

SOCIAL IMPLICATIONS OF MAMMAL REMAINS FROM FORT ROSS, CALIFORNIA

Thomas A. Wake
Department of Anthropology
University of California
Berkeley, CA 94720

ABSTRACT

Mammal remains recovered from recent archaeological excavations in Fort Ross State Historic Park provide important information concerning cultural interchange in an early nineteenth century multiethnic Russian colony. Historical records show that this community consisted of native Alaskans, native Californians, native Russians, and a number of mixed-race individuals. Analysis of mammal remains recently recovered from outside the stockade at Ross shows evidence of persistence of ethnically distinct foodways, as well as the incorporation of non-traditional foods into the diet. The effects of native American and European cultural interchange on native Alaskan and native Californian diets are discussed.

INTRODUCTION

Since 1988, the University of California, Berkeley's Fort Ross Archaeological Project has been conducting surface surveys and excavations in Fort Ross State Historic Park, Sonoma County, California. Fort Ross is a Russian-American Company fur trading and agricultural colony that existed on the California coast from 1812 to 1841. The colony was populated by Russians, Siberians, native Alaskans, native Californians, and occasionally Hawaiians. Relatively few ethnic Russians or Creoles (mixed race persons) were present at the colony at any given time, hence the population was dominated by native Americans (Istomen 1992; Khlebnikov 1976, 1990).

One of the main goals of the Fort Ross Archaeological Project is to evaluate the influence of diverse European colonial policies on the acculturation processes of Pacific Coast hunter-gatherers (Lightfoot et al. 1991). The situation at Fort Ross

is quite complex, involving oral and written histories and material cultural remains of three broad ethnic groups: Californians, Alaskans, and Europeans. One of the major problems confronting archaeological study at Ross is the determination of the spatial patterning and interaction spheres of these various ethnic groups. Recent research proposes three neighborhoods in the vicinity of the stockade complex: Russian, native Californian, and native Alaskan (Lightfoot et al. 1991). One objective of my research is to compare and contrast the faunal remains from the "neighborhoods" and evaluate the spatial organization of the Ross colony.

As a part of the Fort Ross Archaeological Project, I am interested in the potential for using faunal remains as a key to determine the "ethnicity" of the people who produced the archaeological record, and as a tool to gauge their relative degree of acculturation and social status. "Ethnicity" and social status at historic period archaeolog-

ical sites can be determined rather broadly through observation of relative frequencies of dietary constituents and butchery patterns (Gust 1983; Schultz and Gust 1983; Jolley 1983; McKee 1987; Crader 1990b). The situation at Fort Ross is especially interesting due to the fact that this settlement represents the first sustained European contact in this area of coastal California.

In my analysis I address whether or not faunal remains from Fort Ross exhibit characteristics that can provide discrete information on the "ethnic" identity of its depositors. Determining who was actually living in the Native Alaskan Village Site (NAVS) and how it was organized is an important problem at Fort Ross. A variety of native Alaskans and native Californians lived in and around the Ross colony (Khlebnikov 1976, 1990). It is clear from historical records that Pomo and Miwok women lived with Alaskan men (Istomen 1992). The colony simply could not have been successful without the skills Alaskan hunters and Californian laborers brought with them.

In this paper I present the analysis of faunal remains from two sites; the Fort Ross Beach Site (FRBS) (SON-1898/H), and the NAVS (SON-1897/H). The Fort Ross Beach Site (a.k.a. the Beach Site) is located at the north end of Fort Ross Cove. It sits on a low eroded bench next to Fort Ross Creek, and extends partway up the hill towards the Russian stockade approximately 200 m to the North. This site is especially interesting since it lies almost directly beneath the area indicated as the "Aleut encampment" on the 1817 map of the Fort Ross colony (Farris 1989; Fedorova 1973). Archaeological remains recovered from this site include broken European and Asian ceramics, metal tools and debris, glass trade beads, stone flakes, obsidian projectile points, gunflints, worked bone tools, and a variety of faunal remains.

The NAVS lies to the south of the Fort, between the stockade walls and the sea cliffs overlooking the Pacific Ocean. The NAVS includes the likely boundaries of the area noted as the

"Aleut encampment" on the 1817 Russian map of Ross (Farris 1989; Fedorova 1973). The artifactual and faunal assemblages of the NAVS are quite similar to those of the Beach Site, and both appear to date to the Russian occupation. The NAVS is of interest for several reasons. It is likely that some of the inhabitants of this site may have generated or contributed to the Beach Site. More importantly, a number of surface depressions and leveled areas can be seen on this terrace outside of the fort. Based on recent excavation, at least two of these surface features appear to be the remains of semi-subterranean house structures.

The close association of the Beach Site with the "Aleut encampment" is intriguing. If "Aleuts" were responsible for the formation of these sites then one would expect a faunal assemblage exhibiting native Alaskan dietary patterns. The presence of a typical native Alaskan faunal assemblage would indicate a minimal level of dietary acculturation or cultural change (Clark 1974; De Laguna 1972). However, a modified pattern might indicate some degree of cultural and/or dietary exchange. Through observation of the relative frequencies of dietary constituents, element distributions, butchery patterns, fragmentation, and burning of faunal remains recovered from the site, elucidate the food preferences, lifeways, ethnicity and social status of the persons responsible for the formation of the Fort Ross Beach Site and the NAVS.

MATERIALS AND METHODS

In this paper I focus on the mammalian remains recovered from these two sites. The Beach Site sample consists of mammal remains recovered during the 1988 and 1989 excavations of 30 meters of the eroding, ocean-facing portion of the Fort Ross Beach Site, and two excavation units placed up the slope to the north of the profiled erosional face of the site: a 2 by 3 m unit, and a 2 by 0.5 m test trench.

The NAVS sample consists of the mammal remains from all five units of a 1 by 5 m trench

placed in a surface depression that appears to be the remains of a semi-subterranean house structure. This area corresponds to the northern boundary of the 1817 "Aleut encampment", closest to the stockade complex, approximately 150 m further north.

The mammal remains from these sites are important for several reasons. Numerically, mammals represent the bulk of the vertebrate remains recovered at the site. The mammal remains represent the greatest potential source of protein as a whole (Binford 1981). Mammal remains, in general, can show specific ethnic preferences and point to social stratification (Crader 1984, 1990a, 1990b; Gust 1983; Jolley 1983; Lyman 1987; McKee 1987).

The vertebrate faunal remains recovered from these sites were first sorted into broad classes such as fish, reptiles, amphibians, birds, and mammals. The fish remains have been analyzed by Dr. Kenneth W. Gobalet at C.S.U. Bakersfield, and James P. Quinn at Sonoma State University. The bird remains are currently being analyzed by Dwight D. Simons at San Jose State University. I am responsible for the analysis of the mammal assemblage. The mammalian remains have been identified to the most discrete possible taxon, counted, and carefully examined for evidence of modification such as butchery marks, carnivore gnawing, burning, impact points, and artifact production. Identification of individual skeletal elements was aided by various manuals (Gilbert 1980; Kasper 1980; Lawrence 1951; Lyon 1937; Olsen 1960; Smith 1979) and comparative osteological collections housed at the U.C. Berkeley Museum of Vertebrate Zoology, the U.C. Berkeley Archaeological Research Facility, and the California Academy of Sciences.

Quantification of these faunal remains relies on the more basic ordinal counting strategies involving the determination of the total numbers of bones and bone fragments and the number of identifiable specimens per taxon (NISP) (Grayson 1984). The faunal remains recovered from each site are treated as separate single aggregates for

the purposes of NISP and minimum number of individuals (MNI) generation (Grayson 1984). The NISP measure is a straight count of the number of skeletal elements per taxon. Minimum numbers of individuals were determined by adding up numbers of the most common paired elements of a given species (Grayson 1984; Klein and Cruz-Uribe 1984). The NISP measures are the focus of this paper.

RESULTS

The more discretely identifiable species of mammals from these excavations are illustrated in Table 1. A total of 2,814 mammalian skeletal elements were identified from the Fort Ross Beach Site. Two thousand and ninety-seven (2,097) of these skeletal elements are bone fragments identifiable only as mammal. A somewhat larger total of 3,366 mammalian skeletal elements were identified from the NAVS. Two thousand eight hundred and thirty-six (2,836) of these are bone fragments identifiable only as mammal. The high degree of fragmentation could be due to trampling and/or marrow extraction activities (Binford 1978; Gifford-Gonzalez et al. 1985; Lyman 1991). The identified mammal groups are briefly discussed below.

One of the interesting points of Table 1 is the relatively low number of intrusive insectivores and rodents, which are typically much more common in "Californian" faunal assemblages (Bickel 1981; Langenwaller et al. 1989; Chartkoff and Chartkoff 1983; Duque 1989; Gifford and Marshall 1984; Simons 1990; White 1984). In light of the many accounts of crop destruction by rodents at Ross (Khlebnikov 1976; Essig 1933), I expected to find a large number of rodent remains. However, that was simply not the case. Rodents are poorly represented in both assemblages.

Rabbits (*Lagomorpha*) are typically well represented in "Californian" faunal assemblages (Bickel 1981; Chartkoff and Chartkoff 1983; Duque 1989; Gifford and Marshall 1984; Langenwaller et al. 1989; Schwaderer 1992; White

Table 1: Relative Frequency of Identified Mammals

Fort Ross Beach Site			Native Alaskan Village Site		
Common name	Scientific name	#	Common name	Scientific name	#
mole	<i>Scapanus latimanus</i>	2	carnivores	Carnivora	6
canid	<i>Canis sp.</i>	2	canid	Canidae	3
wolf	<i>Canis cf. lupus</i>	1	coyote	<i>Canis latrans</i>	1
coyote	<i>Canis cf. familiaris</i>	1	cat	<i>Felis sp.</i>	1
bear	<i>Ursus sp.</i>	2	grizzly bear	<i>Ursus arctos</i>	1
mustelids	Mustelidae	1	mustelids	Mustelidae	3
sea otter	<i>Enhydra lutris</i>	13	sea otter	<i>Enhydra lutris</i>	3
seals	Pinnipedia	121	seals	Pinnipedia	57
eared seals	Otariidae	125	eared seals	Otariidae	82
s. sea lion	<i>cf. E. jubatus</i>	3	s. sea lion	<i>cf. E. jubatus</i>	3
ca. sea lion	<i>Z. californianus</i>	61	ca. sea lion	<i>Z. californianus</i>	26
earless seals	Phocidae	1	n. fur seal	<i>C. ursinus</i>	1
elephant seal	<i>cf. M. angustirostris</i>	1	elephant seal	<i>cf. M. angustirostris</i>	0
harbor seal	<i>Phoca vitulina</i>	88	harbor seal	<i>Phoca vitulina</i>	26
whale	Cetacea	0	whale	Cetacea	2
porpoise	Phocoenidae	4	porpoise	Phocoenidae	4
pig	<i>Sus scrofa</i>	5	pig	<i>Sus scrofa</i>	3
artiodactyl	Artiodactyla	2	artiodactyl	Artiodactyla	61
elk	<i>Cervus elaphus</i>	2	elk	<i>Cervus elaphus</i>	7
mule deer	<i>Odocoileus hemionus</i>	153	mule deer	<i>Odocoileus hemionus</i>	132
cattle/sheep	Bovidae	62	cattle/sheep	Bovidae	0
cow	<i>Bos taurus</i>	41	cow	<i>Bos taurus</i>	35
goat	<i>Capra hircus</i>	1	goat	<i>Capra hircus</i>	0
sheep	<i>Ovis aries</i>	22	sheep	<i>Ovis aries</i>	33
ca. vole	<i>Microtus californicus</i>	1	gopher	<i>Thomomys bottae</i>	40
woodrat	<i>Neotoma fuscipes</i>	1	woodrat	<i>Neotoma fuscipes</i>	0
cottontail	<i>Sylvilagus sp.</i>	1	cottontail	<i>Sylvilagus sp.</i>	0
Total		717			530

1984). I expected to find a relatively high frequency of rabbits in these assemblages. However, rabbits are poorly represented in both the Beach site and NAVS faunal assemblages (Table 1).

The majority of the domestic animals found in these assemblages such as cattle, sheep, and pigs, were originally purchased by the Russians from the Spanish (Essig 1933; Khlebnikov 1976). According to historical records, a substantial number of pigs were at Fort Ross (Khlebnikov 1976; Essig 1933). However, pigs are not common in these assemblages. This is actually not that surprising. Many of the pigs reported killed for food were used to provision ships (Khlebnikov 1976). Khlebnikov (1976:119) relates that the pigs at colony Ross reportedly ate shellfish and had "a dreadful taste." While on Kodiak Island, the Russian explorer Davydov discovered, to his amazement, "that not a single of the islanders will eat pork, because they say this animal lives on all sorts of dirt (Hrdlicka 1944)." A combination of these factors may explain the poor representation of pigs in both assemblages.

Cattle were used as draft animals and provided tallow, hides, and butter to the colony (Khlebnikov 1976:121-122). It appears that cattle were equally important as a source of meat. Rations of beef were distributed as payment for manual labor (Khlebnikov 1990:146), and dried and salted beef was packed for sea voyages (Khlebnikov 1976:127). Cattle are well represented in both assemblages.

Historical records indicate that a number of sheep were present at Fort Ross (Khlebnikov 1976). Sheep were important primarily for their wool. However, they were also eaten (Khlebnikov 1976, 1990:146). Sheep are present in both assemblages.

The *Cervids* (deer and elk) are well represented in both samples. Deer, and to a lesser extent elk, were an important food resource at Ross (Khlebnikov 1990:192). Both species were hunted by all ethnic groups present at the colony (Khlebnikov 1990:51). *Cervids*, in general, were

an important resource throughout California (Bickel 1981; Simons 1992; White 1984). The importance of *Cervid* remains in this assemblage will be discussed later.

Remains of three species of large carnivores (bears, dogs, and cats) are present in these assemblages. Although low in number, these remains represent animals that were a very real threat to both the colonists and livestock. Khlebnikov states that "sometimes livestock became separated from the herd and were killed by bears and wildcats" (Khlebnikov 1976:119).

Relatively low numbers of sea otter remains are found in these assemblages. This seems somewhat strange for a fur company trading base like Fort Ross. However, this is probably due to the processing of otters for their pelts at sea or elsewhere away from Fort Ross (Ogden 1941:97). The number of sea otters obtained in the immediate area of the colony diminished dramatically during the first ten years of its existence (Khlebnikov 1976:108).

Seals are well represented in both samples. Seals were used in a variety of ways at Fort Ross, such as food (Khlebnikov 1990:192), furs (Khlebnikov 1976:123), intestines (for *kamleikas* [waterproof gutskin outer garments]), and hides, or *lav-taks* (treated sea lion skins), for *baidarkas* (closed skin boats or kayaks) and *baidaras* (open skin boats) (Khlebnikov 1976:123). Sea lions make up the majority of the seal remains. Harbor seals are also well represented. Only one fur seal element appears in either assemblage. This is noteworthy since, like the sea otter, the Russian-American Company sought fur seals for their valuable pelts and stored them at Ross (Khlebnikov 1976). Fur seals captured by the company were probably processed for their pelts elsewhere.

Interestingly, the two main attributes of the Beach Site and NAVS marine mammal assemblages, a low number of sea otter remains and high percentage pinniped skeletal elements, correspond well to faunal assemblages excavated from Kodiak Island, Alaska (Clark 1974, 1985;

Knecht and Jordan 1985), and from Yakutat Bay, Alaska (De Laguna 1972). The opposite is seen in San Francisco Bay, where sea otters appear to have been an important food resource, and pinnipeds appear less frequently (Simons 1992).

The Beach Site faunal assemblage contains an extraordinarily low frequency of burnt bone, only 1.14%. The NAVS sample contains 1.6% burned bone. Such low frequencies of burned bone are not typical for coastal sites of native Californians. Most other coastal sites in California contain much higher percentages of burned bones, somewhere between 30 to 80 percent (Duque 1989; Langenwalter et al. 1989; White 1984).

DISCUSSION

The results provided above exhibit a number of interesting patterns which help elucidate the depositional history of the Fort Ross Beach Site and the NAVS. There is evidence of significant cultural and/or dietary exchange to be seen in these faunal assemblages. However, there are also aspects that show a strong continuity of traditional Alaskan and Californian dietary practices.

Of all the mammal groups represented, the seals show some of the most interesting patterning. Seals are well represented in both assemblages, with proportions greater than in the majority of late central Californian coastal sites (Gifford and Marshall 1984; Hildebrandt and Jones 1992; Langenwalter et al. 1989; Schwaderer 1992; Simons 1990, 1992). Seals make up roughly 56% of the identified mammal remains at the Beach Site (Figure 1). However, they make up only 36% of the identified mammals at the NAVS, a significant difference (Figure 2). It should be noted that the elements listed as "Artiodactyl" on Table 1 have been divided evenly between the bovidae and the cervidae in Figures 1 and 2. While there is a 20% difference in the frequency of seal elements between these two sites, the actual distribution of individual skeletal elements is virtually the same. This indicates that when seals were present, they were being treated similarly in

both areas. Meatier portions of these animals such as long bones and vertebrae, are poorly represented. Hand and foot bones, or flipper elements, make up the largest class of seal bones recovered, representing close to half of the seal elements in both samples (Figures 3-4).

The patterning seen in the seal remains at both sites, especially with respect to the flipper elements, reflects butchery practices and food preferences found throughout coastal Alaska. Seal flippers were consumed as specially prepared delicacies throughout coastal Alaska (Birket-Smith and De Laguna 1938:99; De Laguna 1972:396-397; Hughes 1984). Birket-Smith and De Laguna (1938:99) state that amongst the Eyak of the Copper River Delta, "Seal flippers, considered the best part of the seal, were never given to children..." Flipper elements dominate the seal assemblages at Ross (Figures 3-4).

Large game mammals are not indigenous to Kodiak Island or the Aleutian Islands (Smith 1979). The NAVS contains a greater frequency of large terrestrial mammals than does the Beach Site. Native Alaskan hunters from these island archipelagos would most likely lack the skill to be a successful terrestrial hunter in California. Therefore, the inhabitants of this site either had to learn the necessary skills to hunt deer in California, or have the animals provided for them by persons with the necessary abilities.

A comparison of the deer element distribution shows some interesting patterns (Figures 5-6). The NAVS contains fewer low utility skeletal elements than the FRBS. This is best exemplified by the greater frequency of lower leg elements found at the Beach Site (Figure 5). Differential preservation could be a possibility. However, the pinniped remains discussed previously have virtually identical element distributions at both sites. Differential survivorship of seal skeletal elements based on their bulk densities is not indicated (Lyman 1984). Likewise, the differences seen in the deer assemblages probably are not directly attributable solely to the survival of denser skeletal elements or mineral decomposition at the

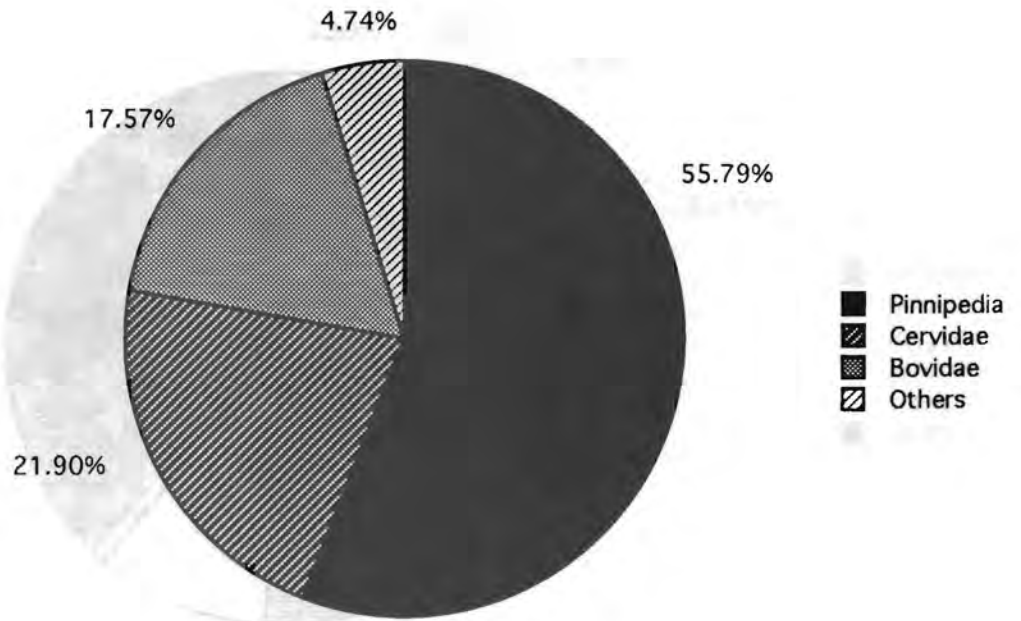


Figure 1: Fort Ross Beach Site Mammal Groups

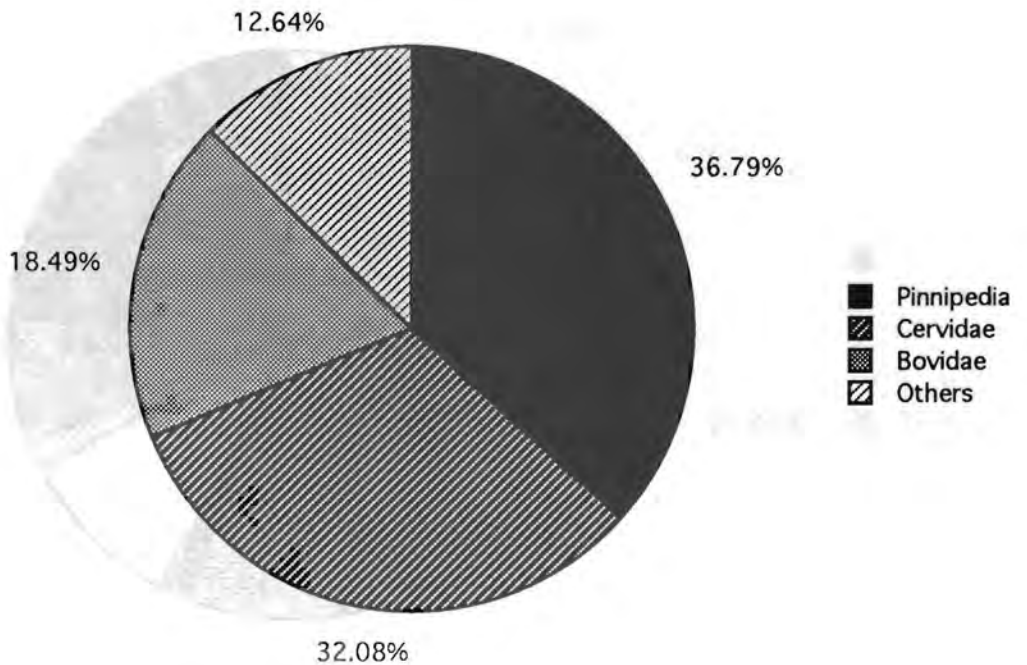


Figure 2: Native Alaskan Village Site Mammal Groups

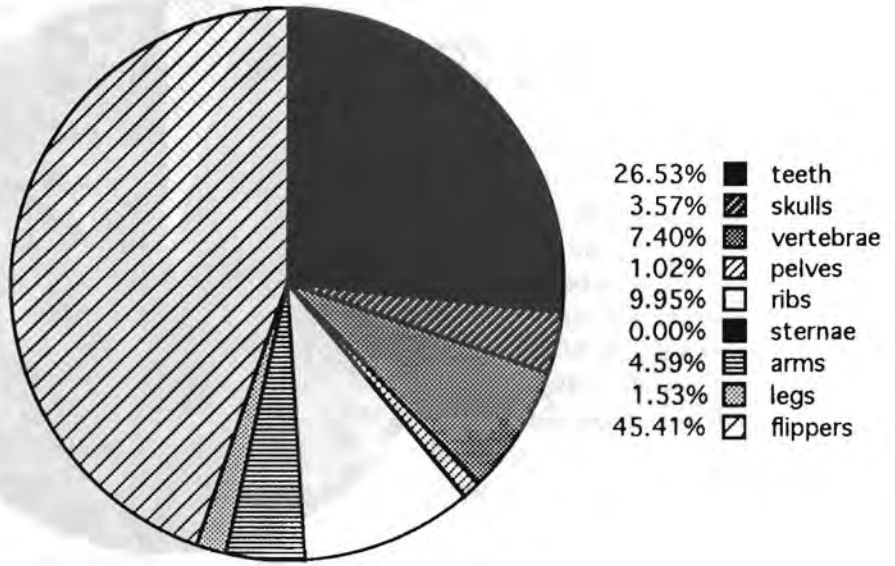


Figure 3: Fort Ross Beach Site Seal Element Distribution

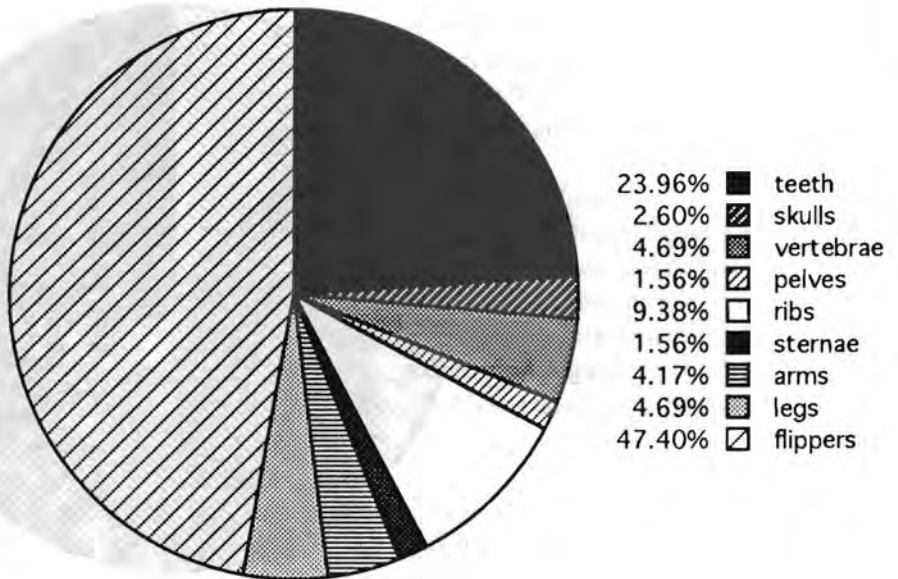


Figure 4: Native Alaskan Village Site Seal Element Distribution

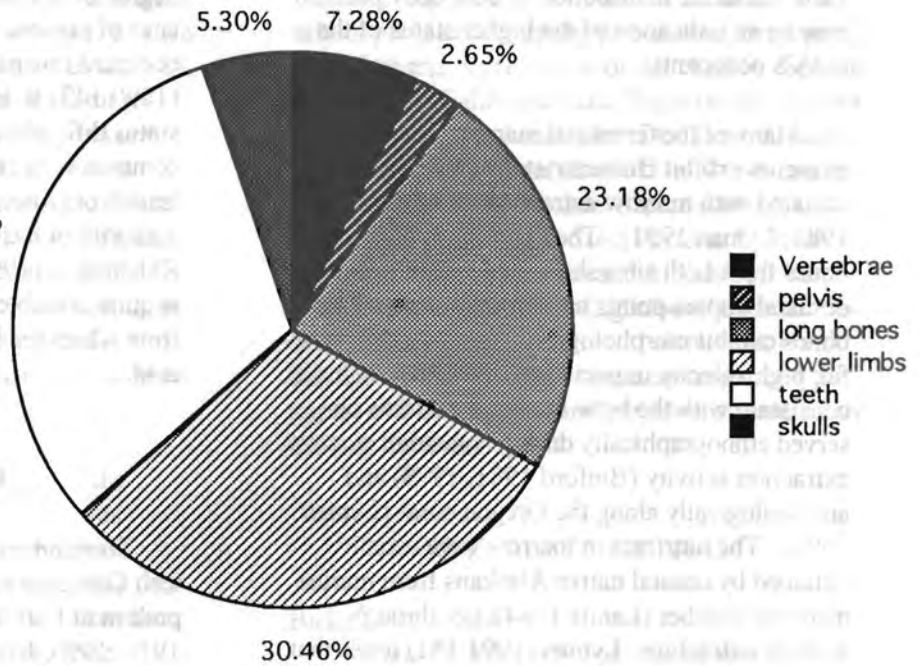


Figure 5: Fort Ross Beach Site Deer Element Distribution

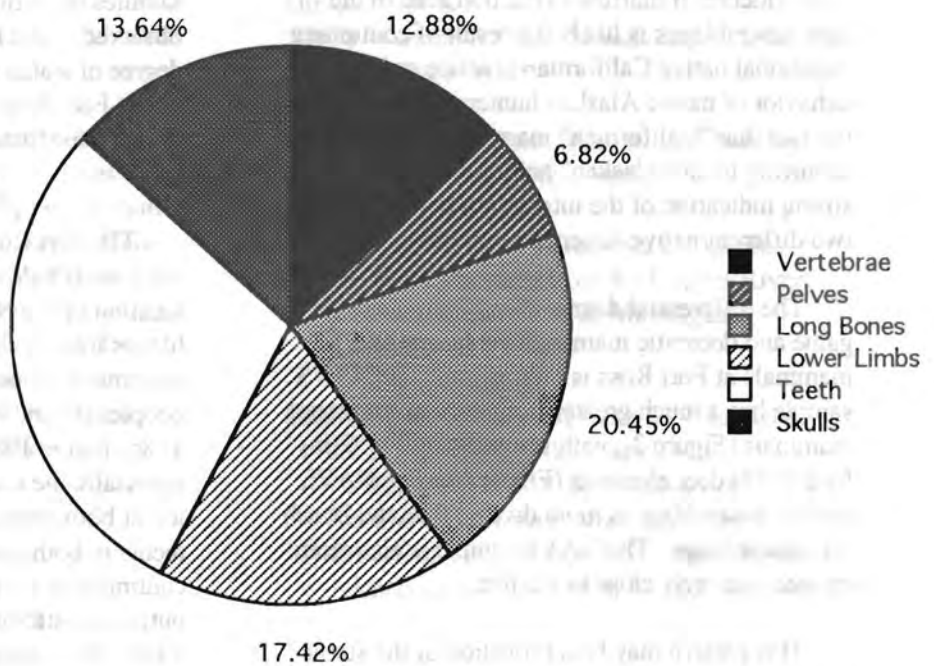


Figure 6: Native Alaskan Village Site Deer Element Distribution

Beach Site (Hare 1980; Lyman 1984). The variation in the distribution of deer body parts may be an indication of the higher status of the NAVS occupants.

Many of the terrestrial mammal long bone elements exhibit characteristics commonly associated with marrow extraction (Binford 1978, 1981; Lyman 1991). The majority of deer long bones from both sites show evidence of proximal or distal impact points and/or flake scars. These bones exhibit morphologies indicative of purposeful, high velocity impact (Johnson 1983). This is consistent with the bone breakage patterns observed ethnographically during Nunamiut marrow extraction activity (Binford 1981, 1978) and archaeologically along the Oregon coast (Lyman 1991). The nutrients in marrow were usually obtained by coastal native Alaskans from marine mammal blubber (Lantis 1984), not through marrow extraction. Lyman (1991:161) notes that harbor seal bones are poor sources of marrow due to their dense nature, and were not broken open.

The extraction of marrow was a practice considered common among native Californians. The evidence of marrow extraction seen in the deer assemblages is likely the result of continuing traditional native Californian practice or learned behavior of native Alaskan hunters. At any rate, the fact that "Californian" marrow extraction was occurring in an "Alaskan" habitation area is a strong indication of the interaction between these two different native American cultures.

The differential distribution of terrestrial game and domestic mammals versus marine mammals at Fort Ross is interesting. The NAVS sample has a much greater frequency of terrestrial mammals (Figure 2), with fewer low utility (Binford 1978) deer elements (Figure 6). The NAVS artifact assemblage is more diverse than the Beach Site assemblage. The NAVS sample is also from an area relatively close to the fort.

This pattern may be a reflection of the status of the persons living in the location of the NAVS sample. Close proximity to the stockade, greater

access to preferred European foods, and a greater degree of artifact diversity all point to the presence of persons of relatively higher status having occupied this part of the NAVS. Khlebnikov (1990:143) states clearly that there was strong status differentiation in the native American community at Fort Ross. Each tribal group had a leader, or "*toion*". Each tribal *toion* was under the authority of a chief *toion*. The majority of *toions* Khlebnikov (1990) refers to are native Alaskan. It is quite possible that a *toion* occupied the housepit from which the NAVS faunal remains were recovered.

CONCLUSIONS

To summarize, according to Russian American Company records, Native Alaskans were present at Fort Ross in large numbers (Khlebnikov 1976, 1990; Essig 1933). A NAVS is located on the 1817 map of Ross, to the south and west of the garrison (Fedorova 1973). The inhabitants of this site included a number of Coast Miwok and Pomo women (Istomen 1992; Khlebnikov 1976, 1990), and perhaps members of their extended families (Lightfoot et al. 1991). The patterns observed in the faunal assemblages point to some degree of status differentiation outside the stockade at Fort Ross. Such status differentiation is noted in the historical record (Khlebnikov 1990:-143).

The Fort Ross Beach Site lies at the foot of a steep bluff below the area corresponding to the location of the NAVS. The archaeo-faunal assemblages from both sites include a variety of marine mammal species preferred by native Alaskan peoples (Clark 1974; De Laguna 1972; Hughes 1984; Lantis 1984). These marine mammals, especially the seals, were treated in a similar fashion at both sites. The great number of flipper elements in both assemblages is indicative of a continuation of traditional Alaskan dietary and butchery patterns (Birket-Smith and De Laguna 1938; De Laguna 1972).

The very low frequency of burned bone

(approximately 1%) helps set both sites apart from more typical Californian faunal assemblages, which usually have far greater percentages of such material (Duque 1989; Langen-walter et al. 1989; White 1984). The virtual absence of rabbit remains is also a notable difference. Rabbits are usually fairly well represented in Californian mammal bone assemblages (Bickel 1981; Chartkoff and Chartkoff 1983; Duque 1989; Gifford and Marshall 1984; Langenwalter et al. 1989; Schwaderer 1992; White 1984). However, there is also a strong indication of more typically "Californian" marrow extraction practices seen in the deer remains (Binford 1978; Lyman 1991).

All things considered, it appears that the historic period component of these sites was formed largely by persons of native Alaskan origin dumping their household garbage near their living area or down the side of the hill below their houses. The faunal remains from Fort Ross suggest that some "Californian" dietary practices may have been adopted by native Alaskans, and that Californians may have adopted some "Alaskan" dietary practices. While European domesticated mammals such as cattle and sheep were used relatively frequently, it is apparent that both ethnic groups continued some aspects of their traditional dietary patterns while cohabiting.

There are certain aspects of each culture's diet that appear to be quite conservative, such as consumption of marine mammal flippers by native Alaskans and marrow extraction by native Californians. In general, the NAVS - Beach Site complex is not a typical "Californian" habitation site. Specifically, the ethnicity and social status of the persons responsible for the production of these faunal assemblages is indicated by their dietary refuse. These conclusions should become more clear as the remainder of the faunal assemblages from Fort Ross is examined further.

ACKNOWLEDGMENTS

The majority of the fieldwork undertaken at Fort Ross State Historic Park since 1988 has been

conducted by undergraduate and graduate students participating in the U.C. Berkeley summer field school program, under the direction of Dr. Kent G. Lightfoot and organization of Ann Schiff. Special thanks go to California State Department of Parks and Recreation archaeologists Dr. Glenn J. Farris and E. Breck Parkman, ranger Dan Murley, ranger Bill Walton, ranger Michael Stevenson, and the entire staff of Fort Ross State Historic Park for their invaluable assistance and friendship. Very special thanks go to Kent Lightfoot for his continued guidance and inspiration. I also thank Frank Bayham for his valuable comments regarding this paper. All conclusions and any inconsistencies are entirely my own.

REFERENCES CITED

- Bickel, Polly McW.
1981 *San Francisco Bay Archaeology: Sites ALA-328, ALA-13, and ALA-12*. Contributions of the University of California Archaeological Research Facility No. 43. Berkeley.
- Binford, Lewis R.
1978 *Nunamuit Ethnoarchaeology*. Academic Press, New York.
- 1981 *Bones: Ancient Men and Modern Myths*. Academic Press, New York.
- Birket-Smith, Kaj, and Frederica De Laguna
1938 *The Eyak Indians of the Copper River Delta, Alaska*. Levin & Munksgaard, Copenhagen.
- Chartkoff, Joseph L., and Kerry K. Chartkoff
1983 Excavations at the Patrick Site (4-Butte-1). In *The Archaeology of Two Northern California Sites*, edited by Ernestine S. Elster, pp. 1-52. Institute of Archaeology, Monograph No. 22. University of California, Los Angeles.

- Clark, Donald W.
1974 *Koniag Prehistory: Archaeological Investigations at Late Prehistoric Sites on Kodiak Island, Alaska*. Tubinger Monographien zur Urgeschichte, Band No. 1. Verlag W. Kohlhammer, Stuttgart.
- 1985 Archaeological Test at the Three Saints Bay Colony, Alaska. *Historical Archaeology* 19:114-121.
- Crader, Diana C.
1984 The Zooarchaeology of the Storehouse and the Dry Well at Monticello. *American Antiquity* 49:542-557.
- 1990a Faunal Remains from Slave Quarter Sites at Monticello, Charlottesville, Virginia. *Archaeozoologia* 3(1-2):229-236.
- 1990b Slave Diet at Monticello. *American Antiquity* 55:690-717.
- De Laguna, Frederica
1972 *Under Mount Saint Elias: The History and Culture of the Yakutat Tlingit*. Smithsonian Contributions to Anthropology Volume 7, Part 1. Smithsonian Institution Press, Washington D.C.
- Duque, Mercedes
1989 Analysis of Faunal Remains from the Three Springs Valley. In *Archaeology of the Three Springs Valley, California: A Study of Functional Cultural History*, edited by Brian D. Dillon and Matthew A. Bost, pp. 102-121. Institute of Archaeology, Monograph No. 30. University of California, Los Angeles.
- Essig, E.O.
1933 The Russian Settlement at Ross. In *The Russians in California*, pp. 3-28. Special Publication No. 7. California Historical Society, San Francisco.
- Farris, Glenn J.
1989 The Russian Imprint on The Colonization of California. In *Columbian Consequences* (vol. 1), edited by David Hurst Thomas, pp. 481-498. Smithsonian Institution Press, Washington D.C.
- Fedorova, Svetlana G.
1973 *The Russian Population in Alaska and California in the Late 18th Century - 1867*, translated by R.A. Pierce and A.S. Donneley. Limestone Press, Kingston, Ontario.
- Gifford, Diane P., and Francine Marshall
1984 *Analysis of the Archaeological Assemblage from CA-SCR-35, Santa Cruz County, California*. Archives of California Prehistory No. 2. Coyote Press, Salinas.
- Gifford-Gonzalez, Diane P., David B. Damrosch, Debra R. Damrosch, John Pryor, and Robert L. Thunen
1985 The Third Dimension in Site Structure: An Experiment in Trampling and Vertical Dispersal. *American Antiquity* 50:803-818.
- Gilbert, B. Miles
1980 *Mammalian Osteology*. Modern Printing, Laramie.
- Grayson, Donald K.
1984 *Quantitative Zooarchaeology: Topics in the Analysis of Archaeological Faunas*. Academic Press, New York.
- Gust, Sherry M.
1983 Problems and Prospects in Nineteenth Century California Zooarchaeology. In *Forgotten Places and Things: Archaeological Perspectives on American History*, edited by A. Ward, pp. 341-348. Center for Anthropological Studies, Albuquerque.
- Hare, P.E.
1980 Organic Geochemistry of Bone and Its Relation to the Survival of Bone in the Natural Environment. In *Fossils in the Making. Vertebrate Taphonomy and Paleoecology*, edited by Anna K. Behrensmeyer and A.P. Hill, pp. 208-219. University of Chicago Press, Chicago.

- Hildebrandt, William R., and Terry L. Jones
1992 Evolution of Marine Mammal Hunting: A View from the California and Oregon Coasts. *Journal of Anthropological Archaeology* 11:360-401.
- Hrdlicka, Ales
1944 *The Anthropology of Kodiak Island*. The Wistar Institute of Anatomy and Biology, Philadelphia.
- Hughes, Charles C.
1984 Saint Lawrence Island Eskimo. In *Arctic*, edited by David Damas, pp. 262-277. Handbook of North American Indians, Volume 5, William C. Sturtevant, general editor. Smithsonian Institution, Washington D.C.
- Istomen, Alexi A.
1992 *The Indians at the Ross Settlement. According to the Censuses by Kuskov. 1820-1821*. Fort Ross Interpretive Association, Jenner, California.
- Johnson, Eileen
1983 A Framework for Interpretation in Bone Technology. In *Carnivores. Human Scavengers and Predators: A Question of Bone Technology*, edited by Genevieve M. LeMoine and A. Scott MacEachern, pp. 55-93. Proceedings of the 15th Annual Conference of the Archaeological Association of the University of Calgary.
- Jolley, Robert L.
1983 North American Historic Sites Zooarchaeology. *Historical Archaeology* 17:64-79.
- Kasper, Jan C.
1980 *Skeletal Identification of California Sea Lions and Harbor Seals for Archaeologists*. Ethnic Technology Notes No. 17. San Diego Museum of Man, San Diego.
- Khlebnikov, Kyrill T.
1976 *Colonial Russian America: Kyrill T. Khlebnikov's Reports, 1817-1832*, translated and edited by Basil Dmytryshyn and E.A.P. Crownhart-Vaughan. Oregon Historical Society, Portland.
- 1990 *The Klebnikov Archive, Unpublished Journal (1800-1837) and Travel Notes (1820, 1822, and 1824)*. The Rasmuson Library Historical Translation Series, Volume 5, edited by Leonard Shur, and translated by J. Bisk. University of Alaska, Fairbanks.
- Klein, Richard G., and Katharine Cruz-Urbe
1984 *The Analysis of Animal Bones from Archaeological Sites*. University of Chicago Press, Chicago.
- Knecht, Richard A., and Richard H. Jordan
1985 Nunakakhnak: An Historic Period Koniag Village in Karluk, Kodiak Island, Alaska. *Arctic Anthropology* 22(2):17-35.
- Langenwarter, Paul E., II, Richard L. Reynolds, Brenda Bowser, and Richard W. Huddleston.
1989 Appendix 1: Vertebrate Animal Remains from CA-MNT-108, an Early Period Archaeological Site on the Monterey Peninsula, California. In *Archaeological Excavations at CA-MNT-108, at Fishermans Wharf, Monterey, Monterey County, California*, edited by Gary S. Breschini and Trudy Haversat, pp. 97-126. Archives of California Prehistory No. 29. Coyote Press, Salinas.
- Lantis, Margaret
1984 Aleut. In *Arctic*, edited by David Damas, pp. 161-184. Handbook of North American Indians, Volume 5, William C. Sturtevant, general editor. Smithsonian Institution, Washington D.C.
- Lawrence, Barbara
1951 Post-Cranial Skeletal Characters of Deer, Pronghorn, and Sheep-Goat, With Notes on Bos and Bison. *Papers of the Peabody Museum of American Archaeology and Ethnology* 25(3):9-43.

- Lightfoot, Kent G., Thomas A. Wake, and Ann M. Schiff
 1991 *The Archaeology and Ethnohistory of Fort Ross, California* (vol. 1). Contributions of the University of California Archaeological Research Facility No. 49. Berkeley.
- Lyman, R. Lee
 1984 Bone Density and Differential Survivorship in Fossil Classes. *Journal of Anthropological Archaeology* 3:259-299.
 1987 On the Zooarchaeological Measures of Socioeconomic Position and Cost-Efficient Meat Purchases. *Historical Archaeology* 21:58-66.
 1991 *Prehistory of the Oregon Coast*. Academic Press, New York.
- Lyon, Gretchen M.
 1937 Pinnipeds and a Sea Otter from the Point Mugu Shell Mound of California. *Publications of the University of California at Los Angeles in Biological Sciences* 1:133-168.
- McKee, Larry W.
 1987 Delineating Ethnicity from the Garbage of the Early Virginians: Faunal Remains from the Kingsmill Plantation Slave Quarters. *American Archaeology* 6:31-39.
- Ogden, Adele
 1941 *The California Sea Otter Trade, 1784-1848*. University of California Press. Berkeley.
- Olsen, Stanley J.
 1960 Post-Cranial Skeletal Characters of Bison and Bos. *Papers of the Peabody Museum of Archaeology and Ethnology* 35(4).
- Schultz, Peter D., and Sherry M. Gust
 1983 Faunal Remains and Social Status in Nineteenth Century Sacramento. *Historical Archaeology* 17:44-53.
- Schwaderer, Rae
 1992 Archaeological Test Excavation at the Duncan's Point Cave, CA-SON-348/H. In *Essays on the Prehistory of Maritime California*, edited by Terry L. Jones, pp. 55-72. Center for Archaeological Research at Davis, Publication No. 10. University of California, Davis.
- Simons, Dwight D.
 1990 Vertebrate Remains from the Albion Sites. In *Western Pomo Prehistory, Excavations at Albion Head, Nightbird's Retreat, and Three Chop Village, Mendocino County, California*, edited by Thomas N. Layton, pp. 37-51. Institute of Archaeology, Monograph 32. University of California, Los Angeles.
 1992 Prehistoric Mammal Exploitation in the San Francisco Bay Area. In *Essays on the Prehistory of Maritime California*, edited by Terry L. Jones, pp. 73-104. Center for Archaeological Research at Davis, Publication No. 10. University of California, Davis.
- Smith, George S.
 1979 *Mammalian Zooarchaeology, Alaska: A Manual for Identifying and Analyzing Mammal Bones from Archaeological Sites in Alaska*. Anthropology and Historic Preservation Cooperative Park Studies Unit Occasional Paper No. 18. University of Alaska, Fairbanks.
- White, Greg
 1984 *The Archaeology of Lak-510, Near Lower Lake, Lake County, California*. Anthropological Studies Center, Sonoma State University Academic Foundation, Rohnert Park, California.