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Preservation, Politics, Productivity, or Preference: Considering Fish Remains from Southern San Joaquin Valley/Emigdiano Sites

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*Interpreting fish remains from sites in the Emigdiano Chumash/southern San Joaquin Valley region is complicated by the diverse set of forces involved in their procurement, use, deposition, and preservation, particularly during the Mission period, when some people from coastal communities made their way to the interior. This paper compares the fish remains from two sites in San Emigdio Canyon with distinct occupational histories (CA-KER-188H and CA-KER-6789). Within these assemblages there is a diachronic shift in the most abundant fish species from Sacramento blackfish (*Orthodon microlepidotus*) to Sacramento perch (*Archoplites interruptus*) during the later precolonial and Mission periods. This change is evaluated within this particular cultural and historical context with reference to multiple possible causal factors: taphonomy, environmental change, access to fish or fishing locations, and preference based on taste.*

Where today we see a landscape dominated by agricultural fields and oil production in the southern San Joaquin Valley, there once flourished one of the richest fisheries of precolonial California. Early historical sources describe the region as a fisherman's paradise: "The abundance of fish of all kinds in these waters is absolutely astonishing. The waters seem alive with them, and the variety is as great as the quality of most of them is good. Pike, perch, bass, salmon, grout, eels, suckers, and many other kinds… are caught with the greatest of ease" (Phillips 1993:20). But by the 1880s, the once prolific Tulare Lake had been reduced to a "great, unsightly mud-hole" (Preston 1981:158), as had Buena Vista and Kern lakes to the south. Before irrigation and other steps were taken to drain the lakes and their corresponding ecosystems, these massive bodies of water once supported rich lacustrine habitats that provided key resources for the Yokuts people who occupied the marshy valley floor.

Neighboring groups, however, also relied on the abundant fish, shellfish, waterfowl, and other floral and faunal resources these lakes provided. Among these were the Emigdiano Chumash, who occupied the canyons, foothills, and mountains that bordered the San Joaquin Valley on its southwestern edge (Fig. 1). The economic and sociopolitical importance of fishing among coastal and island Chumash groups is well documented and has been explored by many. Until recently, however, there has been much less attention given to the interior Chumash groups that were connected to coastal peoples through language, trade, and kinship, but whose environment and population densities—and perhaps even forms of political organization—differed significantly. As research in this region continues, an understanding of precolonial Emigdiano Chumash subsistence, seasonal movements, regional interactions, and cultural evolution is emerging (Bernard et al. 2014; Robinson 2010). From this has come an understanding of the importance of the southern Valley lakes in the lives of Emigdiano Chumash people.

Analyzing diachronic changes in fish remains from Emigdiano sites is complicated by the diverse set of forces involved in their procurement, use, deposition, and preservation. Buena Vista Lake and (probably to a lesser extent) Kern Lake, which lay within regions typically assigned to Yokuts tribelets, were loci of interaction and negotiation between multiple cultural groups. As a result, issues of access to the lakes and their environs likely would have underlain Emigdiano subsistence practices, especially since the groups living in this region

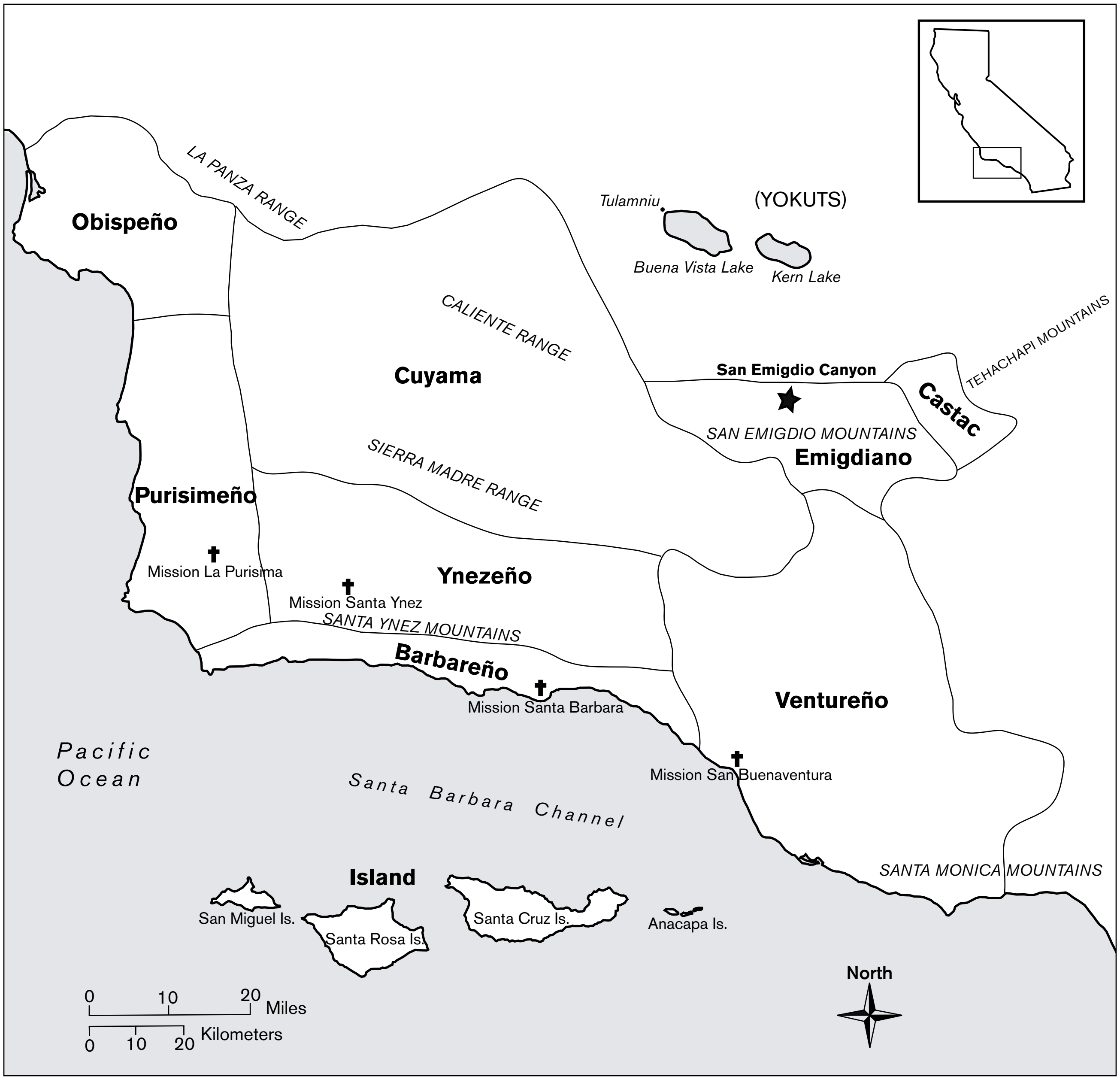

Figure 1. Map of south-central California showing outline of Chumash region with linguistic/cultural group divisions (after Grant 1978), Buena Vista Lake and Kern Lake, and San Emigdio Canyon.

seem to have had at times cooperative (or at least ambivalent) and at other times competitive relationships with one another. These factors must be considered when evaluating fish remains in the region, since changes in fish acquisition may potentially be as reflective of changes in the physical environment as of changes in the political climate. Given the apparent abundance of fish that were available from the lakes, it is also important to consider the likelihood that fishers selected preferred species from those they collected in their hauls, and thus temporal and perhaps even intersite variability may potentially be explained by differences in taste or preference. Furthermore, because taphonomic processes have variable effects on different inland fish taxa, some diachronic changes in species representation may be an outcome of differential preservation rather than a reflection of changes in fishing practices. In this paper, I present baseline ethnographic and archaeological information on fishing in the southern San Joaquin Valley region and discuss data on fish remains from a key interior Chumash village site, *Tashlipun* (CA-KER-188H), a neighboring site called Runaway Camp (CA-KER-6789), as well as summary data from several ancillary sites from the foothills to the south. A comparative analysis of these assemblages enables us to evaluate the importance of fish in the Emigdiano Chumash diet for the first time and to explore the diverse range of sociopolitical, cultural, environmental, and/or taphonomic factors that might be responsible for the changes in species abundance that are evident in the fish remains from the late prehistoric and colonial eras.

ETHNOGRAPHIC AND ARCHAEOLOGICAL DATA ON SOUTHERN SAN JOAQUIN VALLEY AND EMIGDIANO USE OF FISH

Ethnographic, historical, and archaeological sources all attest to the importance of fish in the diet of southern Valley Yokuts people. Fish were procured regularly and with apparent ease from the lakes, rivers, and sloughs of the region. The Yokuts acquired fish through a variety of techniques, including spearing/harpooning, trapping/corralling, and poisoning, but the use of nets, both large and small, was the key mode of fishing (Cook 1960; Gayton 1948; Latta 1977; Wallace 1978). Tule balsa rafts were also employed for acquiring fish from the deeper areas of lakes beyond the reedy margins, as well as for dragging nets and driving fish towards shore (Heizer and Elsasser 1980; Latta 1977; Wallace 1978). Tachi fishers at Tulare Lake cut a hole in the center of these rafts in order to spear fish in shallow waters (Latta 1977; Wallace 1978). Fishing was done by both small and large groups, with some accounts describing groups of 40 or more people engaged in diving for fish or working together to corral fish along the lake shoreline to be then collected with baskets (Gayton 1948:14; Latta 1977:219). Although waterfowl, shellfish, terrestrial game, acorns, and other plant resources were also crucial components of subsistence, fish were available year-round and were a regular, significant source of food.

Archaeological data confirm the importance of fish in the diet of many Valley occupants. Analyses of vertebrate remains at many sites have demonstrated that fish make up a substantial portion of the faunal assemblage (e.g., Barton et al. 2010; Fredrickson 1986; Hartzell 1992; Sutton et al. 2012), in some cases occurring more frequently than mammals and birds. There is considerable variation between faunal assemblages, which is probably explained (in part) by the relative proximity of sites to lakes, rivers, and/or sloughs; this is to be expected, given that these environments would have supported different quantities and types of fish. In many sites close to bodies of water, fish comprise the majority of the faunal assemblage, but some sites contain surprisingly small numbers of fish remains (e.g., CA-KER-180 in Hartzell 1992:281).

Analyses of fish remains from a growing list of southern San Joaquin sites have been instrumental in developing an understanding of the key fish acquired by Valley inhabitants (e.g., Gobalet 2004; Gobalet et al. 2004; Hartzell 1992). Compared to marine fisheries, there is a fairly small number of freshwater species available in the Sacramento-San Joaquin river system, and since these belong to several families and distinct genera, a large portion of fish remains can be identified accurately to the species level. Most sites also contain many vertebrae that can be identified only to the level of family (i.e., Cyprinidae); such specimens are not often included in percentages of taxon abundance, since many cyprinid specimens are successfully identified to the species level. Consequently, it is likely that the percentages of cyprinid species that are presented in many analyses under-represent the actual proportion of cyprinids present in the archaeological assemblages.

At nearly every site at which fish remains have been identified in the southern San Joaquin region, Sacramento perch (*Archoplites interruptus*) comprise the most abundant species identified. Though percentages vary between sites, a summary of data from 33 sites in the San Joaquin Valley and its environs found that the majority of identified elements were from Sacramento perch (Gobalet et al. 2004). At 18 Kern County and San Luis Obispo County sites, Sacramento perch were most abundant (64.2% of elements identified), followed by Sacramento blackfish (*Orthodon microlepidotus*, 18.7%), Sacramento sucker (*Catostomus occidentalis*, 6.2%), hitch (*Lavinia exilicauda*, 4.1%), tule perch (*Hysterocarpus traskii,* 2.9%), thicktail chub (*Gila crassicauda*, 2.6%), Sacramento pikeminnow (*Ptychocheilus grandis*, 0.7%), splittail (*Pogonichthys macrolepidotus*, 0.3%), hardhead

(*Mylopharodon conocephalus*, 0.28%), and marine fishes (0.07%; Gobalet et al. 2004:820, Table 4).

Several factors are responsible for the dominance of Sacramento perch in these assemblages. As discussed in more detail below, they were likely a highly sought-after and easily acquired species. Nonetheless, as the only centrarchids that were present in the San Joaquin Valley (and indeed west of the Rocky Mountains), their bones are quite distinctive compared to those of the Cypriniformes order and they are easily identified to the species level (Hash et al. 2015). Differential preservation attributable to the unique structure of centrarchid bones may also explain their proportional abundance in archaeological contexts (Hash et al. 2015). Through a controlled taphonomic study, Hash et al. (2015) found that centrarchid remains, including both vertebrae and other skull elements, preserved at a higher rate than those of cyprinids. Thus, part of their apparent dominance in so many archaeological contexts may be explained by taphonomic factors rather than by their being an accurate reflection of past consumption.

From this perspective, the frequency of Sacramento blackfish at so many San Joaquin region sites may have greater behavioral significance than was previously thought. Despite a comparative preservational disadvantage, it is often the most abundant identified cyprinid, and in some cases it even tops Sacramento perch. This occurred at CA-KER-39, the site of some of Wedel's (1941) excavations at Buena Vista Lake (Hartzell 1992:183), and one of the largest and most intensively occupied southern San Joaquin sites to be excavated. The abundant freshwater mussel (*Anodonta*) at this site (Hartzell 1992; Wedel 1941) may have contributed to comparatively higher levels of preservation, not unlike that documented at shellmound sites along the California coast. Because of these taphonomic factors, CA-KER-39 may be one of only a handful of sites in the region that gives us a representative picture of precontact fishing practices.

While sites along the lakeshore and sloughs are typically dominated by Sacramento perch, sites along the Kern River tend to contain higher numbers of Sacramento suckers, a species that favors running water (Barton et al. 2010; Hartzell 1992; Moyle 2002; Sutton 1992; Sutton et al. 2012). Given these data, we may generally infer the existence of river or creek exploitation from faunal assemblages containing larger numbers of suckers, whereas lake and/or slough exploitation is evinced by an abundance of Sacramento perch and Sacramento blackfish. Some degree of variation is expected, however, since it is likely that some populations exploited a variety of freshwater environments. Furthermore, ethnographic sources note that fish caught during particularly abundant hauls were often dried and traded, and thus some of the fish remains recovered from archaeological contexts could have been transported far away from their point of acquisition (Gayton 1948; Latta 1977; Wallace 1978).

FISH REMAINS FROM THE EMIGDIANO CHUMASH REGION

The Emigdiano village of *Tashlipun* (CA-KER-188H) is situated neither along a lakeshore, slough, nor major river, and thus it is perhaps somewhat unexpected to find large quantities of fish remains there. There seems to have been a high degree of dependence on fish at this site, however, as well as at the neighboring Runaway Camp site (CA-KER-6789).

Very little is known ethnographically about the Emigdiano Chumash, a group that is defined primarily on the basis of geography. Boundaries have been only approximated, but the Emigdiano region contains the mountains and north-flowing streams and stream drainages extending from the San Emigdio Mountains. It is defined on the north by a line from Grapevine to Maricopa, and is bordered by Castac Lake on the east and the Cuddy Valley vicinity on the south (Grant 1978:533). Grant summarized rather grimly that "there is literally no ethnological or archaeological information on the Emigdiano Chumash" aside from one brief story about a raid by the "Tejón (Emigdiano)" people on the *Muwu* Chumash (Grant 1978:534; Hudson et al. 1977; Johnson 2007). Although the situation regarding archaeological research has changed, the lack of ethnological or ethnographic data with descriptive references to pre-mission life is a pervasive hurdle. Basic elements of daily life, material culture, and ritual activities and beliefs can be gleaned from Harrington's (1942) culture element lists, which demonstrate an overall similarity between the Emigdiano Chumash and other Chumash groups, with a selective borrowing from or similarity to Kitanemuk culture. Thus prior to excavations carried out in the last few years, almost nothing was known about the precolonial Emigdiano diet and the role of fish within it.

Tashlipun, a historically-documented village site, sits at the mouth of San Emigdio Canyon, where San Emigdio Creek makes its way to the valley floor and formerly emptied into Buena Vista Lake (Fig. 1). Today the creek runs year round, and there are areas in the canyon where it feeds wetland habitats; thus it is likely that some of the fish remains recovered from San Emigdio Canyon sites came from these local sources. The creek is unlikely to have been an abundant source for fish, however, since it is fairly small (only a meter or two across and less than 30 cm. deep in most places), and excavation at another site located further up the canyon found very few fish remains (Bernard 2008). The quantity and type of fish and the presence of other lacustrine remains (e.g., waterfowl, turtle, freshwater mollusk) recovered there, however, suggests that Buena Vista Lake—which lay approximately 20 km. north of the site—and its surrounding wetlands provided a large portion of the subsistence for residents of San Emigdio Canyon for many centuries (Bernard 2008; Graesch et al. 2010). *Tashlipun* contains materials from as early as ca. A.D. 1200, during the Chumash Transitional period (A.D. 1150–1300), and appears to have been occupied on a seasonal basis through the Late (A.D. 1300–1782) and Historic or Colonial periods (post A.D. 1782), including the Rancho era (post A.D. 1834) when a ranch structure was built atop the site (Bernard 2008; Orfila 2005). Research carried out in the Emigdiano foothills suggests that *Tashlipun* and other residential settlements located at the mouths of the canyons that fed into the southern San Joaquin Valley were points of seasonal aggregation during the winter and spring months (Bernard 2008; Robinson 2010). During summer and fall, Emigdiano groups dispersed into the higher elevation areas to focus on acorn harvesting and to avoid the heat of the valley during the warmest portions of the year (Robinson 2010). Fish remains have been found at nearly every Emigdiano site at which excavations have been conducted, but the quantity and range of fish species at *Tashlipun* suggests that it was only during the occupation of these winter and spring settlements that Emigdiano people relied heavily upon fish and other lake resources.

The recovery of fish remains from excavations at *Tashlipun* and Runaway Camp is likely to be particularly high compared to other assemblages from the region, however, because of the collecting methods employed. At *Tashlipun* and Runaway Camp, all excavated materials were screened through 1/8-inch mesh screen (as they were at all of the other Emigdiano sites and many of the southern San Joaquin Valley sites), and all screen residue was collected, wet screened, and laboratory sorted (Bernard 2008). This mode of collection has been demonstrated to result in notably higher recovery rates for small items, including bones (Graesch 2009).

Faunal identifications were made by the author and Dr. Thomas Wake of the Cotsen Institute of Archaeology Zooarchaeology Laboratory at UCLA (Bernard 2008: Table 6.14). In total, we analyzed all faunal materials recovered from 18 proveniences (i.e., levels) from the San Emigdio Canyon sites: 12 from *Tashlipun* (representing 18.75% of the 64 proveniences excavated there), and 6 from Runaway Camp (representing 16.2% of the 37 proveniences excavated there). These samples came from multiple areas of each site, and (when feasible) multiple proveniences within each unit were analyzed in order to gain a more representative picture of diachronic change.

At *Tashlipun*, 57.7% (n = 9,809) of the 17,013 specimens identified to at least the class level is from fish. The proportion of fish remains is even higher among specimens identified more precisely than just to class, accounting for 91.8%. The latter value very likely overstates the importance of fishing, however, because the vast majority of specimens identified as fish are cyprinid vertebrae, which survive well and are easy to identify (n = 5,109). Fish remains are far more abundant at *Tashlipun* than at some sites located along the shore of Buena Vista Lake, such as CA-KER-116, where fish constituted only 34.3% of the remains identified to class level or below (although the use of ¼-inch mesh screens probably accounts for this low representation) (Hartzell 1992:250, 257). Nonetheless, they are less abundant than at other lakeshore sites, including CA-KER-39, which yielded 99% fish remains (Hartzell 1992:180), and the Big Cut site (CA-KER-4395), where fish made up 79% of the identified specimens (Sutton et al. 2012).

Although the Runaway Camp site is located less than 100 m. to the southeast of *Tashlipun*, subsurface investigations reveal that it is surprisingly different from its neighbor with respect to material culture and inferred subsistence strategies. Among these differences is a decidedly lower quantity of fish remains. At Runaway Camp, only 27% of the faunal remains identified to at least the class level are fish. As at *Tashlipun*, their quantities increase (to 54%) when only specimens identified more precisely than to just class level are considered.

Both of the San Emigdio Canyon sites contained far more fish remains than any of the sites in the Emigdiano foothills to the south, reinforcing the idea that residents at these canyon settlements were making use of resources from the lakes and/or valley wetlands rather than relying solely on creeks and other local bodies of water for access to fish. At these sites, most of which are also in the vicinity of creeks and even ponds, fish comprise between 0% and 6.8% of the NISP (Table 1). Based on the locations of these sites and the paucity of fish (and shellfish) remains recovered, it is reasonable to expect that they are more likely to reflect use of local water sources or at least minimal access to resources from the lakes and/or valley wetlands. Although a more detailed analysis of these faunal remains is forthcoming, and factors of seasonality almost certainly play a role in this patterning, it is clear that fish did not play a prominent role in subsistence at these locations.

In addition to work done at other sites in the foothills surrounding the valley (e.g., Culleton 2006; Gobalet et al. 2004; Siefkin 2002), the faunal assemblages from *Tashlipun* and Runaway Camp provide a perspective on the importance of fish at southern San Joaquin Valley sites that are not in the immediate vicinity of a major body of water (i.e., lake, slough, or river). Because faunal materials were dense (i.e., higher quantities per liter of soil excavated) and well-preserved, particularly at *Tashlipun*, and a large portion of the total faunal assemblage recovered from excavations was identified, this analysis is likely to provide a representative picture of the vertebrate component of Emigdiano diet, at least for that portion of the year that groups were assembled at these settlements. Furthermore, because *Tashlipun* was occupied over a long span of time, it is possible to assess changes in Emigdiano fish acquisition through the Transitional, Late, and Colonial periods. Interestingly, occupational debris at Runaway Camp is not nearly as temporally deep or intensive. This site contains low-density occupational materials from only the Late and Colonial periods. I have argued elsewhere that Runaway Camp was a satellite of *Tashlipun* that was occupied in the later portions of the Mission period by small numbers of people who successfully fled from the missions on the coast and found refuge in the interior (Bernard 2008; Bernard et al. 2014). This interpretation was based upon patterns of lithic raw materials and manufacture, and the types of trade items, like beads, present at the site. The fish assemblage (see below) provides further support for this conclusion. Thus, through an examination of long-term fish acquisition, as well as through a comparison between fish remains from *Tashlipun* and Runaway Camp, we can assess local changes in fish procurement and utilization from a longer-range perspective, and can interpret the latest forms of change within the historical context and evaluate the changes that context likely wrought in local patterns of resource use.

Table 1

PERCENTAGE OF NISP FOR FISH REMAINS FROM EMIGDIANO CHUMASH SITES[a]

Site	Site Number	Fish%
Pond	Ker-1635	4.67
Three Springs	Ker-3388	6.80
Chimney	Ker-5615	0.00
Pinwheel Cave	Ker-5836	2.94
Pinwheel Bedrock Mortars	Ker-5837	0.43
Santiago	Ker-5841	2.51
Los Lobos	Ker-7312	1.96

[a]Data from unpublished 2013 report by Matthew Armstrong, "Faunal Remains from CA-KER-1635, -3388, -5615, -5836, -5837, -5841, and -7312."

ANALYSIS OF FISH REMAINS FROM *TASHLIPUN*

Of the 19,191 bones that were examined from materials excavated at *Tashlipun*, 9,679 (50.4%) were identified as fish. *Tashlipun* contains two distinct cultural strata: the lower stratum contains materials from an exclusively precolonial occupation (ca. A.D. 1200–1700), while the upper stratum spans a period from ca. 1700 to the 1870s. The lower stratum contains a significantly higher density of cultural materials than the upper stratum, the interpretation of which is further complicated by the non-

Table 2

FISH REMAINS FROM KER-188H

	Post-A.D. 1700 Stratum				A.D. 1200–1700 Stratum			
	NISP		MNI		NISP		MNI	
Taxon	#	%	#	%	#	%	#	%
FISH (unidentified)	375				2,207			
Minnows and suckers (Cypriniformes)	84	10.8			301	4.8		
Minnows (Cyprinidae)	444	57.2	3	6.8	4,665	73.8		
Chub					6	0.1	2	1.5
Hitch	7	0.9	4	9.1	56	0.9	11	8.2
Hardhead	7	0.9	4	9.1				
Sacramento blackfish	28	3.6	9	20.5	773	12.2	91	67.9
Splittail	2	0.3	1	2.3	8	0.1	4	3.0
Sacramento pike minnow	1	0.1	1	2.3	3	<0.1	2	1.5
Suckers					10	0.2		
Sacramento sucker	51	6.6	6	13.6	93	1.5	4	3.0
Sacramento perch	152	19.6	16	36.4	398	6.3	18	13.4
Tule perch					8	0.1	2	1.5
Total fish	**1,151**				**8,528**			
Total identified	**776**		**44**		**6,321**		**134**	

native Rancho-era settlement. The majority of the fish remains (n=8,528 or 88%; see Table 2) came from the A.D. 1200–1700 stratum, and fish appear to have been the primary source of animal food during this period, comprising 93% of the identified faunal assemblage (i.e., faunal specimens identified more precisely than just to class; see Table 3). In the post-1700 assemblage, fish comprise 83% of the identified assemblage, suggesting a small decline in reliance on that resource (Table 3).

Despite this slight difference in quantity, it seems clear that fish dominated the vertebrate component of the diet throughout the occupation at *Tashlipu*n, and there are many similarities in the fish taxa present in both strata (Table 2). As is typical throughout the Valley, all of the identified fish species are cyprinids, except for Sacramento perch, Sacramento sucker, and tule perch, and cyprinids comprise the most abundant taxon in both strata.

When only specimens identified to species level are considered, however, more interesting patterns emerge. The predominant species in the A.D. 1200–1700 stratum is Sacramento blackfish, followed by Sacramento perch, Sacramento sucker, and hitch (Table 2). Although MNI is an imperfect means of quantification, these values may be particularly illustrative, as they demonstrate the relative abundance of specimens identified to species (and are, indeed, largely in line with the NISP values). Sacramento blackfish accounts for 67.9% of the total MNI, while Sacramento perch, which is so frequently the dominant species at San Joaquin Valley sites, accounts for just 36.4% of the total MNI. In the post-1700 stratum, however, the tables are turned: Sacramento perch is the most abundant species and Sacramento blackfish declines notably, with a smaller NISP percentage than

Table 3

COUNTS AND PERCENTAGES OF FAUNAL SPECIMENS IDENTIFIED MORE PRECISELY THAN TO LEVEL OF CLASS AT KER-188H

	Post-A.D. 1700 Stratum		A.D. 1200–1700 Stratum	
Taxon	#	%	#	%
Fish	776	82.8	6,321	93.1
Amphibians			1	<0.1
Reptiles	14	1.5	82	1.2
Birds	5	0.5	13	0.2
Mammals	143	15.3	374	5.5
Total	**938**		**6,791**	

Table 4

VERTEBRATE FAUNAL REMAINS FROM KER-6789

	Mission Period				A.D. 1400–1600			
	NISP		MNI		NISP		MNI	
Taxon	#	%	#	%	#	%	#	%
FISH (unidentified)	49				115			
Minnows (Cyprinidae)					12	21.4	2	22.2
Hitch					1	1.8	1	11.1
Sacramento sucker					2	3.6	1	11.1
Sacramento perch	18	100	5	100	41	73.2	5	55.6
Total fish	**67**				**171**			
Total identified	**18**		**5**		**56**		**9**	

Sacramento sucker. By both measures (NISP and MNI), percentages of Sacramento sucker are notably higher in the post-1700 stratum (Table 2). Small numbers of some species occur only in the post-1700 stratum (hardhead) or the A.D. 1200–1700 stratum (chub [*Gila* sp.] and tule perch). Although the quantities of most of these are too small to interpret with confidence, it is worth noting that several species that most typically inhabit streams rather than lakes or slow-moving rivers occur either in larger percentages (i.e., Sacramento pike minnow and Sacramento sucker) or exclusively (i.e., hardhead) in post-1700 deposits (Moyle 2002).

These data demonstrate a heavy reliance on fish from the now-drained lakes of the southern San Joaquin Valley, as well as from the local streams that fed them. In the A.D. 1200–1700 stratum, fish constitute a larger percentage of the faunal assemblage relative to the post-1700 stratum, and fishing efforts appear to have been oriented predominantly toward the capture of Sacramento blackfish, which is likely to have been the most (or at least one of the most) abundant species present in the lakes (Moyle 1976:183; 2002:145). The fish assemblage in the post-1700 stratum reveals a comparatively greater emphasis on Sacramento perch, another species common to lake habitats, and a more diverse fish assemblage overall. This includes a greater incorporation of fish that would have been most abundant in streams, particularly Sacramento sucker (Moyle 2002). Thus, in the post-1700 stratum, San Emigdio Canyon residents were eating less fish overall and obtaining a greater number of fish from more localized stream habitats. They also appear to have caught greater numbers of Sacramento perch than Sacramento blackfish during this period.

ANALYSIS OF FISH REMAINS FROM RUNAWAY CAMP

Cultural materials, including faunal remains, are far less dense at Runaway Camp than they are at *Tashlipun*. Furthermore, levels of fragmentation are greater than those observed at *Tashlipun*, resulting in a larger number of unidentified specimens. Here only 1,139 animal bones were identified to the class level or below, and only 21% of those were identified as fish (n=238; see Table 4). Like *Tashlipun*, Runaway Camp contains two fairly distinct cultural strata, although together they span a much smaller range of time than at *Tashlipun*. The earlier stratum at Runaway Camp contains only precolonial materials and dates to ca. A.D. 1400–1600. This is separated from a thin veneer of Mission/Historic-era (ca. A.D. 1769–1834) deposits by a thin, sterile layer of sand. Occupation of Runaway Camp was never as intense as at *Tashlipun*, and the site appears to have been utilized by small numbers of people for more discrete periods of time. Nonetheless, because it does not contain the Rancho-era materials that complicate the interpretation of later *Tashlipun* deposits, it provides an important source of data about indigenous life in the Mission era. Furthermore, comparing the materials from this Mission-era occupation to the later deposits at *Tashlipun* reveals many interesting differences in both foodways and other

Table 5

COUNTS AND PERCENTAGES OF SPECIMENS IDENTIFIED MORE PRECISELY THAN TO LEVEL OF CLASS AT KER-6789

	Mission Period		A.D. 1400–1600		Total	
Taxon	#	%	#	%	#	%
Fish	18	42.9	56	58.3	74	53.6
Amphibians	0	0.0	0	0.0	0	0.0
Reptiles	1	2.4	1	1.0	2	1.4
Birds	3	7.1	10	10.4	13	9.4
Mammals	20	47.6	29	30.2	49	35.5
Total	**42**		**96**		**138**	

aspects of culture, since (as noted above) the Mission-era component may have been produced by non-Emigdiano native groups who came to the region after fleeing from the missions (Bernard 2008; Bernard et al. 2014). Most of the fish remains (n=171; 72%) came from the A.D. 1400–1600 layer (Table 4), and fish appear to have been the key source of animal food during this phase, comprising 58% of the identified faunal assemblage (i.e., faunal specimens identified more precisely than to the level of class; see Table 5). In the Mission-era occupation, however, fish quantities declined to 43%, comprising less of the faunal assemblage than mammals and evidencing the lowest reliance on fish seen in any San Emigdio Canyon component (Table 5). Fish were thus the second most abundant class overall at Runaway Camp. MNI counts show fewer individual fish than mammals in both strata, and the total number of fish specimens (n=238) is considerably lower than that of mammals (n=642).

Compared to *Tashlipun*, species diversity is much lower at Runaway Camp, although this pattern may be attributable to the significantly smaller quantity of faunal remains recovered from this site. In the A.D. 1400–1600 stratum, Sacramento perch dominate the fish assemblage (Table 4). Cyprinids, including hitch, and Sacramento sucker are present as well, but in much smaller quantities (Table 4). In the Mission-era stratum, we identified only Sacramento perch, but it is likely that some of the unidentified fish specimens were cyprinids. Considering MNI and NISP values, there appears to be continuity in the abundance of Sacramento perch across strata, but there is a decline in the total number of fish and the number of cyprinids in the Mission-era stratum. Sacramento blackfish, which was so abundant only a hundred meters away at *Tashlipun*, is notably absent at this site.

INTERPRETING DIFFERENCES IN FISH ASSEMBLAGES

Overall, at *Tashlipun*, Sacramento blackfish dominate the fish assemblage in the A.D. 1200–1700 stratum, while Sacramento perch and suckers become more abundant in the post-1700 stratum. Across the creek at Runaway Camp, Sacramento blackfish are entirely absent, and Sacramento perch are the most common, with fish becoming overall less significant in the Mission-era deposits. This suggests a general trend away from Sacramento blackfish and toward Sacramento perch, especially post A.D. 1700. Interpreting this trend is not a simple endeavor: the process by which fish remains became a part of the archaeological record was complicated by the variety of cultural, environmental, taphonomic, and other forces involved. With this complexity in mind, there are several possible explanations for this apparent trend, and for the differences between the *Tashlipun* and Runaway Camp assemblages.

Factors of Identification and Preservation

Because faunal identifications are likely to be more consistent when made by a single analyst (Gobalet 2001), some patterns may be due in part to the fact that identifications were made by two different individuals. Nonetheless, this overall trend does not appear to be the result of variability in identification, since the same patterns emerged in post-1700 stratum samples examined by both analysts (Bernard 2008).

Variables of preservation may be far more significant in driving this pattern. As mentioned above, several factors predispose Sacramento perch to having an inflated representation in archaeological deposits. It is possible that since the faunal assemblage for the post-1700 *Tashlipun* and Runaway Camp deposits is less dense and generally more fragmented, we identified Sacramento perch bones in greater numbers because they are easier to identify to the species level than those of cyprinids. Further, experimental research demonstrates that Sacramento perch bones consistently preserve better than cyprinid bones in San Joaquin Valley contexts, and thus differential decomposition rather than actual fishing practices may be far more responsible for the apparent abundance of Sacramento perch at many sites, including the San Emigdio Canyon assemblages (Gobalet 2008; Hash 2008; Hash et al. 2015).

It is thus possible that there was no significant inter-or intra-site difference in fish acquisition, and that the apparent decline of Sacramento blackfish in later deposits is merely an artifact of differential preservation. This would suggest that the A.D. 1200–1700 deposits at *Tashlipun* provide a much more complete picture of Emigdiano fishing and/or fish use (and perhaps even southern San Joaquin Valley fishing behavior in general) than many of the other assemblages considered here, and that Sacramento blackfish were often the most common fish acquired. However, the fact that there are diachronic and intra-site differences in other types of material culture that are less subject to decomposition (i.e., lithics and beads) suggests that several forms of cultural change did indeed occur (Bernard 2008; Bernard et al. 2014). As a result, it is important to consider potential behavioral factors that may have been responsible for this apparent shift in fishing or fish acquisition practices.

The Politics of Access

The apparent shift from Sacramento blackfish to Sacramento perch may instead have been driven by changes in how fishing was performed, and thus may have been affected by a range of issues related to fishing technology and/or the way in which fish were acquired. Given the fact that the large majority of fish remains present at the Emigdiano sites analyzed here are likely to have come from a source that is within a region historically associated with a different cultural group (i.e., the Yokuts), issues related to access to the lake and its resources should be considered critically rather than simply presumed.

Ethnographic and historical data reflect the fact that among the Yokuts, fishing was performed by men individually or in small groups, as well as during larger, more communal collection events (Gayton 1948; Latta 1977). Although we can presume that most fish were eaten fresh by residents who lived near the lakes, ethnographic accounts also refer to the practice of drying fish (Gayton 1948; Latta 1977; Wallace 1978). Steelhead, as well as other fish, were sometimes smoked and dried in large numbers and could thus be preserved, stored, and traded (Latta 1977:511). Given the potential for lakeside residents to easily acquire surplus quantities of fish, it is possible that those who lived at sites farther away from the lakes may have acquired their fish—either fresh or dried—through trade rather than from engaging in fishing themselves; indeed, some historical accounts document the trading of fish (Latta 1977:729; Phillips 2004:14). Other lacustrine and wetland/riverine resources (e.g., freshwater mussel, waterfowl, paleobotanical remains) have been recovered from San Emigdio Canyon sites, suggesting that these habitats were accessed directly by some Emigdiano groups, but this would not necessarily preclude the possibility that changes in *Yokuts* practices (either with respect to fishing or exchange) were responsible for some aspects of the evident shift.

Following these points, it is necessary to consider issues related to permission and access to Buena Vista Lake. The lakes were capable of supporting high population densities, but it is likely that access to their resources was not necessarily given freely and without concern. An account of trade between the Yokuts at Tulare Lake and "bead and seashell traders from the coast" states that locals protected access to the lake—they "would not let the people from the west come right up to the lake. They were afraid they would learn how to get things without trading" (Latta 1977:728). Given the size of Buena Vista Lake, which at its maximum would have covered approximately 150 square miles in surface area (Lynch 2009), it is difficult to speculate on how access to the lakes and their resources would have been managed and monitored, but since relationships between *Tashlipun* residents and southern Yokuts groups were anything but stable, it is likely that access or permission to use the lake was contingent on amicable political relationships. Ethnographic and historical data suggest that complicated and fluctuating relationships existed between people at *Tashlipun* and the Yokuts groups living in the southern San Joaquin Valley. Some oral historical accounts collected by Harrington suggest that there was endemic conflict between these groups in the form of feuding, poisoning, and murder, often fueled by "jealousies of the chiefs" (Johnson 2007; King 1982:182–183). However, historical accounts that describe intermarriages between such groups (Johnson 2005), and episodic alliances in conflicts against the Spanish and other Chumash groups, suggest that inter-village and inter-group relationships were anything but fixed, and likely fluctuated in light of specific circumstances.

Considering the variable political relationships between these groups, then, it is possible that the change in fish species represented reflects a shift in how the lake could be accessed by Emigdiano groups who almost certainly had less secure claims to its resources. Although both Sacramento blackfish and Sacramento perch spawn in the spring-summer and are likely to have occurred in large numbers in many areas of the lake (Moyle 2002), they may not have been uniformly represented in all lake habitats. Sacramento perch are characteristically found in lake habitats containing "beds of rooted, submerged and emergent vegetation," and are mainly found in shallow, inshore areas (Moyle 2002:378). Their movements are described as "sluggish," and they occur in sloughs and slowly-moving rivers, as well as in lakes on the valley floor (Moyle 2002:378–379). Thus, they would have been easily acquired along the lake margins. Sacramento blackfish, while also inhabiting warm, shallow, slow-moving (or still) waters, are noted to vary in habitat (Moyle 2002). Younger fish occur in small schools close to the shore, while older fish school in large stretches of open water, away from the shore (Moyle 2002:29, 145). Thus, it is possible that different fishing methods would have been optimal for capturing the two species. The largest Sacramento blackfish would have been more easily (although not exclusively) acquired using tule rafts, which were known to have been used by the coastal Chumash and by the Yokuts who lived near the large interior lakes—and thus possibly by the Emigdiano Chumash as well.

The apparent shift from Sacramento blackfish to Sacramento perch, then, may reflect a change in how readily the Emigdiano Chumash were able to access lake environments. Perhaps during a phase in which they were allowed greater access to the lake, they could exploit a variety of habitats and use watercraft to pursue a number of fish species, including Sacramento blackfish. An emphasis on Sacramento perch might reflect a more limited access to the lake's shoreline and its surrounding sloughs. The fact that percentages of Sacramento suckers—which are typically found in flowing waters, including streams and creeks (Moyle 2002:186)—rise along with those of Sacramento perch at *Tashlipun* lends support to the idea that there was less use of deeper lake habitats and perhaps an increased use of more local creek sources of fish during this time (Table 2).

The general decline in the role of fish in subsistence in the Mission-era occupation at Runaway Camp may also be related to politics. If permission was necessary in order to access the lakes and their resources, and if Runaway Camp was indeed occupied by mission refugees with a range of cultural and political backgrounds, perhaps the inhabitants of Runaway Camp lacked the political ties needed in order to regularly acquire fish and other resources from the valley floor. Indeed, analysis of other faunal and paleobotanical remains from Runaway Camp reflects a comparatively greater use of canyon and foothill/mountain resources than does *Tashlipun* (Bernard 2008; Popper 2007). The notion that changes in fish assemblages were related to factors involving permission and access is admittedly speculative and difficult to prove convincingly with data from just a handful of sites, but the political aspect of habitat access is an important variable that should be considered in interpreting changes in the exploitation of fish.

A Shift in Productivity

The apparent shift from Sacramento blackfish to Sacramento perch may also be related to environmental changes, which would have directly affected the availability of these particular fish species in the lakes, as well as in rivers, sloughs, and streams. Local climatic fluctuations are likely to have played a role in the relative abundance of these species over the last few thousand years. In general, Sacramento perch seem to be less susceptible to changes in lake conditions. Although

Sacramento blackfish are also able to withstand extreme environments and are known for their ability to tolerate low oxygen conditions and warm temperatures and thus survive during periods of drought or low flow (Moyle 2002:145), Moyle describes situations in which Sacramento blackfish regularly experienced large scale die-offs in some regions, caused by patterns of algae consumption and/or by a failure to survive fluctuations in temperature or oxygen levels when weakened after spawning (1976:184). No such occurrences are specified for Sacramento perch, which are instead renowned for their ability to withstand significant fluctuations in turbidity, temperature, alkalinity, and salinity (Moyle 2002:378). Thus, during changes in the lake environment itself, Sacramento perch would have been more likely to survive and become the key food-fish available for indigenous populations to exploit.

Hartzell (1992) used archaeological data to evaluate variability in the depth and productivity of Buena Vista Lake over the last 8,000 years, and concluded that the most favorable climatic conditions for the lake occurred between ca. A.D. 1 and 1000, when Sacramento blackfish quantities are particularly high (Hartzell 1992:309). According to Hartzell, occupation at lakeshore sites declined after ca. A.D. 1000, as the warm/dry conditions of the Medieval Climatic Anomaly (roughly A.D. 900–1350) reduced the lake volume, making it more shallow and alkaline. During later periods of occupation (255–130 B.P.), Sacramento perch were again found in greater numbers (Hartzell 1992:313). These patterns somewhat fit what we observe in San Emigdio Canyon, but the Emigdiano sites provide diachronic data of somewhat higher resolution for the last millennium than are available from Hartzell's assemblages. Given Hartzell's findings, it is possible that the apparent decline in Sacramento blackfish in later periods of occupation simply reflects the recession of the lake and a decline in its ability to support that particular species. If this change in the lake environment corresponded with the Medieval Climatic Anomaly, however, it is surprising that the decline in Sacramento blackfish is not really apparent until after A.D. 1700, particularly since Culleton's (2006) data suggest that aquatic habitats in the region expanded significantly after ca. A.D. 1300. While other fish assemblages from the region also show larger numbers of Sacramento perch in sites occupied during later phases of prehistory (e.g., Big Cut Site, CA-KER-4395 [Sutton et al. 2012]; Bead Hill site, CA-KER-450 [Barton et al. 2010]; Siefkin 1999), additional analyses of fish remains from lakeshore sites occupied during this crucial period of time may be useful in evaluating the long-term impact of these climatic changes on local subsistence.

Changes in Food Preferences

Despite possible reductions in the lake's size and productivity during the Middle and Late periods, Buena Vista Lake supported a thriving fishery in the colonial era (Gayton 1948:49) and even into the 1950s (albeit one increasingly dominated in the twentieth century by introduced species; see Lynch 2009). Many types of fish were abundant, and thus an alternative interpretation of the apparent replacement of Sacramento blackfish by Sacramento perch is that it may reflect a shift in preference instead of simple availability. Archaeologists typically emphasize objective factors like meat yield and ease of capture in evaluating changes in species acquisition. Subjective matters of taste are, of course, culturally, temporally, and indeed individually variable, but they are also worthy of consideration in this case. If fish were as abundant and easy to acquire as the historical sources suggest, it would have been easy for people to select for preferred species within their netted catches or through targeted fishing practices. The fish we recover archaeologically therefore may not simply reflect which species were most available, but rather which species were most preferred. It may be the case that a cultural preference for Sacramento perch emerged later in time, and that Sacramento blackfish fell out of favor among the Emigdiano and perhaps other valley residents.

The food quality of these species is somewhat difficult to assess. There is limited access to Sacramento perch and blackfish at present because of lake drainage and significant declines in native fisheries of all forms, and thus few people alive today have actually consumed both of these species and can therefore comment knowledgably on their flavor, texture, and ease of preparation. We can derive some insight into their food quality and palatability from historical accounts, as well as from the opinions of contemporary individuals who have obtained them from aquaculture enthusiasts who are now raising native California species. Such sources depict Sacramento perch favorably, describing them as "delightful," "sweet," and "the best eating fresh water fish of all time" (Jon Parr, personal communication). In the 1886 report of the Commissioners of the Fisheries of the State of California, Buckingham et al. (1886:6) describe the fish as "regarded by many who claim to be good judges as the best flavored and most palatable fish found in the inland waters of California." Other contemporary accounts refer to them as "much esteemed as a food-fish" (Henshall 1903:58).

Sacramento blackfish, however, seem to have a more limited appeal. As Moyle mentions, Sacramento blackfish are sold live in fish markets in San Francisco's Chinatown (1976:185) and in other California cities (2002:146), and some sources suggest that they were popular recently among Chinese and Jewish populations in San Francisco and Sacramento (Li and Mosman 1977). They are "prized for their culinary qualities" among at least some groups, and thus have been harvested in large numbers from contemporary lake and reservoir habitats (Moyle 2002:146). They are described as having "a sweet flavor but they are also rather bony" (Hallock 1949). This opinion is echoed by those who remember eating Sacramento blackfish in the 1970s and/or claim to have eaten them recently, and who describe their boniness as a prohibitive factor.[1] While additional sources are needed in order to have a truly comprehensive assessment of their relative palatability, my reading of these and other contemporary personal accounts regarding their taste is that the Sacramento perch has a far broader appeal.

It is dangerous to extrapolate from the preferences of others to Emigdiano and indigenous interpretations of taste, but a convincing case can be made that these two species are at the very least qualitatively *different* in terms of palatability, and thus a shift in their abundance may indeed have been driven by a change in preference. If one takes the perspective that the Sacramento blackfish was a less desirable fish, it is interesting to contemplate the shift to Sacramento perch in terms of the political considerations given above. Perhaps higher numbers of Sacramento perch are actually a reflection of more amicable political relationships with the Yokuts who granted access to the lakes (or supplied fish from them). In this view, if Emigdiano people were indeed directly fishing from the lake, the need to use watercraft to access the deeper portions of the lake would have reflected (ironically) more politically marginal access to lake resources.

Differences in taste or preference may also account for the differences that exist between the Mission-era Runaway Camp fish assemblage and the latest deposits at *Tashlipun*. In the later deposits at Runaway Camp, the number of fish remains is significantly lower than in all the other San Emigdio components, and only Sacramento perch is present. If the inhabitants of Runaway Camp at this time were indeed from coastal groups that had fled the missions, this lower number perhaps reflects a lack of interest in the range of freshwater species available in this inland region, either because such species were unfamiliar or because they were simply undesirable.

THE COMPLEXITIES OF INTERPRETING PAST FISHING BEHAVIOR IN THE EMIGDIANO REGION

The many factors considered above make it difficult to develop a clear picture of Emigdiano fishing practices and the degree to which they changed over the last thousand years. We can conclude with a high degree of confidence that San Emigdio Canyon residents relied on fish for a significant portion of their diet and that the fish they ate came from Buena Vista Lake and probably from local creeks as well, emphasizing Sacramento perch and Sacramento blackfish and including a range of other freshwater species.

Beyond this, our ability to either demonstrate or attempt to explain true change in fishing practices is limited. Although there appears to have been a shift in emphasis from Sacramento blackfish in the earlier strata to Sacramento perch in the post-1700 strata, the change may be merely an illusory result of differential preservation. If this shift did indeed occur, it may have been driven simply by fluctuations in the size and productivity of the lake environment. When we situate the fish remains within the specific cultural, political, and historical context, issues of access and permission emerge as additional variables that may have spurred changes in the way in which fish were most likely to be acquired. Finally, the elusive factor of taste preferences provides yet another reason why there may have been a change in the fish species taken from the lake. Fortunately, many of the possible explanations suggested here are mutually exclusive, and thus the potential exists to evaluate them further utilizing larger sample sizes and data from additional sites.

Despite the blurred explanation that results, it is nonetheless important to consider the full tapestry of factors responsible for the fish remains present in archaeological assemblages. The abundance, availability, acquisition, consumption, and preservation of particular species make the most straightforward contributions to the formation of an archaeological fish assemblage. Nonetheless, a range of less-concrete elements, such as politics, preference, and permission, also play important determinative roles. These variables are all the more compelling in the San Emigdio case, because the locale is situated near the boundary between two distinct cultural/linguistic groups and lies at a significant distance from the main source from which fish were acquired. The interpretation of past behavior in this unique situation necessarily involves a consideration of a complex web of cultural, historical, and political factors. Interpreting fish remains in any cultural context, however, is likely far more complex than we often recognize. Fishing was an everyday practice for a large number of native Californians, and it created a context within which people did far more than merely acquire necessary resources. Fishing also provided a setting for developing and negotiating interpersonal relationships and building individual statuses and identities. As archaeologists, we see the broad results of the fishing efforts and decisions made by hundreds—perhaps even thousands—of individuals over long spans of time, and although the intentions, motivations, and decisions of those people are obscured by time (and taphonomy), it is important to consider the full range of social, political, economic, and ideological factors that underlay their everyday behaviors with respect to fishing practices. Intertwined with so many aspects of culture, fish remains reflect far more than just subsistence.

NOTES

[1]Sacramento blackfish seem to have either been renamed in markets and on menus as "steelhead" (not to be confused with steelhead trout), "Soong yue" or "Soon Yee," and/or replaced by the introduced species American shad (*Alosa sapidissima*). Anything called "blackfish" is apparently rare today, and the selling of so-called "steelhead" is also rare, presumably because of palatability issues. The tone of comments on a web discussion about blackfish/steelhead describe them unfavorably as "a boney fish," desirable only if you can "get someone else to do the work of filleting it." One poster summarizes it most disparagingly as a "fresh water 'trash' fish" (http://chowhound.chow.com/topics/39200). One person who claims to have found a source of live Sacramento blackfish describes it as having a "sandpaper" like quality because of the abundance of small bones, but also mentions it having a mild, "buttery soft" texture with "minimal freshwater taste" (post by alfredcd at http://chowhound.chow.com/topics/573124).

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