Title
Cooking Features of Coastal
Hunter-Gatherer-Fishers
in Baja California, Mexico

Journal
Journal of California and Great Basin Anthropology, 39(1)

ISSN
0191-3557

Authors
Ibarra, Enah M. Fonseca
Ainis, Amira F.
GuÌa-RamÌrez, Andrea

Publication Date
2019

Peer reviewed

Journal of California and Great Basin Anthropology | Vol. 39, No. 1 (2019) | pp. 43–58

Cooking Features of Coastal Hunter-Gatherer-Fishers in Baja California, Mexico

ENAH M. FONSECA IBARRA
Instituto Nacional de Antropología e Historia, Mexico

AMIRA F. AINIS
Department of Anthropology/Museum of Natural and Cultural History,
University of Oregon, Eugene, OR 97403

ANDREA GUÍA-RAMÍREZ
Instituto Nacional de Antropología e Historia, Mexico

We present results from excavations at several shell midden sites in the region of Bajamar-Jatay, along the northwest coast of Baja California, Mexico. The morphology of stone cooking features is discussed in connection with potential uses and associated faunal remains, which indicate a diet based on the exploitation of nearshore marine resources. Under the assumption that differential consumption of harvested food resources may have influenced the type of heated stone structures used for cooking and processing, we suggest that the morphological differences between heated stone features are not random. The structure and style of a heated-rock cooking feature may be related to the types of foods that were prepared and the methods used to cook them. Ethnographic information supplements the archaeological data provided here and further supports our interpretations.

Hearths and other heated-rock cooking structures often form the primary features uncovered in hunter-gatherer sites around the world (e.g., Black and Thoms 2014; Thoms 2008, 2009; Wandsnider 1997). Stone heating elements were likely used by the earliest inhabitants of the New World, and securely dated features extend back to at least 10,000 years ago in western North America (Leach et al. 2006; Thoms 2009). The use of heated stones for cooking is evident in a variety of forms, from simple clusters to elaborate earth ovens (Black and Thoms 2014), and a proliferation of these structures throughout the Holocene has been utilized as an indicator of land-use intensification through time (Ames 2005; Blackhouse 2010; Milburn et al. 2009; Thoms 2003).

Temporal and spatial distributions of heated-rock structures have been studied by Waechter (2005) and Milburn et al. (2009) in southern California. Roasting pits interpreted as earth ovens in which agave (*Agave deserti*) was roasted are reported in large numbers in the eastern foothills of San Diego County (Castetter et al. 1938; Christenson 1981; Cook and Fulmer 1981; Laylander 2014; Schaefer et al. 2014).

A variety of rock structures have also been reported across the Baja California peninsula (Bulhusen and Fujita 2015; Des Lauriers 2010; Drakíc et al. 2007; Drakíc and Delgado 2010; Figueroa 2009; García et al. 2016; Gruhn and Bryan 2009; Moore 1999, 2010; Ovilla and García 2008; Porcayo 2012, 2014; Porcayo et al. 2016; Ritter 1979, 2008; Ritter and Aceves 2006; Vázquez 2015). Macrobotanical studies indicate that juniper seeds and agave stalks were processed in hearths (Des Lauriers 2010:71–72) and roasting platforms (Moore 2010:237). In some of these features, concentrations of charcoal and bones of marine and freshwater fish were found, as well as the bones of birds and small-sized terrestrial mammals (Porcayo et al. 2016:41–42).

Even though heated-rock cooking structures are informative indicators, studies from the Baja California peninsula are limited, especially published examples. Field reports that mention heated-rock features subsume a variety of forms under the term "*fogón*" (hearth), even though they have different morphologies and are found in association with diverse archaeological indicators and/or dissimilar vegetative communities (Drakíc et al. 2007; Drakíc and Delgado 2010; Ovilla and García 2008).

As in other regions, a unifying nomenclature defining various forms of heated-rock features is needed, as are specific studies focused on understanding and interpreting these cultural remains as part of a technology imbued with behavioral information concerning hunter-gatherer lifeways (Black and Thoms 2014).

Two primary cultural complexes have been identified along the northwest coast of Baja California: (1) the La Jolla complex, which was characterized by a proliferation of coastal camps, or shell middens, during the Archaic period (8,000–1,500 years B.P.), and (2) the Yuman complex, whose people occupied coastal areas but also settled in the valleys and the mountains. The Yuman complex has been identified as having a different subsistence pattern from that of its predecessor and dates to the Late Prehistoric phase (1,500–150 years B.P.; Laylander 1987; Moriarty 1966; Rogers 1945).

In this paper, we describe a variety of hearth designs and other constructed stone features from coastal sites along the northwestern coast of Baja California, Mexico. These features are found predominantly in shell midden contexts, and they involve a variety of styles and sizes. Collectively, the features we discuss are composed of fire-affected rock occurring in a variety of morphological forms of diverse sizes, and which were likely utilized in the preparation of food. In addition, we suggest a range of fuels that were probably utilized, and analyze their distribution and their relationship to dietary fauna harvested along the northwestern coast of the peninsula. We include ethnographic and ethnohistoric accounts for comparisons with archaeological features and discuss aspects of use that were not likely to leave traces.

Milburn et al. (2009) emphasized the importance of differentiating hearths from heated-rock cooking structures by defining the cooking methods used with each type of cooking platform; e.g., was food cooked by direct contact with heated rocks but not flames, or cooked in direct contact with open flames (Milburn et al. 2009)? They propose distinguishing the following categories: (1) hearths, and (2) heated-rock cooking features (earth ovens and grills), with hearths being defined as "open-air, mostly non-rock, thermal structures used to cook foods above flames, placed on coals, or contained in ceramic or stone vessels" (Milburn et al. 2009:16). Earth ovens, on the other hand, are defined as "facilities that indirectly bake foods placed on rock 'cooking platforms' constructed above fires in subsurface pits" (Milburn et al. 2009:3). One subcategory of the earth oven is the stone-lined firing pit oven, characterized as "firing pits lined with granitic cobbles, slabs, or small boulders, single-course cooking platforms, and firing concavities…" (Milburn et al. 2009:3). In addition, heated-rock cooking features include grills, which are structures that "contain mostly single-course stone cooking platforms and relatively shallow unlined firing depressions…" (Milburn et al. 2009:4).

In this paper, we employ several subcategories of food cooking facilities as defined by Milburn et al. (2009) to create a typology of archaeological thermal features uncovered in open-air sites in the Jatay area. Based on these criteria, hearths are defined here as Type A, grills as Type B, and stone-lined firing-pit ovens as Type C. In addition, we define a fourth type of heated rock feature that does not conform to any of the previous varieties, and which we have termed "Type D." Type D heated-rock cooking features consist of a group of stones delimiting a circumference within which other rocks are purposely placed (see below). Morphologically, Type D features differ from grills (Type B) in that they are more compact, with a clearly delimited circumference, and they differ from hearths (Type A) in that heated rocks fill the interior of the feature.

MATERIALS AND METHODS

Study Area

This paper describes archaeological features and materials from three coastal sites located in the Bajamar-Jatay area, 63 km. (39 mi.) south of the Tijuana international border (Fig. 1). Bajamar-Jatay is a particularly interesting area for the study of archaeological coastal camps[1] on the Baja California peninsula due to the large number, high concentration, fairly good preservation, extensive chronology, and diversity of archaeological sites present (Drakíc et al. 2005; Drakíc et al. 2007; Drakíc and Delgado 2010; García 2013; Hernández and Schoerberg 1993a, 1993b; Ovilla 2013; Ovilla and García 2007, 2008; Reina 1994, 1995; Rojas 2009; Serrano 1992, 1993). The Bajamar-Jatay coastal region includes a mosaic of diverse shell midden sites, revealing the presence of various groups of hunter-gatherer-fisher peoples who inhabited the northern part of the peninsula throughout at least the past 10,000 years (Gruhn and Bryan 2009), but probably longer.

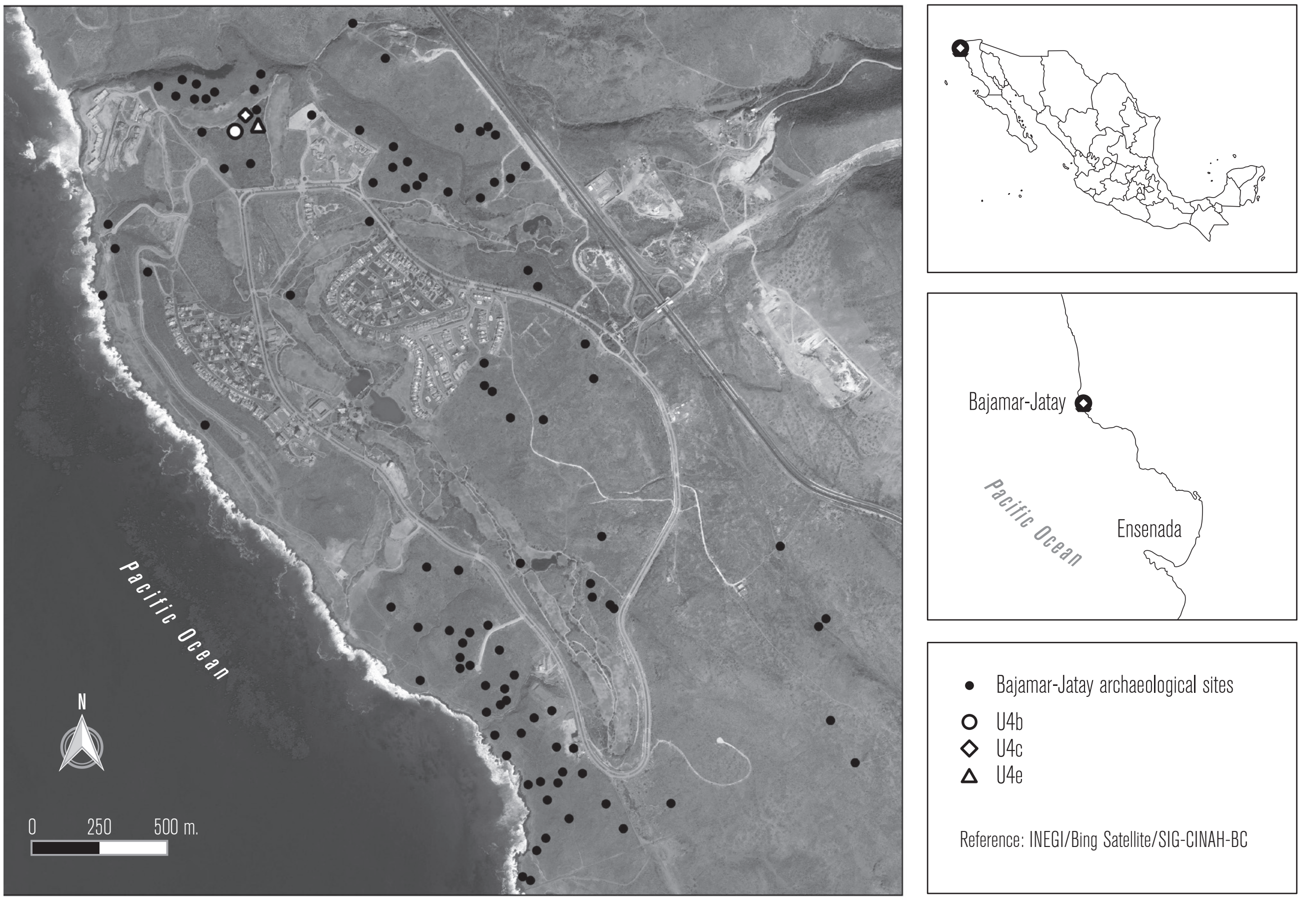

Figure 1. Archaeological sites at Bajamar-Jatay, Baja California, Mexico. Archaeological sites documented in the Bajamar tourist complex are indicated with solid dots. U4 sites are indicated by open symbols.

In 2011, an evaluation of archaeological sites within the Bajamar tourist complex was conducted and sites were selected for an interdisciplinary research agenda based on the density of archaeological materials and their degree of preservation (Fonseca 2012). In 2012, three shell midden sites were excavated by the primary author as part of the *Estudio de campamentos en la línea costera y valles intermontanos de Baja California*, supported by the Instituto Nacional de Antropología e Historia (INAH). Some 34 units, each measuring 2×2 meters, were excavated to depths of 40–50 cm. below the surface, until either bedrock or sterile soil was reached (Fonseca 2013a; Fig. 2). The number of excavation units roughly corresponded to the size of each site: 16 units were excavated at the U4e site, 10 units were excavated at the U4b site, and eight units were excavated at the U4c site (the smallest of the "U4" grouping of sites). Sediments were screened through 1/8-inch mesh screens in the field, and excavated materials were sorted into primary categories (i.e., shell, bone, lithics, and ceramics) before being taken to the Museo Histórico Regional de Ensenada (Regional Historic Museum of Ensenada) for further identification and analysis. Soil samples and portions of fire-affected rock features were also transported to the museum for laboratory analysis.

Chronology

In the absence of clear stratigraphy, excavations proceeded in arbitrary 10 cm. levels until either bedrock or sterile soil (absence of cultural objects) was encountered. All analyses were conducted utilizing these levels.

The chronology of site use is based on radiocarbon dating of seven black abalone (*Haliotis cracherodii*) shells that were uncovered and catalogued during excavations. Occupational chronologies for the rest of the levels were assigned based on the vertical distribution of these dated samples. In spite of potential post-depositional mixing (rodent burrows), no inverted radiocarbon dates were

Figure 2 Bajamar-Jatay rocky shore (above) facing south. Site U4b before excavation (below) facing south.

obtained, except in the case of strata U4b II and U4b III, which involve a difference of ~50 years. However, both dates correspond to the same chronological period (Transition), diminishing the significance of this slight reversal.

According to Laylander (1987), the history of human occupation on the northern portion of the Baja California peninsula prior to the Spaniards' arrival can be divided into three periods: Paleoindigenous (12,000–8,000 B.P.), Archaic (8,000–1,500 B.P.) and Late Prehistoric (1,500 B.P.-eighteenth century A.D.). However, towards the end of the Archaic period, between ~3,000 and 2,000 B.P., a wider variety of cultural practices develop (Moriarty 1966; Porcayo 2007; Rogers 1945), probably associated with a period of transition between the occupation of La Jolla groups during the Archaic period and the entry of the Yuman groups that would characterize the Late Prehistoric period.

In order to identify this transitional occupation, designated by Rogers (1945) as the preceramic Yuman phase or Yuman I, and by Moriarty (1966) as Diegueño I, the occupations discussed in this study were classified into three groups: Archaic period (8,000–3,500 B.P.), Transition (3,500–1,500 B.P.), and Late Prehistoric period (1,500–140 B.P.).

Radiocarbon dates were calibrated in the OxCal 4.3.2 (Bronk Ramsey 2009) online program using the Marine13 (Reimer et al. 2013) curve and a ΔR of 200 ± 25, which is the average of the three closest marine reservoir corrections available for the study area (14 CHRONO; Bien et al 1960; Ingram and Southon 1996; Table 1). Date ranges were modeled using the Probability Method as a single sequence with three phases: namely, the Archaic, Transition, and Late Prehistoric phases. Indices show strong agreement with $A_{model} = 100.6$ and $A_{overall} = 97$. A visual representation of the model and all calibrated radiocarbon date ranges is presented in Figure 3.

Heated rock structures from each site are also listed in Table 1 and ordered according to the dated strata. All described cooking features can be placed within the broad temporal divisions of Archaic, Transition, and Late Prehistoric, with the exception of one Type D feature, which may correspond to the Transition or Late Prehistoric period since it was found in the upper component (level I) of the U4c site.

Radiocarbon dates indicate that the U4b and U4c sites were occupied for a few hundred years during the early part of the Late Holocene, corresponding to the Transition period (3,500–1,500 years B.P.). The U4e site, however, shows evidence of multiple occupations

Table 1

SITE CHRONOLOGY AND FEATURE CONTEXT

Site	Level	Depth (cm.)	Lab Number	Uncorrected ^{14}C age (RYBP)	Calendar Age Range Cal B.P. (2 sigma)	Feature	Cultural Phase
U4e	II	10–20	INAH-3237	1,525 ± 80	1,045 : 690	Type D	Late Prehistoric
U4e	III	20–30	INAH-3238	1,760 ± 109	1,329 : 894	Type A	Late Prehistoric
U4e	III	20–30		–	–	Type B	Late Prehistoric
U4e	V	40–50	D-AMS 013277	4,305 ± 23	4,287 : 4,040	Type C	Archaic
U4c	I	1–10		–	–	Type D	Transition-Late Prehistoric?
U4c	II	10–20	D-AMS 019654	2,703 ± 28	2,293 : 2,057	Type A	Transition
U4c	IV	30–40	INAH-3245	2,864 ± 75	2,643 : 2,148		Transition
U4b	II	10–20	INAH-3242	3,308 ± 76	3,104 : 2,729	Type A	Transition
U4b	III	20–30	INAH-3241	3,254 ± 77	3,049 : 2,689	Type B	Transition
U4b	III	20–30		–	–	Type A	Transition
U4b	III	20–30		–	–	Type A	Transition
U4b	III	20–30		–	–	Type D	Transition
U4b	IV	30–40		–	–	Type D	Transition
U4b	IV	30–40		–	–	Type D	Transition

All the dates were calibrated using OxCal 4.3 (Bronk Ramsey 2009). A ΔR of 200 ±25 years was used for the reservoir effect, which is an average of the three closest corrections to the study site (Bien et al. 1960; Ingram and Southon 1996) and taken from 14 CHRONO Marine Reservoir database (http://intcal.qub.ac.uk/marine/).

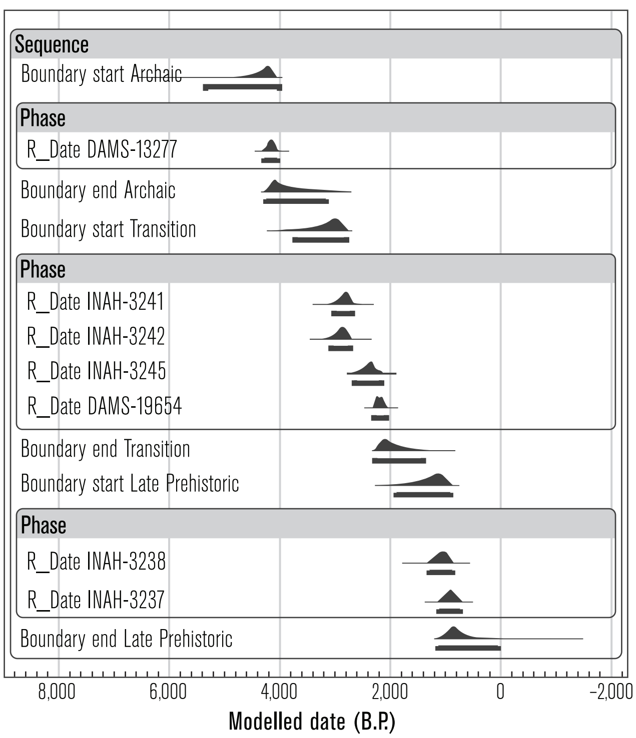

Figure 3. Results of OxCal 4.3 radiocarbon dates modeling (Bronk Ramsey 2009). The dates were adjusted according to the Marine13 calibration curve (Reimer et al. 2013) using an averaged Delta R for the region of the southwest coast of California and presented as two sigma ranges.

spanning the Middle and Late Holocene, including the Late Prehistoric period (1,500–250 years B.P.) (Table 1).

The shell middens forming the U4 grouping of sites (U4e, U4b, and U4c) appear to correspond to three occupational periods (Table 1), although their uses and functions appear to have been similar, based on several shared characteristics. General activity areas were designated at each site based on the association of identified archaeological materials and evidence of such activities as (1) food processing and preparation; (2) food consumption; and (3) lithic manufacturing (Table 2).[2] Many of the lithic artifacts appear to be relatively expedient multi-function tools, with each edge evidencing different functions for the same tool (i.e., one edge resembles a scraper and another resembles a knife, and so on—the equivalent of an ancient Swiss army knife). The present study focuses on the site areas associated with food processing and consumption, with the intention of identifying similarities and differences in the selection of dietary resources and the processing of foods by the hunter-gatherer-fishers who inhabited this stretch of coastline throughout the past ~4,000 years. We provide a description of the various types of uncovered rock features we believe were used in food preparation

Table 2

LITHIC ARTIFACTS FROM SITES U4B, U4C AND U4E

	Site U4b		Site U4c		Site U4e		Total	
Artifact type	N	%	N	%	N	%	N	%
Chipped stone								
Unmodified flakes	829	82	1,442	93	3,436	92	5,707	91
Knives	0	0	1	<1	1	<1	2	<1
Cores	34	3	23	2	55	2	112	2
Core and scrapers	1	<1	0	0	2	<1	3	<1
Core and side scrapers	0	0	0	0	1	<1	1	<1
Core and hammer stones	1	<1	0	0	0	0	1	<1
Drills	1	<1	1	<1	2	<1	4	<1
Hammers	8	1	6	<1	26	1	40	1
Percussion hammer	0	0	1	<1	0	0	1	<1
Projectile points	1	<1	2	<1	0	0	3	<1
Scrapers	59	6	25	2	92	3	176	3
Side scraper	26	3	16	1	52	1	94	2
File/sharpener	3	<1	3	<1	11	<1	17	<1
Ground stone								
Anvils	2	<1	0	0	4	<1	6	<1
Morters	26	3	13	1	43	1	82	1
Pestles	11	1	0	0	2	<1	13	<1
Polishing stones	4	<1	9	1	9	<1	22	<1
Sinkers/net weights	1	<1	1	<1	0	0	2	<1
I	**1,007**	**100**	**1,543**	**100**	**3,736**	**100**	**6,286**	**100**

activities, as well as a brief overview of the faunal data collected during excavations.

Relationship between features and faunal remains

Distributions of primary faunal materials were mapped in order to investigate potential differences and/or correlations between specific types of faunal remains and hearth or heated-rock cooking features at these sites. We suggest that various kinds of heated-rock features were associated with (1) different ways of preparing foods (e.g., grilling, boiling, baking), and/or (2) the preparation of different types of foods (e.g., taxonomic differences in faunal remains).

Associations between heated-stone features and faunal remains were identified based on correspondences in the horizontal and vertical location of materials recovered during excavations. In instances where heated-stone features occupied two or more 10 cm. levels, faunal remains from both layers were included. Whenever there was more than one structure in the same layer, we excluded the materials unless their precise location had been recorded during excavation, as it was usually impossible to determine which feature they were associated with. Representative elements and their associated materials were mapped using three dimensional coordinates during all of the excavations discussed here.

A chi-square test (Chi^2) was used to determine the significance of differences between the various faunal groups. For this purpose, archaeofaunal elements were classified into the three primary resource groups of mollusks, fishes, and mammals.

Zooarchaeological Analysis

Faunal materials were sorted into general categories and identified to the lowest taxonomic group possible using comparative collections at the Zooarchaeology-

Paleontology Department of the Regional Historical Museum of Ensenada (Guía-Ramírez 2013). In addition to weight measurements, malacological remains were quantified by MNI (minimum number of individuals; Allen 2017; Guía-Ramírez 2013). In the case of gastropods, MNI was determined using apices that were more than 50% complete in order to eliminate any possibility of counting an individual more than once. Bivalve remains containing intact umbos (i.e., over 50% complete) were sided and counted and MNI was calculated using whichever side (left or right) provided the highest values for each site. In some cases, a single element indicative of an uncommon species was counted as an individual, whether it was a whole shell or a single fragment, since there was no possibility of over-representation in these instances.

Vertebrate remains were quantified using NISP values (number of identified specimens; Grayson 1984; Lyman 1994; Marín-Arroyo 2008; Wake 1999). No estimated meat yields were obtained for vertebrate remains as the materials were fairly weathered and decomposed, making any estimates too problematic to be of any value.

For highly fragmented mammalian bone remains, categories were assigned based on approximations of animal size. Bones in the small-sized mammal category included elements corresponding in size to those of a small squirrel or rabbit; specimens in the medium-sized mammal category included bones corresponding in size to those of an animal about the size of a coyote or a fox; and the large mammal category included elements corresponding in size to those of an animal about the size of a deer or a sea lion.

Table 3

STOVES AND STONE STRUCTURES USED FOR THE PREPARATION OF FOODS

	Hearth	Hearth?	Heated-rock cooking structures	
Site	Type A	Type D	Grills: Type B	Stoned-lined firing pit oven: Type C
U4b	3	3	1	–
U4c	1	1	–	–
U4e	1	1	1	1

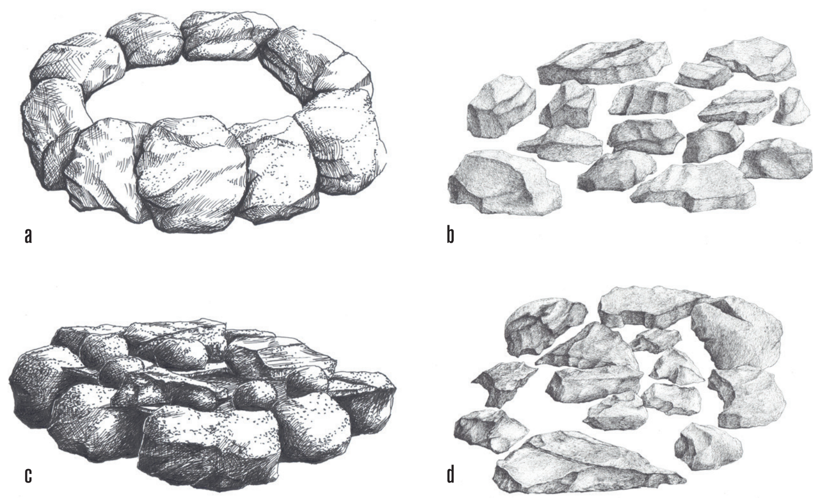

Figure 4. Type of rock structures that were identified in the U4 sites: (a) Type A or "round hearth," (b) Type B or "grill," (c) Type C or "stone-lined firing pit ovens," and (d) Type D or "hearth variety."

RESULTS

Milburn et al. (2009) classified heated stone features from archaeological contexts into three primary types. Following these criteria, stone features at the U4 Sites were distributed as follows: there were five hearths (Type A), two grills (Type B), and one stone-lined firing-pit oven (Type C) (Table 3; Figs. 4 and 5). In addition, there were five instances of a fourth type of heated-rock feature that did not conform to any of the defined varieties, and which we have termed "Type D."

Faunal remains associated with heated stone features represent species found in rocky intertidal areas along with taxa associated with kelp patches and subtidal zones, with some evidence for the hunting of marine and terrestrial mammals.

Identified mollusks include owl limpet (*Lottia gigantea*), black abalone (*Haliotis cracherodii*), California mussel (*Mitylus californianus*), bifurcate mussel (*Septifer bifurcatus*), black turban snail (*Tegula funebralis*), and speckled turban snail (*Tegula gallina*). Fourteen zoological groups were identified within the bony fish (Teleostei) remains, including California sheephead (*Semicossyphus pulcher*), wrasses (Labridae), rockfish (*Sebastes* spp.), scorpionfish (Scorpaenidae), sea

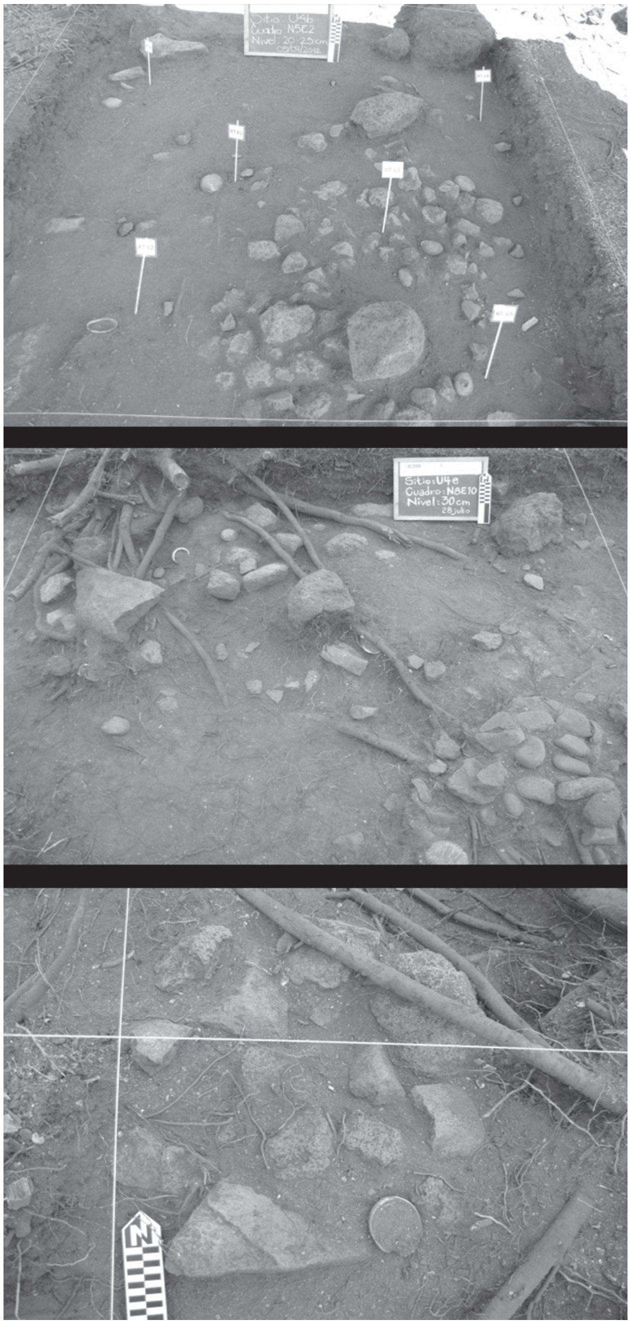

Figure 5. Heated-rock structures at U4 sites. Type B or "grill" at U4b (top), Type C or stone-lined firing pit oven (center) and Type D "hearth variety" (bottom) at U4e.

bass (*Paralabrax* sp.), Canary rockfish (*Sebastes aff pinniger*), surfperch (Embiotocidae), sculpins (Cottidae), California scorpionfish (*Scorpaena guttata*), cabezon (*Scorpaenichthys marmoratus*), lingcod (*Ophiodon elongates*), mail-cheeked fishes (Scorpaeniformes), and the California moray eel (*Gymnothorax mordax*).

Mammalian bone remains were assigned to eight taxa, including three at the order level (Rodentia, Carnivora, and Cetacean), one at family level (Otariidae), and four at species level, including San Diego pocket mouse (*Chaetodipus fallax*), Botta's pocket gopher (*Thomomys bottae*), sea otter (*Enhydra lutris*), and California sea lion (*Zalophus californianus*). We included all other elements as "unidentifiable mammal," and placed them in the general categories of small, medium, large, and "other unidentified." It is possible that the mouse and gopher bones are of natural deposition as there is no evidence suggesting that they were eaten (e.g., they are not charred or burned and do not contain cut marks or breakage patterns that suggest human modification). Bird (*Pelecanus* sp.) and reptile (*Crotalus* sp.) bone remains were excluded from statistical analyses as their low densities (n=2) invited sampling error.

A chi-square test was performed to examine the relationship between the type of stone structure and the associated archaeofaunal elements (Table 4). The stone-lined fire-pit oven (Type C) category has an expected count of less than 5, so it was suppressed to achieve the minimum required expected count. The relationship between these variables was significant, with X^2 (4, N=274)=21.65, $p < 0.05$. For this reason, we reject the null hypothesis of no difference and accept the alternative hypothesis that the location of archaeofaunal elements was not random with regard to the form or stone structure type employed in the preparation of foods, and that there was a relationship between the types of cooking features and the associated faunal remains.

Although molluscan remains are associated with all four types of rock features, they are most abundant in Type A (40.8%) features. Fishes seem to be predominantly associated with Type D (51 %) features, as are mammal remains (72%). All faunal classes were found associated with Type B features, although in lower densities (Table 4, Figs. 6 and 7).

DISCUSSION

The presence of hearths and heated-rock cooking features, some of which were associated with ceramic pots, grinding stones/mortars, marine shells, and animal bones, suggests that food production was one of the activities conducted in the vicinity of these features.

Table 4

ARCHAEOFAUNAL REMAINS AND HEARTHS/HEATED-ROCK COOKING STRUCTURES EMPLOYED IN THE PREPARATION OF FOODS

Hearths/heated-rock cooking structures		Archaeofaunal remains[a] Mammals	Mollusks	Fish	Total
A	Count	8	71	17	96
	% within hearths/ heated-rock cooking structures[b]	8.30%	74.00%	17.70%	100.00%
	% with archaeofaunal remains[c]	14.00%	40.80%	39.50%	35.00%
B	Count	8	35	4	47
	% within hearths/ heated-rock cooking structures	17.00%	74.50%	8.50%	100.00%
	% with archaeofaunal remains	14.00%	20.10%	9.30%	17.20%
D	Count	41	68	22	131
	% within hearths/ heated-rock cooking structures	31.30%	51.90%	16.80%	100.00%
	% with archaeofaunal remains	71.90%	39.10%	51.20%	47.80%
Total	Count	57	174	43	274
	% within hearths/ heated-rock cooking structures	20.80%	63.50%	15.70%	100.00%
	% with archaeofaunal remains	100.00%	100.00%	100.00%	100.00%

[a]Malacological remains were quantified by MNI and vertebrate remains were quantified using NISP values.

[b]This is the percentage according to the type of cooking structure.

[c]This is the percentage according to the type of fauna.

CHI-SQUARE TESTS

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.645[a]	4	0
Likelihood Ratio	23.21	4	0
N of Valid Cases	274		

[a]0 cells (.0%) have expected count less than 5. The minimum expected count is 7.38.

The identified molluscan taxa, presence of fire-affected shell remains, and the absence of shell specimens with evidence of intentional modification point to a systematic selection of certain species primarily for dietary purposes,

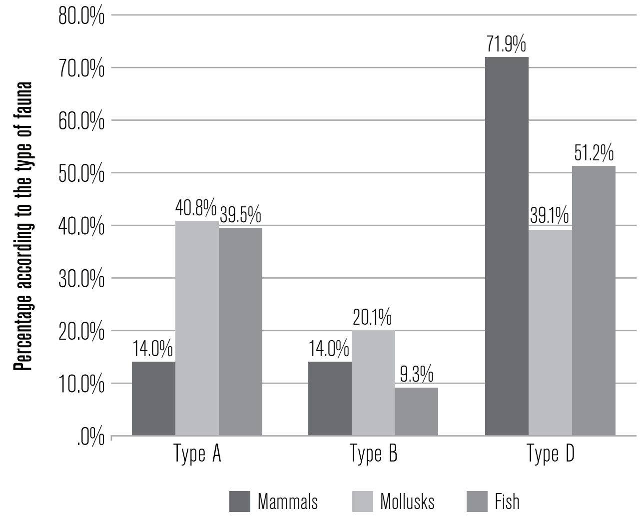

Figure 6. Distribution of faunal remains in each type of cooking structure.

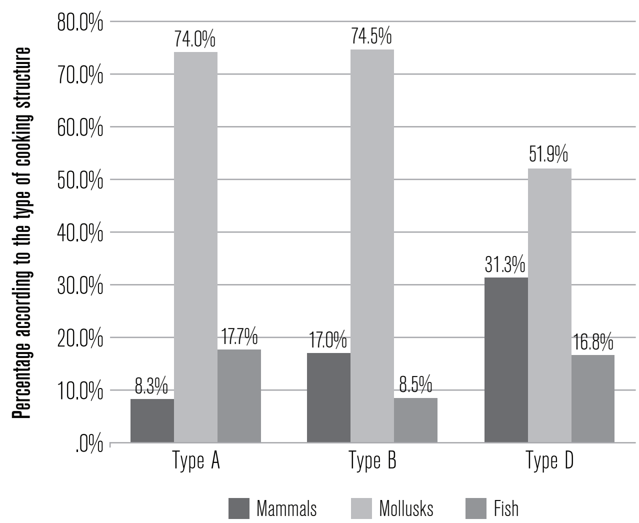

Figure 7. Distribution of faunal remains in each type of cooking structure.

and not for use in manufacturing artifacts or ornamental goods (Bonomo 2007). However, not all hearths and other heated-rock cooking structures had the same morphology or the same association with specific faunal remains, suggesting that the type of hearth might be related to the specific types of foods that were prepared in it or the desired style of cooking (i.e., direct or indirect contact with open flames, etc.).

Our analysis suggests that these heated-rock features were mainly employed in the preparation of food, based on their contextual associations with such archaeological indicators as marine shells, animal bones, and ceramic pot fragments. The possibility that these heated-stone features were used for the extraction of flakes through thermal fracturing does not seem likely, as only 2% of the recovered lithic materials show evidence of having been subjected to extreme heat, and these specific lithic artifacts were not associated with any of the stone features (Fonseca 2013b).

Milburn et al. (2009) have discussed the difference between hearths or bonfires (in which food was cooked through direct contact with fire, either touching the flames or in cookware), and heated-rock cooking structures (in which food was cooked by direct contact with heated rocks but not open flames). Rocks that contain burn imprints and/or fractures indicate longer direct exposures to heat and fire, suggesting more extensive occupational episodes. Some heat-altered rocks were shattered by fire, indicating that they were likely employed as "heat radiators" for food processing, or as walls for combustion structures (Black and Thoms 2014; Méndez and Jackson 2004).

Temporal variations in the availability of harvested fauna may have contributed to perceived differences in feature types, and it is an alternative that cannot be entirely excluded at this time, as dated samples are somewhat limited. However, this preliminary analysis suggests that the differential use of hearth and/or heated-rock cooking structure types is not related to temporal differences in site occupations in the Bajamar-Jatay region. The stone-lined pit ovens (Type C) comprise a somewhat exceptional category in this study, since only one example of this type of rock feature was found, corresponding to the earliest period documented at these sites. Grills (Type B), which were identified at Site U4e and in Site U4b, appear to correspond to Late Prehistoric and Transition occupations. Hearths (Type A) and Type D stone features were found in all three sites, suggesting that this style of cooking feature was used throughout the temporal sequence represented here (Table 1).

The heated-rock feature variety that we refer to as Type D consists of a group of stones that delimit a space within which other rocks are purposely placed (Table 3 and Fig. 4). Morphologically, they differ from grills in that they are more compact and have a clearly delimited circumference. Furthermore, they differ from common hearths in that rocks are placed within the stone circle and fill the interior of the feature. The rocks placed within

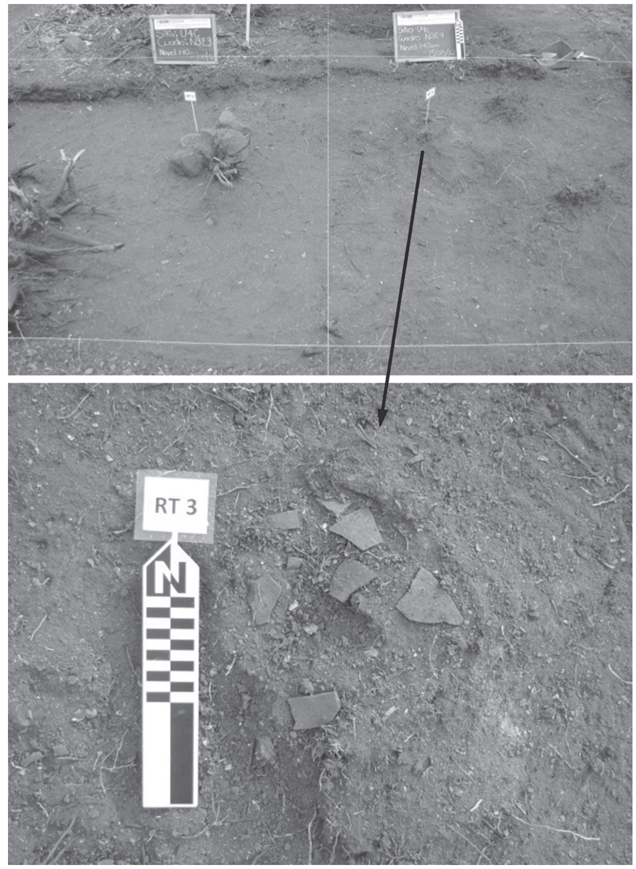

Figure 8. Type D cooking structure found in association with a broken ceramic pot in Site U4c.

the outer ring appear to have also served for cooking, and later—with the introduction of ceramics—might have been readjusted to match the diameters of ceramic pots (see below).

The Type D "stove" was found in association with a broken ceramic pot in Site U4c (Fig. 8). Drakíc and Delgado (2010:11) reported finding a pot *in situ* on a stove that was "small and elaborated specifically to deposit the pot," suggesting that the diameter and reduction in size of these hearths might be dependent upon the sizes of the ceramic pots that were placed on them to be heated by the hot rocks rather than by the direct flames. The lack of burned ceramic fragments further supports this idea. Drakíc et al. (2007:109) referred to this variety of stove as "a new technique in terms of shape" since they were "more round." Ovilla and García (2008:14–15), however, do not make this distinction, even though their photographs and drawings of Site Z9 also show this variety of stone feature. In addition, this type of heated rock feature is described in ethnohistoric descriptions of life in the Kumeyaay *rancherias* during the first half of the twentieth century, where women placed hearth rocks in such a way as to serve as a base for the tin pots used in cooking (Hohenthal 2001:154). The morphological differences between hearths, grills, and stoned-lined firing-pit ovens stem from their use or function, so it is probable that the same is true of the new "hearth" variety (Type D) as well.

Remains of shellfish, fish, and mammals were found in Type B features, which Milburn et al. (2009) classified as "grills." The structures' shape suggests that they may have been used to reheat foods by allowing them to warm up in a slow but steady manner. These structures were not delimited by encircling stones and there was a separation between the rocks of approximately 10 cm., suggesting that foods were not cooked directly in the fire at high temperatures, but rather through contact with the heated stones and from the heat radiating out from them.

No bone fragments were found in Type C heated-stone features. However, as there is only one example of this type of feature in the data set, it is impossible to draw firm conclusions at this point. Milburn et al. (2009) defined "stone-lined firing ovens" as fairly elaborate structures in which levels of rocks and slabs were placed until a furnace was formed. The absence of bone is likely significant and may point to this type of cooking feature being used for certain specific food resources, mollusks included. It may have been used as an earth oven for roasting seeds or other botanical resources, although testing that hypothesis awaits an analysis of archaeobotanical remains from this activity area.

Agave roasting platforms were identified at El Vallecito, 95 km. northeast of Bajamar-Jatay (Porcayo 2014), and in the region of San Quintín ~200 km. to the south (Moore 1999, 2010). These platforms typically have a greater diameter and depth; however, we cannot ignore the possibility that *Agave shawii* was cooked in this type of structure, since it was a known food resource that was abundant in the area (Aschmann 1959; Gentry 1978; Vanderplank 2014).

ETHNOHISTORIC ANALOGIES

Historical and ethnographic sources make reference to the hunting of various terrestrial fauna for food (Barco 1988; González-Vázquez 2000; Laylander 2000; Shipek 1991), but there are relatively few sources that discuss the types of mollusks that were collected or the ways in which they were prepared. One description comes from María Osuna, a Kumeyaay elder, who recalls the way abalones were steamed in their shells:

> …she and her husband, Feliciano, used to walk, from Manteca Canyon all the way to Pacific Coast for fish. It took several days to arrive; generally, they went to San Miguel Arroyo. Once there, the Indians pried off abalones with a sharp pointed stick, and later steamed them in the shell; they did not pound them ("in those days people had good teeth"), but built a fire, placed the abalones, shells down, on this, and then covered the whole with wet kelp [Hohenthal 2001:148].

Additional ethnographic accounts describe the same capture process, although they establish that some types of mollusks had to be battered with a rock in order to soften the meat for consumption (Shipek 1991:28).

It is possible that during the Archaic and late Prehistoric eras people also boiled some foods, especially after the introduction of ceramic vessels. Alternatively, larger mollusks like mussels and abalone could have easily been "steamed" in kelp fronds, as described by Hohenthal (2001; see above). The variety of ways in which shellfish could have been prepared likely contributed to differences in shell remains. For instance, some shells show signs of having been burned directly, while others do not.

Ethnohistoric and ethnographic accounts describe the indigenous practice of drying shellfish and fish in the sun (Barco 1988:146; Guía-Ramírez and Oviedo-García 2015:37–78; Hohenthal 2001:157, 333; Meigs 1939:28; Shipek 1991:28), although meats may have also been smoked for longer preservation. It is possible that Type C structures might have been used for this purpose.

All of the sites considered here contained little if any charcoal, which may be indicative of the types of fuel that were used. It is very likely that people collected and used coastal scrubland twigs and branches, which are thin and do not produce significant amounts of charcoal. According to ethnohistoric accounts:

> The best firewood (PA) for cooking and heating purposes is mesquite; manzanita is next best, then oak. Willow, cottonwood, and juniper are not good, juniper the worst of all since it burns too fast, leaving nothing but a white powdery ash. Indians prefer to go far afield for wood rather than use the last three kinds [Hohenthal 2001:155].

The primary vegetation surrounding these sites today is *Arctosta phylosglauca*, commonly known as little apple (Rebman and Roberts 2012:227). It is possible that branches and twigs of this species were used as fuel; however, botanical analysis is required to confirm this. Magnetometric analyses of rocks from one of the studied hearths and from additional heated-rock cooking structures have determined that temperatures reached a range of around 225º to 400º C (Fonseca 2013a).

According to Milburn et al. (2009), a Type A hearth feature is characterized by the fact that cooked foods are in direct contact with fire. This would have allowed the opening of bivalves and the cooking of a variety of shellfish. This appears to have been a common practice among coastal peoples in Baja California, as Barco describes: "Molluscs were eaten on the beach. After throwing them into the fire they waited for the shells to be opened and removed until they were roasted or fried, and thus they eat it from the shell" (1988:145).

Fish seem to have been prepared mainly in type A and D structures, which exhibit similar morphologies, suggesting that perhaps Type D is a variant of Type A with rocks in the center of the feature. Based on the limited data set presented here, this type of hearth appears to have been mostly utilized for the cooking of marine mammals. Associations between faunal remains and the types of stone structures seem to corroborate the information provided in ethnohistoric accounts, which describe the indigenous practice of cooking meat in direct contact with flames (Baegert 2013:93; Barco 1988:206). Barco (1988:206) describes meat being cooked and turned over so the carbon and ashes would be shaken off; it would then be eaten "half-burnt, half-raw" (Barco 1988:206). It is likely that the rocks placed in the center of Type D hearths formed a platform on which food was either deposited directly, or on which some form of container (i.e., stone bowl or ceramic pot) was placed to stay warm without burning.

Apart from ceramic pots, woven fiber basketry was manufactured and used by indigenous people of the Baja California peninsula (Baegert 2013:94; Barco 1988:101). The basketry made by these groups was so strong and tight that "it wouldn't let a drop fall out," and it was used as jars for drinking water, bowls and containers for eating and storing food, and for cleaning seeds before they were toasted (Barco 1988:101–102). Seeds were reportedly toasted by placing them in "*bateas*," or fiber containers, that were in direct contact with fire and flames (Barco 1988:205–206).

CONCLUSIONS

Excavated features and associated faunal remains suggest that the structural morphology of heated rock structures is not clearly correlated with the exclusive cooking of any one type of food, except in the instance of Type C features, where no bone fragments were found. Nevertheless, the rock features described here appear to have been constructed in a prescribed variety of forms. We suggest that the shape of the heated stone features may be related to the different ways in which foods were cooked.

A differential consumption of dietary resources may have influenced the use of one or another type of stone structure. It is likely that the various types of structures were practical and generalized forms that persisted through time in concert with the kinds of harvested resources and the general lifeways of the coastal inhabitants in the region, lifeways which remained relatively consistent over the past several thousand years. We suggest that the morphological differences evident among the stone structures employed in the preparation of foods are not random, and—based upon the analysis of these coastal camps located along the northwest coast of the Baja California peninsula—might be related to the types of foods that were prepared and the methods used to cook them, which in turn were perhaps related to the sizes of captured specimens or the length of time required for cooking them.

Based on our current understanding of site chronology, differences in the shape and form of cooking features do not appear to reflect temporal trends. However, the Type D structure was found only in an Archaic Period context and in association with ceramics. It is likely that this type of structure may have been modified from an earlier form after the introduction of ceramics, at which time the average hearth diameter was reduced to match a pot's shape.

Despite the paucity of ethnographic references describing the cooking of marine foods harvested from coastal habitats, and the types of hearths and other heated-rock cooking structures that were employed in their preparation, the few clues we do have suggest similarities with the archaeological features described here. We hope these potential scenarios inspire further research (including paleobotanical and faunal analyses) into similar heated stone features in the region, particularly those involving Yuman traditions. This and future studies have the potential to identify long-standing cultural traditions and preferences related to food preparation that were transmitted from one generation to another for thousands of years.

NOTES

[1]In this study we will use the terms coastal camp and shell midden interchangeably.

[2]We present the activities that were carried out in the camps, although we also found additional lithic artifacts corresponding to the activities of fishing (net weights, lines or rod) and hunting (spear tips).

REFERENCES

Allen, Michael J. (ed.)
2017 *Molluscs in Archaeology. Methods, Approaches and Applications*. [*Studying Scientific Archaeology* 3.] United Kingdom: Oxbow Books.

Ames, Kenneth E.
2005 Intensification of Food Production on the Northwest Coast and Elsewhere. In *Keeping It Living: Traditions of Plant Use and Cultivation on the Northwest Coast of North America*, Douglas Deur and Nancy J. Turner, eds., pp. 67–100. Seattle and Vancouver: University of Washington Press and University of British Columbia Press.

Aschmann, Homer
1959 The Central Desert of Baja California: Demography and Ecology. *Ibero-Americana* 42. Berkeley: University of California Press.

Baegert, Juan Jacobo
2013 *Noticias de la Península Americana de California*. Baja California: Instituto Sudcaliforniano de Cultura/ Archivo Histórico Pablo L. Martínez.

Barco, Miguel de
1988 *Historia natural y crónica de la antigua California*. Miguel León Portilla, ed. México: Universidad Nacional Autónoma de México.

Bien, G. S., N. W. Rakestraw, and H. E. Suess
1960 Radiocarbon Concentration in Pacific Ocean Water. *Tellus* 12(4):436–443.

Black, Stephen L., and Alston V. Thoms
2014 Hunter-Gatherer Earth Ovens in the Archaeological Record: Fundamental Concepts. *American Antiquity* 79(2):203–226.

Blackhouse, Paul
2010 *Campfires in Context: Hunter-Gatherer Fire Technology and the Archaeological Record of the Southern High Plains, USA*. Oxford: Archaeopress.

Bonomo, Mariano
2007 El uso de los moluscos marinos por los cazadores-recolectores pampeanos. *Chungara: Revista de Antropología Chilena* 39(1):87–102.

Bronk Ramsey, Christopher
2009 Bayesian Analysis of Radiocarbon Dates. *Radiocarbon* 51(1):337–360.

Bulhusen Muñoz, Karim, and Harumi Fujita
2015 *Informe de la tercera temporada del proyecto Registro y Excavación de los sitios arqueológicos del municipio de la Paz, B.C.S. Excavación del sitio A-176 Cueva Tecolote #2 (cuadros d2 y d3) en 2014*. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Castetter, Edward F., Willis H. Bell, and Alvin R. Grove
1938 *Ethnobiological Studies in the American Southwest: VI. The Early Utilization and the Distribution of Agave in the American Southwest*. [*University of New Mexico Bulletins, Biological Series* 5(4).] Albuquerque: University of New Mexico.

Christenson, Andrew
1981 Roasting Pits. In *The Archaeology of the McCain Valley Study Area in Eastern San Diego County, California: A Scientific Class II Cultural Resource Inventory*. John R. Cook and Scott G. Fulmer, eds., pp. 177–184. Riverside, California: BLM Cultural Resource Publications.

Claassen, Cheryl
2000 Quantifying Shell: Comments on Mason, Peterson, and Tiffany. *American Antiquity* 65(2):415–418.

Cook, John R., and Scott G. Fulmer (eds.)
1981 *The Archaeology of the McCain Valley Study Area in Eastern San Diego County, California: A Scientific Class II Cultural Resource Inventory*. Riverside, California: BLM Cultural Resource Publications.

Des Lauriers, Matthew
2010 *Island of Fogs: The Archaeology and Ethnohistory of Isla de Cedros, Baja California*. Salt Lake City: University of Utah Press.

Drakíc, Danilo, Luis Delgado, and Oswaldo Cuadra
2005 *Salvamento arqueológico Costa Azul, Lote 20*. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Drakíc, Danilo, Isaac Aquino, and Luis Delgado
2007 *Salvamento arqueológico Cañada del Águila, sitio La Punta, conchero 40, Informe final de la primera etapa de excavación y análisis, mayo-noviembre 2007.* MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Drakíc, Danilo, and Luis Ramón Delgado
2010 *Salvamento arqueológico Cañada del Águila, segunda temporada, Informe final de la segunda etapa de excavación y análisis, noviembre 2008–marzo 2009.* MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Figueroa, Carlos
2009 *La arqueología del holoceno en el corredor costero Colnett-el Rosario (Baja California, México): un análisis orientado a la gestión*. Ph.D. dissertation, Universidad Autónoma de Baja California.

Fonseca Ibarra, Enah
2012 *Estudio de campamentos en la línea costera y valles intermontanos de Baja California. Informe temporada 2011 y propuesta de trabajo 2012*. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.
2013a *Estudio de campamentos en la línea costera y valles intermontanos de Baja California. Informe de excavación, análisis de materiales temporada 2012 y propuesta de trabajo 2013*. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.
2013b Baja California Shell Midden Camps: Similarities and Differences, Research in Process on the Northern Coast of the Peninsula. *SCA Proceedings* 27:73–83.

García Hernández, Carlos Eduardo, Harumi Fujita, and Diana Irasema Larios Córdova
2016 *Informe parcial de la tercera temporada del proyecto Registro y Excavación de los sitios arqueológicos del municipio de la Paz, B.C.S.: excavación del sitio A-176 Cueva Tecolote #2 (cuadro d4) en 2014*. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

García, Rubén
2013 *Tipología y cadenas operatorias de puntas de proyectil de la costa noroeste de Baja California. Estudio de caso del sitio Bajamar-Jatay, Ensenada, B.C*. Senior thesis, Universidad Veracruzana/Facultad de Antropología.

Gentry, Howard S.
1978 The Agaves of Baja California. *Occasional Papers of the California Academy of Scences* 130:1–119.

Glassow, Michael A.
2000 Weighing vs. Counting Shellfish Remains: A Comment on Mason, Peterson, and Tiffany. *American Antiquity* 65 (2):407–414.

González-Vázquez, Araceli
2000 Aprovechamiento de los recursos acuáticos en California y Alaska: cazadores-recolectores en las fuentes escritas de los Siglos XVI, XVII y XVIII. *Nivel Cero* 8:77–93.

Grayson, Donald K.
1984 *Quantitative Zooarchaeology, Topics in the Analysis of Archaelogical Faunas*. [*Studies in Archaeological Sciences*.] Orlando: Academic Press.

Gruhn, Ruth, and Alan Bryan
2009 An Interim Report on Two Rockshelter Sites with Early Holocene Occupation in the Northern Baja California Peninsula. *Pacific Coast Archaeological Society Quaterly* 42(2 & 3):1–16.

Guía-Ramírez, Andrea
2013 *Informe del análisis de los restos faunísticos del sitio Bajamar. Temporada 2012*. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Guía-Ramírez, Andrea, and Fernando Oviedo-García
2015 *La Fauna del Ayer y el Hoy en Baja California. Una visión a través de los grupos Yumanos: Kumiai y Paipai*. México: ICBC/PACMYC.

Hernández, Cynthia, and Daniel Schoerberg
1993a *Reporte de recorrido. Bajamar 93*. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.
1993b *Reporte de salvamento Proyecto Bajamar, sitios concheros, Ensenada, B.C. BM93*. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Hohenthal, William, Jr.
2001 *Tipai Etnographic Note: A Baja California Indian Community at Mid-Century*. Thomas Blackburn, ed. Menlo Park, Cal.: Ballena Press/Institute for Regional Studies of the Californias.

Ingram, B. Lynn, and John R. Southon
1996 Reservoir Ages in Eastern Pacific Coastal and Estuarine Waters. *Radiocarbon* 38(3):573–582.

Laylander, Don
1987 Una exploración de las adaptaciones culturales prehistóricas en Baja California. *Estudios Fronterizos* V(14):117–124.
2000 *Early Ethnography of the Californias: 1533–1825*. [*Coyote Press Archives of California Prehistory* 47.] Salinas: Coyote Press.
2014 Redundancy, Avoidance, and Ideology in Prehistoric Southern California. *SCA Proceedings* 28:326–339.

Leach, Jeff D., Glenn R. Gibson, and Jan Van Loo
2006 Human Evolution, Nutritional Ecology and Prebiotics in Ancient Diet. *Bioscience and Microflora* 25:1–8.

Lyman, R. Lee
1994 Quantitative Units and Terminology in Zooarchaeology. *American Antiquity* 59(1):36–71.

Marín-Arroyo, Ana Belén
2008 El yacimiento paleolítico de la Cueva del Mirón: El resultado de aplicación de las nuevas metodologías arqueozoológicas. In *Zooarqueología Hoy: Encuentros Hispano-Argentino*, Carlos Díez, ed., pp. 69–88. España: Universidad de Burgos.

Meigs, Peveril, III
1939 The Kiliwa Indians of Lower California. *Ibero-americana* 15. Berkeley: University of California.

Méndez, César, and Donald Jackson
2004 Ocupaciones humanas del holoceno tardío en los vilos (IV Región Chile): origen y características conductuales de la población local de cazadores recolectores del litoral. *Chungara: Revista de Antropología Chilena* 36(2): 279–293.

Milburn, Douglas H., U. K. Doan, and Joanna Huckabee
2009 Spatial and Temporal Distributions of Archaeological Heated-rock Cooking Structures in the Transverse Mountain Ranges: Proposed Markers of Land-Use Shifts Since the Early Holocene. *SCA Proceedings* 22:1–21.

Moore, Jerry D.
1999 Archaeology in the Forgotten Peninsula: Prehistoric Settlement and Subsistence Strategies in Northern Baja California. *Journal of California and Great Basin Anthropology* 21(1):17–44.
2010 La región San Quintín-El Rosario. In *La Prehistoria de Baja California. Avances en la arqueología de la península olvidada*, Don Laylander, Jerry D. Moore, and Julia Bendímez Patterson, eds., pp. 224–243. Mexicali: INAH.

Moriarty, James
1966 Cultural Phase Divisions Suggested by Typological Change Coordinated with Stratigraphically Controlled Radiocarbon Dating at San Diego. *Anthropological Journal of Canada* 4:20–30.

Ovilla, Gengis
2013 *Las tradiciones funerarias en los campamentos prehistóricos de Bajamar-Jatay, B.C. y su contexto regional.* Senior thesis, Universidad Veracruzana/Facultad de Antropología.

Ovilla, Gengis, and Rubén García
2007 *Rescate Arqueológico Bajamar 38-A1.* MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.
2008 S*alvamento Arqueológico Bajamar-Jatay B.C. 2006–2007.* MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Porcayo, Antonio
2007 Programa arqueológico del estado de Baja California en el tercer milenio. *Memoria 2007–2012*, N. Robles (coord.), pp. 1438–1456. Coordinación Nacional de Arqueología/INAH, México.
2012 *Informe del Proyecto de Salvamento Arqueológico Carretera San Felipe-Laguna Chapala Km 109+340 al Km 117+940 (Primera etapa—Excavación*). MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.
2014 *Proyecto Arqueológico El Vallecito T1. Informe preliminar de la primera temporada (PAVT1-13 Recorrido de Superficie). Base de datos de evidencias registradas.* MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Porcayo, Antonio, Alejandra Navarro, Andrea Guía, and Alberto Tapia
2016 *Cambios y continuidades de la vida ancestral Cucapá. Datos arqueológicos, arqueofaunísticos y etnográficos para su comprensión*. México: INAH.

Rebman, Jon, and Norman Roberts
2012 *Baja California Plant Field Guide*, 3rd ed. San Diego: San Diego Natural History Museum.

Reimer P., E. Bard, A. Baylis, W. Beck, P. Blackwell, C. Ramsey, C. Buck, H. Cheng, L. Edwards, M. Friedrich, P. Grootes, T. Guilderson, H. Haflidason, I. Hajdas, C. Hatté, T. Heaton, A. Hogg, K. Hughen, F. Kaiser, B. Kromer, S. Manning, M. Niu, R. Reimer, D. Richards, M. Scott, J. Southon, C. Turney, and J. van der Plicht
2013 IntCal13 and MARINE13 radiocarbon age calibration curves 0–50000 years cal BP. *Radiocarbon* 55(4):1869–1887.

Reina, Magdalena
1994 *Trabajos Arqueológicos de Sondeo en el Conchero B3 del Sitio Bajamar. Informe Preliminar, 1a Temporad*a. MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.
1995 Jatay: un sitio conchero. In *Memoria 1994. Seminario de Historia de Baja California*, pp. 101–104. Ensenada: Instituto de Investigaciones Históricas/Universidad Autónoma de Baja California.

Rogers, Malcolm
1945 An Outline of Yuman Prehistory. *Southwestern Journal of Anthropology* 1:157–198.

Rojas, Martín
2009 Trabajo y género en la antigua Baja California: análisis osteobiográfico de los esqueletos del Jatay. *Camino Real Misionero de las California* 6:34–37.

Ritter, Eric W.
1979 A*n Archaeological Study of South-Central Baja California*. Ph.D. dissertation, University of California, Davis.
2008 The archaeology of the Three Sisters Lagoons, Baja California, Mexico. In *Memorias de Balances y Perspectivas de la Antropología e Historia de Baja California, 2002–2004*, pp. 61–74. Mexicali: INAH.

Ritter, Eric W., and Patricia Aceves Calderón
2006 Fragments of archaeological landscapes in north-central Baja California, Mexico. In *Memorias de Balances y Perspectivas de la Antropología e Historia de Baja California 2005–2011* [CD-ROM]. Mexicali: INAH.

Schaefer, Jerry, Don Laylander, Sherri Andrews, James Daniels, and Tony Tri Quach
2014 Identifying, Dating, and Explaining Fire-Affected Rock Features in the Western Colorado Desert, California. *California Archaeology* 6:65–93.

Serrano, Jorge
1992 *Informe de Actividades del Proyecto de Registro de Sitios Arqueológicos en Baja California. Temporada 1991.* MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.
1993 *Proyecto de Investigación Arqueológica en el sitio conchero Bajamar, 30 de julio de 1993.* MS on file at Centro de documentación CINAH-BC, Ensenada office, Baja California.

Shipek, Florence
1991 *Delfina Cuero: Her Autobiography. An Account of Her Last Years and Her Ethnobotanic Contributions.* Menlo Park, Cal.: Ballena Press.

Thoms, Alston V.
2003 Cook-Stone Technology in North America: Evolutionary Changes in Domestic Fire Structures during the Holocene. In *Le Feu Domestique et ses Structures au Neolithique et aux Ages des Metaux*, Marie-Chantal Frère-Sautot and Christophe Bontemps, eds., pp. 87–96. Saint-Apollinaire: Collections Prehistoires. Editions Monique Mergoil.
2008 The Fire Stones Carry: Ethnographic Records and Archaeological Expectations for Hot-Rock Cookery in Western North America. *Journal of Anthropological Archaeology* 27:443–460.
2009 Rocks of Ages: Propagation of Hot-Rock Cookery in Western North America. *Journal of Archaeological Science* 36:573–591.

Vanderplank, Sula
2014 A Conservation Plan for *Agave shawii* subsp. *Shawii* (Shaw's agave, Agavaceae). *Rancho Santa Ana Botanic Garden Occasional Publications* 14. Claremont, California: Rancho Santa Ana Botanic Garden.

Vázquez Ojeda, Olimpia
2015 *Cultural manifestations within the landscape: a geospatial approach to site distribution at El Vallecito, Baja California*. Senior thesis, University of California, Santa Cruz.

Waechter, Sharon A.
2005 Late-Period Resource Intensification in Sierra Valley, Eastern Plumas County: A Response to the Medieval Climatic Anomaly. *SCA Proceedings* 18:45–52.

Wake, Thomas
1999 Temporal Variation in Vertebrate Archaeofaunas from Camp Pendleton Marine Corps Base, San Diego County, California. *Pacific Coast Archaeological Society Quarterly* 5(4):45–64.

Wandsnider, LuAnn
1997 The roasted and the boiled: food composition and heat treatment with special emphasis on pit-hearth cooking. *Journal of Anthropological Archaeology* 16:1–48.