, a continuity that began around 1,500 years ago and persisted until well into the Mission Period.

One could, of course, suggest that this trend is partly a bias stemming from small sample size, given the brevity of the 65-year Scheme D Mission Period. However, that time span includes median intercepts of 180 cal B.P. or later from some 20 sites (represented by 27 radiocarbon dates), all but one of which are Native American settlements (Table 2). The other dated site (CA-SCL-30/H) comprises the Native American residential area



Note: Dates are normalized by 100-year intervals to account for the varied period durations.

Figure 6. Radiocarbon median probability distribution of site components by Scheme D cultural period in the Bay-Delta area.

Table 2

NATIVE AMERICAN SETTLEMENTS WITH POST-CONTACT RADIOCARBON DATES AND THE PRESENCE/ABSENCE OF CORROBORATING ARCHAEOLOGICAL EVIDENCE

Trinomial	Radiocarbon Date (Material, Lab #, Conventional date)	Median Intercept (Cal B.P.)	Napa obsidian hydration ≤1.1 microns	H Series Shell beads	Glass beads	Mission Period European Goods	Traditional Tools from European Material	Domesticated Plants	Euro-asian Weeds	Domesticated Animals	References
ALA-565/H	CP, Beta-434388, 110 ± 30; CP, Beta-434389, 130 ± 30; HB, D-AMS 024091, 198 ± 22	131, 129, 115	Y	–	Y	–	–	Y	Y	Y	Byrd et al. 2018; Luby 1995; Ruby et al. 2016
CCO-009	C, Beta-318998, 200 ± 30	180	–	–	–	–	–	–	Y	–	Price et al. 2016; Zimmer 2013
CCO-018/548	HB, OS-096376, 195 ± 20	175	–	–	–	–	–	Y	–	Y	R. Fitzgerald, personal communication 2014; Rosenthal 2010; Rosenthal et al. 2006; Wiberg 2010; Wiberg and Clark 2004
CCO-129/138	C, Beta-219265, 110 ± 40	120	Y	–	–	–	–	–	–	–	Atchley 1994; Beardsley 1954; Chard et al. n.d.; Fentress 2006; Jackson 1974; Price et al. 1993; Wiberg and Clark 2007

Table 2 (Continued)

NATIVE AMERICAN SETTLEMENTS WITH POST-CONTACT RADIOCARBON DATES AND THE PRESENCE/ABSENCE OF CORROBORATING ARCHAEOLOGICAL EVIDENCE

Trinomial	Radiocarbon Date (Material, Lab #, Conventional date)	Median Intercept (Cal B.P.)	Napa obsidian hydration ≤1.1 microns	H Series Shell beads	Glass beads	Mission Period European Goods	Traditional Tools from European Material	Domesticated Plants	Euro-asian Weeds	Domesticated Animals	References
CCO-397	C, Beta-308275, 90 ± 30; C, Beta-319003, 90 ± 30; C, Beta-319004, 120 ± 30; C, Beta-308274, 130 ± 30; C, Beta-319002, 170 ± 30	180, 129, 119, 108, 108,	–	Y	–	–	Y	–	Y	Y	Price et al. 2016; Zimmer 2013
CCO-462/468	C, Beta-090636, 80 ± 70	124	Y	–	–	–	–	–	–	–	Meyer and Rosenthal 1997
CCO-832	C, Beta-342414, 180 ± 30	136	–	–	–	–	–	Y	Y	Y	Price et al. 2016
MRN-005/H	C, UGa-R03426, 200 ± 30	180	–	–	–	–	–	–	–	Y	Evans and Smith 2009
MRN-194	C, Beta-204688, 180 ± 60	174	Y	–	Y	–	–	Y	–	–	Basgall et al. 2006
MRN-327	C, Beta-204691, 130 ± 50	140	Y	–	Y	–	–	–	–	–	Basgall et al. 2006
NAP-015	C, UGa-R03413, 145 ± 65	150	Y	–	Y	Y	–	–	–	Y	Heizer 1953; Stradford and Schwaderer 1982
NAP-189/H	C, Beta-230236, 140 ± 40; C, Beta-230238, 140 ± 50	144, 143	Y	Y	Y	–	Y	–	–	Y	Basgall et al. 2015
SCL-828	MS, Beta-135951, 580 ± 60	150	na	na	na	na	na	na	na	na	Meyer 2000; White and Thomas 1999
SFR-004/H	HB, ULN-13D0020, 174 ± 30	172	Y	–	–	–	–	–	–	Y	Morgan and Dexter 2008; J. Eerkens, personal communication 2015
SFR-129	C, Beta-128142, 190 ± 40	179	–	–	–	–	–	–	–	–	Clark 1998, 2001; Reynolds 2000
SFR-148	FB, Beta-200577, 150 ± 40	153	–	–	–	–	–	–	–	–	Crawford 2005
SFR-154/H	FB, Beta-188706, 170 ± 30	180	–	–	–	–	–	–	–	Y	Martin 2006
SFR,-191/H	C, Beta-289758, 110 ± 30	115	–	–	–	–	–	–	–	–	WSA 2011, 2014; Wohlgemuth and Arpia 2016
SMA-204	C, Beta-003786, 101 ± 70	130	Y	–	–	–	–	–	–	–	Bocek 1987, 1988, 1992

Reservoir correction: 285 ± 35 for south of Carquinez Straight, 315 ± 50 north of Carquinez Straight (Byrd et al. 2017; Meyer et al. 2011)

C: Charcoal, CP: Carbonized seed/nut, HB: Human bone, FB: Faunal bone, MS: Marine Shell

Radiocarbon calibration done using Calib version 7.04 (Stuiver et al. 2014)

at Mission Santa Clara. Moreover, 63% of these 19 sites fall within portions of the Bay-Delta region where fewer than 50% of the population had been baptized by 1800 C.E., and 53% are in areas where no baptisms occurred until after 1800 C.E. (Table 3). These sites are also widely distributed (falling within 11 tribelet territories around the Bay-Delta), and notably include a number of sites situated a considerable distance from the Bay-Delta area missions, especially in the northwest Bay area (n=4) and the south Delta area (n=6; Fig. 7). In short, the radiocarbon results are consistent with the baptismal records, demonstrating that many village settlements in the study area persisted during the Mission Period.

In order to determine whether or not the presence of more Native American sites with Mission Period radiocarbon dates in those areas with fewer baptisms is significant or not, we compared the spatial distribution of these sites with the distribution of Native American sites lacking Mission Period dates. A chi square test was conducted that contrasted sites with post-contact dates (12 of the 19 are located in areas with baptismal rates in 1800 C.E. below 50%) with Native American sites with exclusively pre-contact radiocarbon dates (only 75 of 190 of which are located in areas with baptismal rates in 1800 C.E. below 50%). The goodness-of-fit results deviated from expected frequencies and were statistically significant at $p < .05$ (p-value .045841, chi-square=3.9874, df=1). This reinforces the perspective that sites with post-contact median dates are not randomly distributed in the region; instead, their distribution is in part due to the varied regional trends in the timing of traditional village abandonment and persistence, as well as relocation to other communities to avoid the mission system (e.g., Milliken 1995).

It is important, of course, to recognize that fine-grained accuracy in radiocarbon dating during this period is difficult, since the radiocarbon curve wiggles and overlaps with itself due to fluctuations in atmospheric carbon (e.g., Gale 2009; Hua 2009). This creates multiple intercepts, increasing the likelihood that the median intercept is not highly accurate. This poor resolution likely means that some of these Mission Period median dates may not accurately reflect the actual age, which suggests that some of these radiocarbon dates are actually from events that occurred in the prior Late Period 2 (i.e., the final pre-contact cultural period).

However, this also may mean that some of the Late Period 2 median intercept dates are inaccurate. Some 23 (38%) of the 60 sites in the Bay-Delta study area with Late Period 2 components (based on median radiocarbon age) have radiocarbon dates that at two standard deviations extend into the Mission Period. Moreover, 70% of these 23 dated sites are located in areas where less than 50% of the population was baptized in 1800 C.E, and all but one of these sites is in native regions where less than 20% of the population had been baptized in 1800 C.E. Given the general consistency in spatial patterning between this data set and the post-contact data set, it appears likely that at least some of these radiocarbon samples reflect post-contact events as well (see also Schneider 2015a).

Overall, the aggregate data strongly support the conclusion that a great deal of post-1776 C.E. occupation is documented in the results of radiocarbon dating from Bay-Delta area sites. Moreover, the spatial distribution of these data is consistent with the spatial patterning documented in the mission baptismal records.

ARCHAEOLOGICAL EVIDENCE OF PERSISTENCE WHILE INTERACTING

Other archaeological evidence from native villages with Mission Period radiocarbon dates is explored to corroborate the dating evidence and to ascertain if some insight can be gained into the degree of material interaction with nearby colonial settlements. The archaeological reports from the indigenous sites with a Mission Period median date were reviewed, and the presence or absence of various types of archaeological data indicative of likely post-contact occupation and colonial interaction was noted. Available archaeological reports were examined for the following eight lines of evidence: Napa obsidian hydration readings of ≤1.1 microns; Class H series needle-drilled *Olivella* beads; European-made glass trade beads; other European-made Mission Period goods; traditional indigenous tools/items made from European materials; non-native domesticated plants (such as wheat, barley, and corn); non-native introduced weeds (such as filaree and mustard); and non-native domesticated animals (including cattle, pigs, and horses).

Class H series *Olivella* beads are considered diagnostic of the time period, as they were made from

Table 3

NATIVE AMERICAN SETTLEMENTS BY TRIBAL COMMUNITY AREA WITH RADIOCARBON OR NAPA OBSIDIAN HYDRATION EVIDENCE INDICATIVE OF POST-CONTACT OCCUPATION

Tribal Affiliation	Tribal Community	% Baptised at end of 1800 C.E.[a]	Sites with Post-Contact Date (Median intercept)	Site with dates extending in Mission Period at two standard deviations	Site with Napa Obsidian hydration ≤1.1 microns
Bay Miwok	Chupcan	2.6%			
Bay Miwok	Julpun	0.0%	CCO-18/H, -129/138		CCO-128, -129/138, -767
Bay Miwok	Ompin	0.0%			
Bay Miwok	Saclan	91.3%			CCO-236
Bay Miwok	Tatcan	5.6%			
Bay Miwok	Volvon	0.0%		CCO-320	CCO-320/H
Coast Miwok	Alaguali	0.0%			SON-227, -2226
Coast Miwok	Choquoime	0.0%	NAP-189/H		NAP-189/H, -795
Coast Miwok	Guaulen	14.4%			
Coast Miwok	Huimen	48.8%	MRN-5/H	MRN-42	MRN-255/H
Coast Miwok	Napa	0.0%	NAP-15	NAP-15	NAP-015/H
Coast Miwok	Olema, Echatamal	0.0%			MRN-495
Coast Miwok	Olompali	0.0%	MRN-194, -327		MRN-194, -195, -197, -327
Coast Miwok	Omiomi	0.0%			MRN-529
Coast Miwok	Tamal Aguasto	17.3%		MRN-114, -115, -254, -328	MRN-127, -254, -328, -644/H
Ohlone	(Partacsi)	98.8%			
Ohlone	Aramai (Pruristac)	100.0%			SMA-072
Ohlone	Carquin	2.6%			
Ohlone	Causen	43.4%	ALA-565/H	ALA-565/H	ALA-565/H
Ohlone	Chiguan	100.0%		SMA-151	
Ohlone	Cotegen	100.0%			
Ohlone	Huchiun-Aguasto	10.5%			
Ohlone	Huchiun-Southern	100.0%	SFR-4/H	ALA-310, CCO-290, -295, -297	CCO-297
Ohlone	Lamchin	100.0%			
Ohlone	Oljon	100.0%			
Ohlone	Olpen	99.5%	SMA-204		SMA-204
Ohlone	Pelnan/Cavuran	3.1%			
Ohlone	Puichon	97.6%			SCL-012/H, -464, -806
Ohlone	San Carlos	98.7%			
Ohlone	Santa Ysabel	87.2%		SCL-38, -919	
Ohlone	Seunen, Patlan	5.7%			ALA-554, -555, CCO-124
Ohlone	SF Solano	97.2%		ALA-576, SCL-677	ALA-342, -576
Ohlone	Souyen	10.4%			
Ohlone	Ssalson	100.0%		SMA-6	
Ohlone	Ssaoan	0.0%	CCO-9, 397, -462/468, -832	CCO-9, -755	CCO-458/H, -462/468, -696
Ohlone	Tamien	98.7%	SCL-828	SCL-478	
Ohlone	Taunan	47%		ALA-428	
Ohlone	Tuibun	82.7%			ALA-329, -343, -453, -479
Ohlone	Urebure	100.0%			
Ohlone	Yelamu	100.0%	SFR-129, -148, -154/H, -191/H		SFR-4/H
Ohlone & Bay Miwok	Jalquin/Irgin	7.7%			ALA-566
Patwin	Suisun/Malaca	0.0%		SOL-356	
Plains Miwok	Anizume	0.0%			
Plains Miwok	Musupum	0.0%			
Yokuts, Delta	Jalalon	0.0%			

[a]Note that 100% baptized does not imply the end of Native American society or their ties to traditional homelands, but rather that the practice and context of indigenous persistence changed.

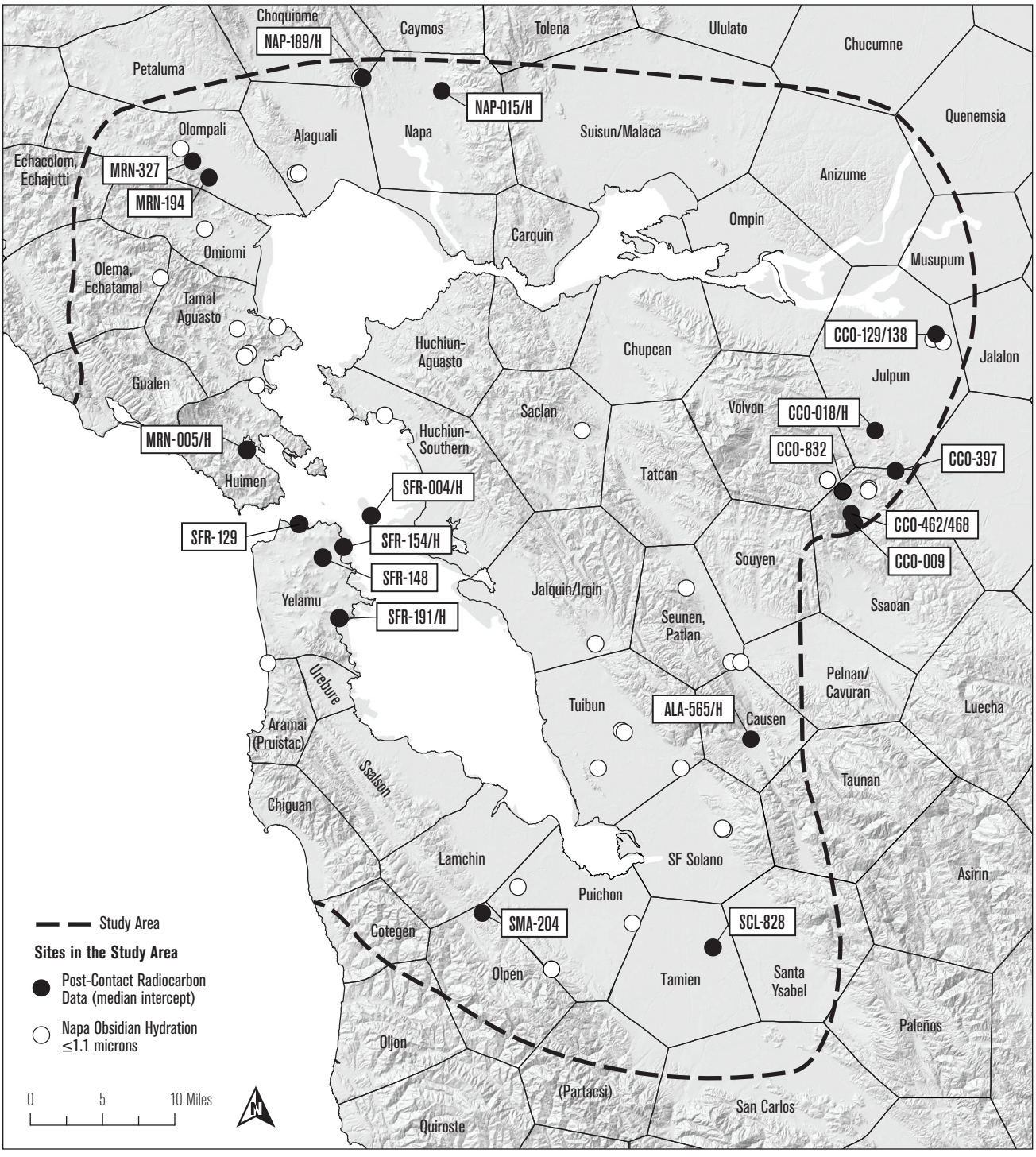


Figure 7. Spatial distribution of archaeological sites with post-contact radiocarbon date median intercepts.

1769 C.E. onward with metal needles provided by the Spanish (Bennyhoff and Hughes 1987:312–313; Groza et al. 2011) and are, for example, a very common offering in native burials at Mission Santa Clara (Hylkema and Allen 2009). Similarly, the Spanish effort at colonization in the Bay-Delta area is considered to be the primary and most likely means by which European-made items, such as glass trade beads, and non-local plants and animals (both domesticates and weeds/commensals) would have spread to post-contact Native American villages (e.g.,

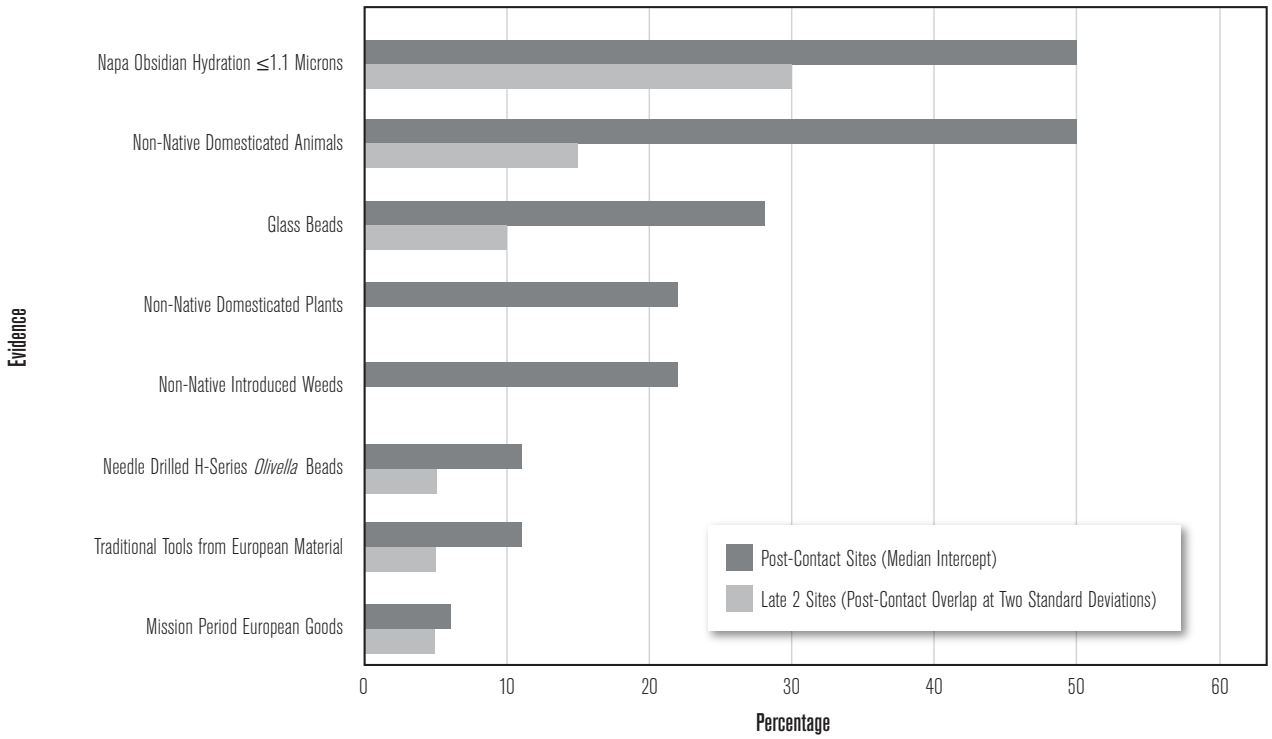


Figure 8. Relative frequency of post-contact archaeological materials at sites with post-contact radiocarbon dates and with Late Period 2 dates that overlap with the post-contact time span at two standard deviations.

Hackel 2005; Lightfoot 2005; Lightfoot and Parish 2009). (Although we consider it less likely, we acknowledge that all of these items could have reached these communities prior to the founding of the missions in the Bay-Delta region.) Napa Valley obsidian was chosen as it is the dominant obsidian recovered from Bay-Delta sites and its hydration rate is fairly well understood, although the three main formulas used vary slightly from one another (Origer 1982; Rosenthal 2005; Schneider et al. 2014). A recent analysis by Rosenthal that considered only Napa hydration readings from contexts (such as features and burials) with absolute dates demonstrated that Late Period 2 hydration readings at one standard deviation range from 2.15 to 1.25 microns, while historical readings range from 1.0–0.6 microns (Byrd et al. 2017:7–18 to 7–19, Table 19). Therefore, a hydration reading of ≤1.1 microns was considered an appropriate figure to use to identify probable Mission Period occupations, since the most recent formulas suggest that a reading of 1.1 microns would convert to an approximate age of 180–174 cal B.P. (Rosenthal 2005; Schneider et al. 2014; contra Panich et al. 2018a:Table 5). Note that the precision of a hydration reading is ±0.2 microns.

The results presented in Table 2 reveal that 83% of the 18 sites with post-contact radiocarbon dates have at least one additional attribute indicative of Mission Period occupation (CA-SCL-828 was excluded since archaeological work was limited to trenching with no sampling except for dating). The two most common additional attributes present are Napa obsidian hydration results and domesticated animal remains (both at 50%), followed by glass beads (28%), non-native domesticated plants (22%), and non-native weeds (22%) (Fig. 8). Needle-drilled H-Series *Olivella* beads (11%), traditional tools made from European materials (11%), and Mission Period goods (6%) are less commonly noted.

For comparative purposes, we also reviewed the reports from sites with Late Period 2 median intercepts that extend into the Mission Period at two standard deviations. Three of the original sample of 23 sites (CA-CCO-9, -MRN-5/H and -SFR-154/H) were excluded as they also had Mission Period dates. Some 50% of the remaining 20 sites have at least one of the eight attributes indicative of Mission Period occupation. As shown in Figure 8, there is also a consistent drop-off in the relative frequency of items indicative of post-contact occupation

in comparison with sites with post-contact radiocarbon dates. The two most common attributes present are Napa obsidian hydration results (30%) and domesticated animal remains (15%), followed by glass beads (10%). The other five categories are either infrequent at 5% (needle-drilled H-Series *Olivella* beads, traditional tools from European materials, and Mission Period goods) or are absent (non-native domesticated plants and introduced non-native weeds). These trends, especially the decline in relative frequency across all of the eight categories, are consistent with the expectation that some of these sites may have had post-contact occupations, but at a significantly lower rate than those sites with post-contact radiocarbon dates.

As a final line of inquiry, we examined the full Napa Valley obsidian hydration data set for the Bay-Delta study area. This includes data from 136 Native American sites and 3,844 Napa Valley obsidian hydration readings, many of which lack associated radiocarbon dates. Forty-two of the Native American sites yielded 96 readings that were ≤1.1 microns and thus indicative of post-contact occupation (this included the nine sites that matched these criteria and had post-contact radiocarbon dates, as previously discussed). This represents only 2.5% of the full hydration data set but does include 30.1% of the total site sample. It is possible that this is an over-representation of post-contact occupation, as other factors (such as a rapid burial of sediments) might have either damaged or hindered the hydration build up on individual samples, thereby effectively creating a false positive. Overall, however, all but three of these post-contact readings are clustered between 1.1 and 0.8 microns, which is also precisely the same range as that in a sample of 14 Napa obsidian hydration readings from the Native American occupation at Mission San Francisco, CA-SFR-22H (Ambro 2003). It should be noted that recent Napa obsidian hydration results from Mission San Jose range from 1.1 to 5.1 microns, peaking at 1.3 microns, and that this is inconsistent with all previous post-contact results, potentially revealing a greater overlap in readings between pre-contact and post-contact contexts (Panich et al. 2018a:7).

Out of the 42 sites with post-contact Napa obsidian hydration readings (≤1.1 microns), 67% are located in areas with baptismal rates in 1800 C.E. lower than 50% (see Fig. 8/ Table 3). This is a considerable contrast from what is found in those sites with exclusively pre-contact Napa obsidian hydration readings (≥1.2 microns), since only 48% of those 94 sites are in areas with baptismal rates in 1800 C.E. below 50%. To determine whether or not the higher concentration of Native American sites with Mission Period obsidian hydration readings in areas with lower baptismal rates is a significant pattern or not, a chi square test was conducted. The goodness-of-fit results deviated from expected frequencies and were statistically significant at $p < .05$ (p-value .042282, chi-square = 4.1239, df = 1). These results demonstrate that sites with post-contact obsidian hydration readings are distributed in the region in a manner that correlates with regional trends in the timing of traditional village abandonment and persistence.

SUMMARY

This study has integrated several lines of evidence to assess the nature and extent of continuity in traditional village occupation in early Bay-Delta area colonial times. The baptismal records show that there was considerable spatially-structured persistence, with the majority of native communities remaining viable settlements until at least 1800 C.E, while some communities, especially in the north and west, persisted as independent entities for another 10–20 years. Archaeological evidence of post-contact native community persistence is also present and is consistent with the spatial patterning in the archival record. Evidence from both absolute (radiocarbon) and relative (obsidian hydration) dating provides the most robust support for Bay-Delta area village persistence. Spatial patterning in these lines of evidence is also consistent with the baptismal trends—sites with post-contact chronological evidence are significantly more likely to be situated in areas where the majority of the population was not baptized until after 1800 C.E. In contrast, Native American sites lacking post-contact chronological evidence are significantly more likely to be concentrated in areas where the majority of the community was baptized prior to 1800 C.E. Material indicators of the Mission Period are present at many of the native settlements with post-contact radiocarbon dates, indicating at least a limited movement of goods during the early colonial era. Their low frequency, however, highlights the fact that these data sets are

poor indicators of early colonial indigenous persistence. There are several probable reasons for this situation, including a dearth of appropriate site sampling, limited trade and exchange between traditional communities and mission residents, and socio-ideological factors tied to conservatism. As a result, although non-native foods and goods may occur in post-contact contexts at traditional settlements in low frequencies, they should not be relied upon as the primary evidence for post-contact occupation and persistence (see also Schneider 2015a, 2015b). This situation should be taken into account when considering broader cultural resource management implications.

Overall, these trends strongly indicate that there was widespread village persistence during the Mission Period, even if material exchanges with the Spanish and with Mission Indian residents was fairly limited. We recognize that this sort of presence/absence assessment is not very rigorous, nor do the results from any single site provide definitive evidence for the nature of native village persistence, for a variety of reasons. This is partly due to the fact that the archaeological investigations which produced the reports used here differed considerably with respect to such factors as when they were carried out, their overall objectives (which were generally not focused on discerning post-contact occupations), their methods, and whether or not each of the nine attributes considered here were collected/studied/reported upon. It is also important to keep in mind that some of the post-contact indigenous archaeological evidence—in areas where communities entered the mission-system at an early date—may represent a short-term use/reuse of traditional settlements by Mission Indian residents while on furloughs (*paseos*) or while fleeing as fugitives (e.g., Schneider 2015b). In addition, a number of these sites likely had a subsequent Mexican/Early American period occupation that may be inflating some of these results. Regardless, the available data suggest that continued occupation of native settlements after Spanish arrival did leave a discernible archaeological signature, and future archaeological studies will need to tailor their approach and methods to document unobtrusive evidence of colonial-era native occupation.

It is also interesting to note that variation in the relative frequency of these categories of material culture is broadly consistent with both continued village occupation and with limited regional interaction—especially that related to trade with the newly established Spanish missions and their native residents. The three most common attributes considered here are indicative of either continued traditional tool production (obsidian hydration values), poaching of ubiquitous herd animals (domestic animal bones), down-the-line trade, payment for temporary labor, or recruitment-related gifts of the most common imported trade item (glass beads). In contrast, the least frequent items are most likely to have been acquired through direct trade and exchange and are also items less likely to have been traded, in part due to their relative scarcity (Mission Period European goods, traditional tools from European materials), or were made by native people at the missions largely for their own use (needle-drilled H-Series *Olivella* beads). Given this situation, it may be worthwhile to reconsider whether the suggested scale of trade and exchange between individuals within autonomous traditional communities and Mission Indians in the study area may have been considerably smaller than has been suggested previously (Arkush 2011:83; Lightfoot 2013:195), with the possible exception of Napa obsidian-related trade (Panich et al. 2018a).

DISCUSSION AND CONCLUSIONS

A similar approach to identifying traditional village persistence can be applied to other areas of western California to explore how colonialism played out on a larger indigenous landscape, and how such trends compare to the developments discussed here. In doing so, it will be important to consider how the colonial approach to controlling and subjugating indigenous groups varied; for example, the priests at the San Luis Rey and San Diego missions tended to favor greater settlement flexibility, often allowing native communities to reside for longer periods each year outside the mission quadrangle (Lightfoot 2005, 2014; Newell 2009). The varied spacing of the early missions, the timing of the subsequent infilling of missions, and differences in terrain undoubtedly also played a role in how regional populations responded to these intrusions.

This sort of broad-scale visualization allows San Francisco Bay-Delta village persistence to be considered in the larger California colonial context and provides a wider perspective on this dynamic landscape of cultural

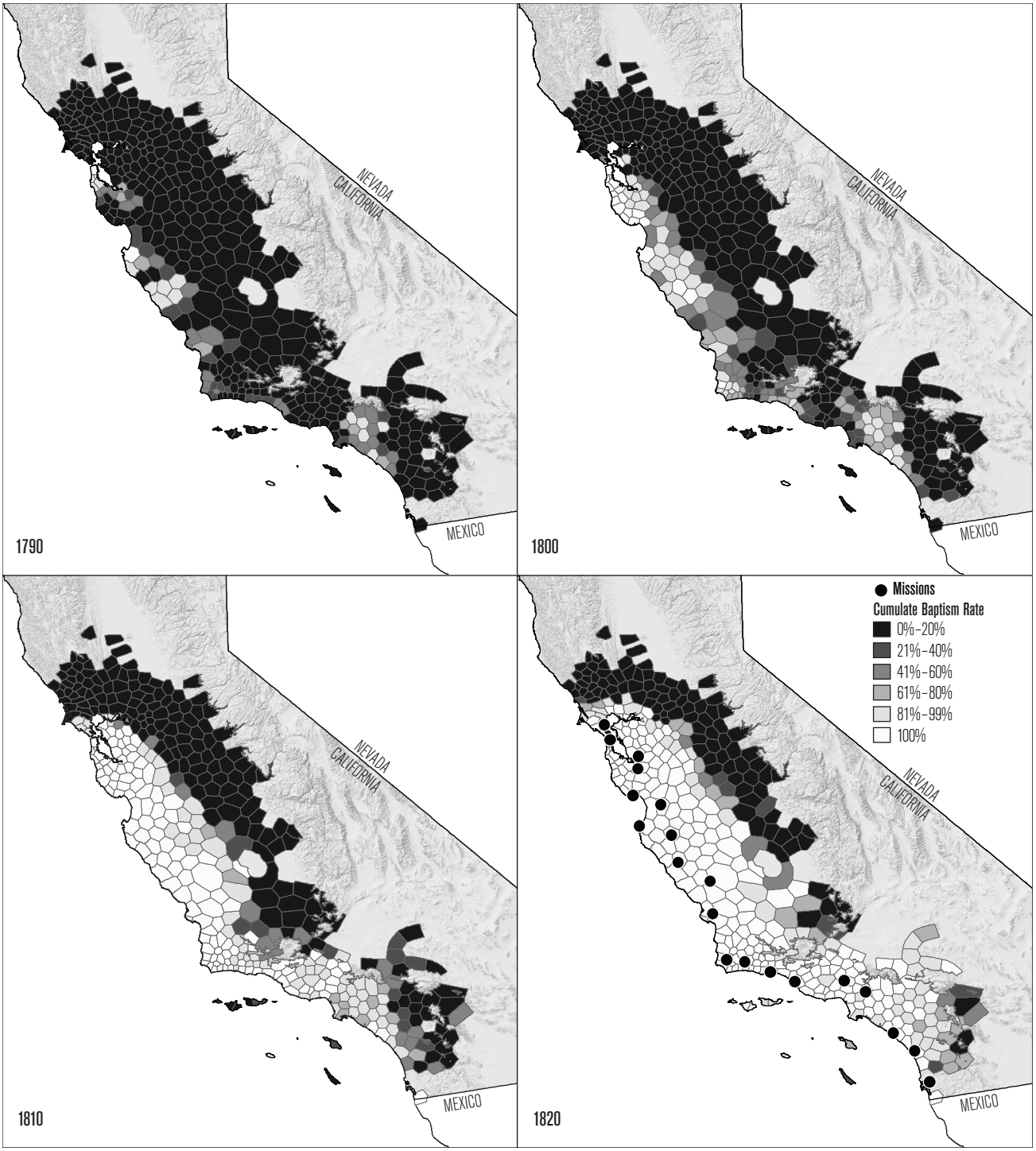


Figure 9. Cumulative baptismal trends by tribal community across California at 1790, 1800, 1810, and 1820 C.E.

change and persistence. Drawing on the work of Milliken and others such as Johnson (e.g., McLendon and Johnson 1999; Milliken and Johnson 2005; Milliken et al. 2006), Figure 9 presents the timing of baptisms throughout California at 10-year intervals from 1790 to 1820 C.E.; an animated version of this visualization is available online and specific areas of interest can be enlarged (Byrd and DeArmond 2018). When California as a whole is considered, it is clear that the overall process plays out over a longer time frame than is represented in the

Bay-Delta area. The depopulation of village communities in southern California and along much of the central coast lags somewhat behind that in the Bay-Delta area. The central San Joaquin/lowermost Sacramento Valley and the North Coast ranges in particular have a much later onset of baptisms, invariably occurring after 1815 C.E. Overall, it conforms to what Bennyhoff (1977) referred to as the domino effect, with impacts rippling out from the initial coastal mission locations in a time-transgressive manner. The obvious main point to note here is that the longer the time span before baptism and relocation, the greater the potential for discerning and examining archaeological evidence of traditional community persistence, as well as colonial-induced interactions and adaptive changes.

Until recently, research on the Mission Period has largely focused on the actions of the Spanish and their impact on native people once they entered the missions (e.g., Panich and Schneider 2015; Schneider and Panich 2014). Any consideration of the larger regional setting in which the Spanish missions were situated invariably employs terms such as periphery or hinterlands. As has been pointed out in a variety of different contexts, a reliance on core-periphery terminology and theoretical perspectives often hampers and inadvertently biases our consideration of the past and downplays the role of native agency, especially with respect to traditional communities during early colonial times (see Lightfoot and Martinez 1995; Schneider and Panich 2014:197). Imposing such a Eurocentric perspective on the indigenous landscape can potentially limit insight into the dynamic nature of this time period, when during at least the first quarter-century of colonization the Spanish missions in the Bay-Delta area housed relatively few people and controlled a very limited area of land in comparison with the numerous and extensive tribal communities around them.

Since our results show that the potential for discerning the presence and understanding the general timing of post-contact occupations at traditional settlements is considerable, we hope that this paper will inspire and reframe future archaeological research in such a way as to put the perspectives of traditional native communities at contact front and center, as others have strongly advocated recently (Lightfoot 2013, 2014; Panich 2013; Panich and Schneider 2015; Schneider 2015a; Schneider and Panich 2014). Such an approach could include consideration of a wide range of questions, such as how these enduring communities differentially viewed and reacted to the Spanish intrusion; how their perspectives varied in relationship to their distance from the colonial settlements or the number of intervening tribal communities that initially served as a buffer; and whether there were differences in perspectives and reactions based on such inter-community constructs as ethnolinguistic affiliation and alliances?

It also may be worthwhile to consider how the perspectives of those still living in traditional communities may have changed as neighboring communities closer to the missions were baptized and moved into the mission quadrangles. How disruptive were these changes to traditional alliances, marriage patterns, and localized inter-tribal trade and exchange? Similarly, did these developments disturb down-the-line trade and the exchange of long-distance goods such as obsidian, shell beads, and abalone pendants; and if so, were these trade networks reconfigured, and in what manner? A consideration of these research questions, however, will require a reconstruction of the degree of inter-community interaction just prior to contact as a necessary basis for predicting the potential impacts on the movement of communities into the missions (Lightfoot 2014:207).

Such insights into localized pre-contact inter-community trade and exchange also would provide a baseline for exploring how native lifeways outside the missions further changed once most of the indigenous communities nearest the missions had left their traditional homelands. What then took place in this buffer zone/empty quarter besides the grazing of Spanish herd animals? Did Indians living at the missions continue to use their traditional territorial landscape (albeit in a less intensive way) to acquire resources, spend furloughs, slip away to die, and/or be buried (Newell 2009; Panich 2015:121)? That appears to be quite likely, given the consistent and frequent recovery of traditional foods and tools from mission contexts (Arkush 2011), and what appears to be limited evidence of trade and exchange between Mission Indians and nearby, contemporaneous traditional villages. Moreover, there were certain years (such as 1785–1786 C.E.) when Mission Indians had to rely more heavily on traditional foods due to food shortages at the missions caused by drought, crop failures, or population spikes (e.g., Milliken 1995:87–88, 125, 137).

At the same time, did some adjacent native communities encroach and begin to infill or exploit resources in these areas (or at least those of higher value) through longer logistical forays, or begin to shift long-standing settlement patterns and group sizes to capitalize on such "abandoned" zones? In addition, were selective pressures on some resources reduced due to changing patterns of land use and a less intensive exploitation of the traditional territories of native communities that had moved into the missions? Similarly, did annual burning continue in these depopulated areas, and if so, who carried it out? It seems highly likely that this was the case, since on May 31, 1793 (16 years after the initial founding of missions in the Bay-Delta area), Governor Arrillanga banned traditional landscape burning from being carried out by both mission and non-mission Indians (and he especially singled out older women; Ford 1922; Lightfoot 2005:86–87). The edict was sent to all the mission priests in California, informing them that the cost of enforcement would be borne by the Spanish government. Although enforcement may have been successful in the depopulated zone directly around the missions, Lightfoot (2013:196) has questioned how successful this effort was further afield or within the territories of traditional native communities that had not yet entered the mission system. All of these potential changes in regional patterns of resource exploitation and interaction have the potential to be discernible in the post-contact archaeological record, and they need to be considered within the context of refuges and site reuse as well.

An investigation of these topics from the perspective of the as-yet uncolonized should also greatly aid in understanding and interpreting how and to what degree mission-based Indians chose to or were able to maintain existing relations with their former neighbors. Did the new constraints placed on those who moved away cause abrupt and irrevocable changes in social roles, relationships, and obligations? Perhaps new negotiations with old neighbors were required in order to maintain relations, avoid conflicts, and reach consensus regarding access to and use of what used to be a community's traditional territory. Alternatively, perhaps these developments caused the nexus of social interactions to shift toward communities located farther from the Spanish settlements, resulting in an increased likelihood of conflicts with traditional allies. As Milliken has noted (1995:63, 100, 150), there is considerable archival evidence of Mission Period inter-tribelet conflict and raiding tied to the dynamic and changing circumstances of the times, and this included the targeting of vulnerable communities (such as those in which many members had already shifted to the missions or were away from the village working for a period of time at the pueblo of San Jose, the Monterey presidio, or the San Francisco presidio).

The limited archaeological evidence of trade between native communities and the missions and their native residents does not appear to support previous suggestions that there may have been fairly frequent trade and exchange, and that mission-introduced goods were either widely available or were perceived as extremely desirable by traditional communities outside the missions' sphere of influence (Arkush 2011:83; Lightfoot 2014:201). In fact, the situation appears to have been more similar to Lightfoot and Simmons' (1998:158) assessment of proto-historic encounters with European explorers: "…[T]he materials exchanged between voyagers and natives were probably limited in quantity, mostly of a perishable nature, and delegated to primarily ceremonial and honorific contexts." A similar low-level use of non-native foods and other items (albeit driven by other communal social factors) is documented, for example, by Reddy (2015) at a historic Gabrelino/Tongva settlement along the southern California coast.

The archival record for the Bay-Delta area supports the perspective that the vast majority of non-local resources recovered from archaeological investigations at post-contact indigenous villages was not acquired via trade and exchange with mission Indians. For example, the poaching of domesticated animals by non-mission Indians was a widespread, pervasive problem, and the Spanish invested considerable effort into catching and punishing offenders (Arkush 2011:66; Milliken 1995:120–122,163; Phillips 1993:78–79). There was also a recognition by some mission priests that there were circumstances in which poaching was not unexpected (and was perhaps even justified), such as when Pueblo San Jose herds heavily impacted the native food resources of non-mission Indians or during droughts and other periods of food shortages (Milliken 1995:72–74, 99, 125, 156). The stealing of domestic plant crops during harvest time also took place (Milliken 1995:67, 148).

In contrast to the means by which non-native foods were acquired, European-made goods were primarily obtained by indigenous communities through direct, mutually-beneficial interactions with the Spanish (rather than via poaching or direct trade with mission Indians). For the most part this was in the form of pay for working on a short-term project, such as harvesting crops at Pueblo San Jose or working on a construction project at the pueblo, the Monterey presidio, or the San Francisco presidio (Milliken 1995:104–106, 122, 147–148, 151, 214). Moreover, payment invariably consisted of perishable items (typically blankets, clothing, or cloth), glass beads, and sometimes food. For example, for a Monterey presidio project in 1790 C.E., Fages (1793:Appendix 4, 2) states: "I promised to reward them with blankets, shirts, glass beads and shells." European-made tools were rarely traded or paid to individuals from traditional communities, and Spanish officials went to considerable effort to halt such activities, including banning the sale of all iron tools after some Pueblo San Jose citizens provided metal axes to members of an indigenous community in 1790 C.E. (Milliken 1995:98, 165).

Future studies that focus on the perspectives and actions of traditional native communities during the post-contact era have the potential to supplement inward-looking Mission Indian studies, which until very recently rarely took into account the native world beyond the mission quadrangle (however, see Panich and Schneider 2014 and their subsequent studies). Creating a more finely-grained consideration of the changing post-contact landscape from the perspective of traditional communities that remained outside the colonial system (including taking into account where they were located) should also provide further context to recent ground-breaking Mission Indian studies that are focusing on the larger regional setting in considering how traditional goods, such as Napa obsidian, were acquired (Panich et al. 2018a), and the archaeological record created by Mission Indians during regular *paseos* or as fugitives creating new sites or reoccupying abandoned settlements (e.g., Schneider 2015b). For example, a review of the timing of the abandonment of the two tribal communities (the Canijolmano and Mayacma Wappo) where the Napa obsidian sources were located can aid in the consideration of whether Napa obsidian raw material acquisition by Mission San Jose Indians (at some point between 1797 and 1840 C.E.) was done via trade and exchange or through direct procurement (Panich et al. 2018a). Direct procurement would have been most likely only during the last 10 years of the Mission San Jose occupation, since before 1830 C.E. the majority of both Wappo communities remained outside the mission system (and those members that relocated did not go to Mission San Jose). Similarly, the timing of baptisms at the Coast Miwok tribal community of Tamal Aguasto—where Schneider's (2015b) study of the post-contact reoccupation of shell mound CA-MRN-114 took place—provides a minimal age constraint of 1805 C.E. for reuse and reoccupation (since until then a native occupation persisted there).

In conclusion, this study has shown that the native occupation of traditional villages throughout much of the Bay-Delta area continued for a considerable period of time after the Spanish arrived in 1776. Until recently, that indigenous persistence has been little recognized or appreciated archaeologically. This in large part is because—owing to a continuity in lifeways—its general archaeological character was very similar to that of pre-contact occupations, and we lacked the archaeometric resolution to distinguish such small-scale temporal spans. Future studies of Late Period villages should be designed to explicitly focus on identifying post-contact archaeological components, and should embrace new perspectives, approaches, and data sets in order to discern these fine-grained temporal events at traditional settlements (Lightfoot 2014:207). In doing so, it will be important to take into account the insights and perspectives of recent studies of post-contact cultural resiliency and change in California (and in the Bay-Delta area in particular) that are focusing on such topics as the re-occupation of traditional settlements by mission residents, the presence of refugium settlements, native daily life in mission settings, and Native American lifeways at Mexican and early American period ranchos (e.g., Panich et al. 2018a, 2018b; Reddy 2015; Schneider 2015a; Silliman 2004).

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