Subsistence, Ethnicity, and Vertebrate Exploitation at Colony Ross

Thomas A. Wake
Zooarchaeology Laboratory, UCLA Institute of Archaeology

Introduction

This article examines vertebrate faunal remains and bone artifacts recovered from the Native Alaskan Neighborhood at Colony Ross. These two broad artifact classes serve as a means to study aspects of ethnicity and cultural interaction of Native American peoples under the domination of a European colonial power in California. Colony Ross, now incorporated as part of Fort Ross State Historic Park in Sonoma County (Figure 1), was established by the Russian-American Company (RAC) as a fur trading and agricultural colony in 1812. The Colony existed until 1841, when it was sold to John Sutter (Farris 1983, 1989; Spencer-Hancock 1980). Four main ethnic groups were present at Colony Ross: Native Alaskans, Native Californians, Creoles, and Russians. Historical accounts suggest a great deal of interaction between these people (Istomen 1992; Jackson 1983; Lightfoot *et al.* 1991). Such close interaction provided a situation ripe for the exchange of different cultural practices and preferences.

Lightfoot *et al.* (1991, 1993) divide Colony Ross into three general areas corresponding to the dominant ethnic group present: the Russian Neighborhood, the Native Californian Neighborhood, and the Native Alaskan Neighborhood (Figure 2). The Native Alaskan Neighborhood (NAN), as defined here, consists of two sites: the Native Alaskan Village Site (NAVS), and the Fort Ross Beach Site (FRBS).

A large number of animal bones have been recovered during excavations in the NAN at Ross from 1987 to 1992. A total of 4,457 identified fish, bird, and mammal bones from NAN were examined in detail and are discussed here. The fish remains were analyzed by Kenneth W. Gobalet (Gobalet 1997). The bird remains were analyzed by Dwight D. Simons (Simons 1997). The mammal remains and bone tools were analyzed by Thomas A. Wake (1995, 1997a, 1997b, 1997c). The bone tools from NAN are also discussed here since they are, in essence, heavily modified faunal remains, were used in part to capture vertebrate prey, and perhaps most importantly, show interesting ethnic patterns.

This paper summarizes these analyses and discusses these vertebrate faunal remains and bone artifacts in an approach similar to the multi-ethnic, direct historical investigation of contact period cultural exchange found in Lightfoot *et al.* (1991, in press) and modeled by other authors (Deetz 1991; Falk 1991; Kirch 1992; Sahlins 1981, 1985, 1992; Rogers 1990; Rogers and Wilson 1993). While the emphasis of this article is on the Native Alaskan inhabitants of NAN it is imperative to remember that other broad ethnic groups, Native Californians, Creoles, and Russians, all had roles in forming the archaeological record of this area.

Previous archaeological research at Colony Ross has evaluated the influence of diverse European colonial and commercial policies on the acculturation processes of Pacific Coast hunter-gatherers (Dilliplane 1985; Lightfoot 1995; Lightfoot *et al.* 1991, 1993, in press). One

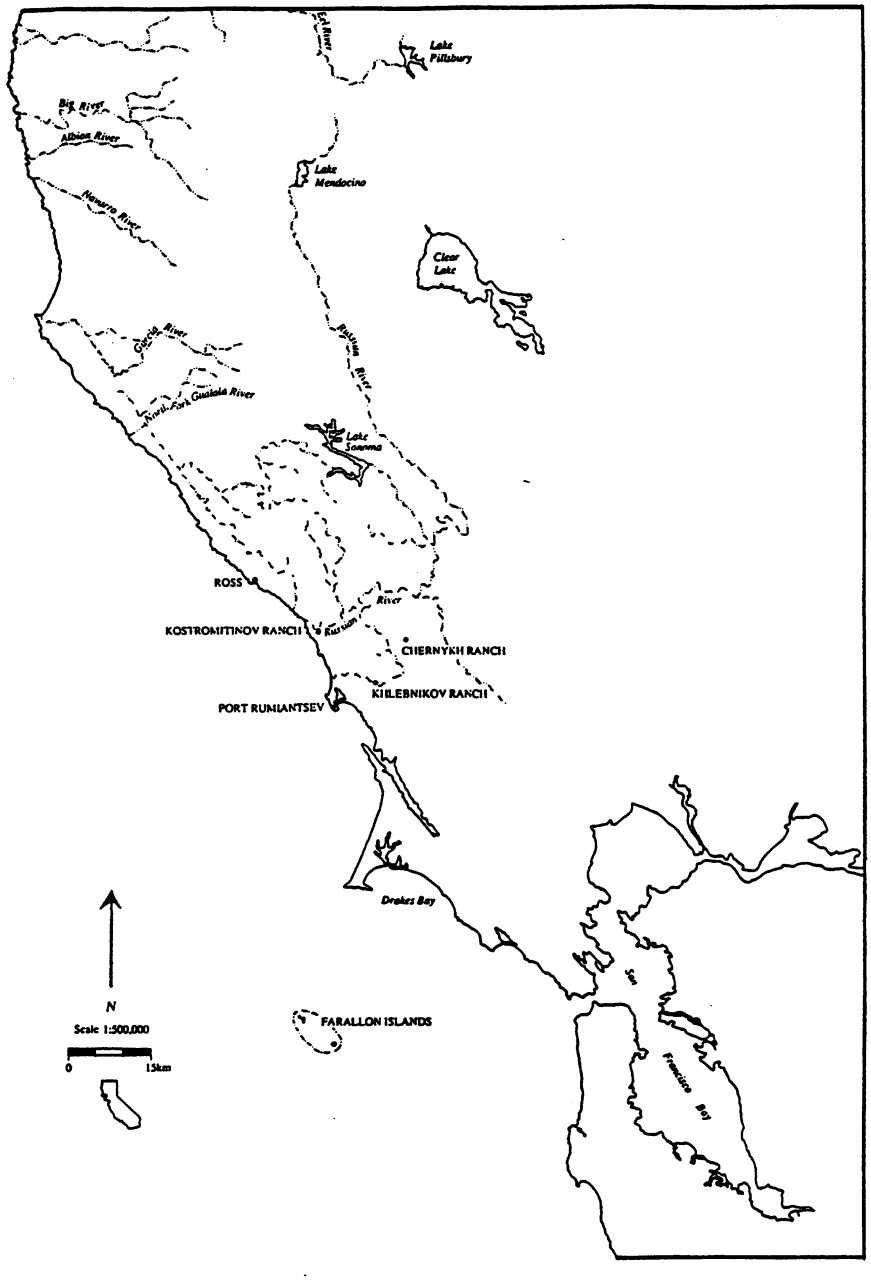

Figure 1. Location of Ross and Outlying Ranches (after Lightfoot *et al.* 1991)

goal of the research at Ross is to better understand the nature of the relationships existing between the various Native American groups represented at the Colony and the Russian and Creole inhabitants (Lightfoot *et al.* 1991, 1993, 1997). One of the major problems confronting the archaeological study of these questions at Ross involves the determination of the spatial patterning and interaction spheres of these various ethnic groups, and the degree to which they affected each other.

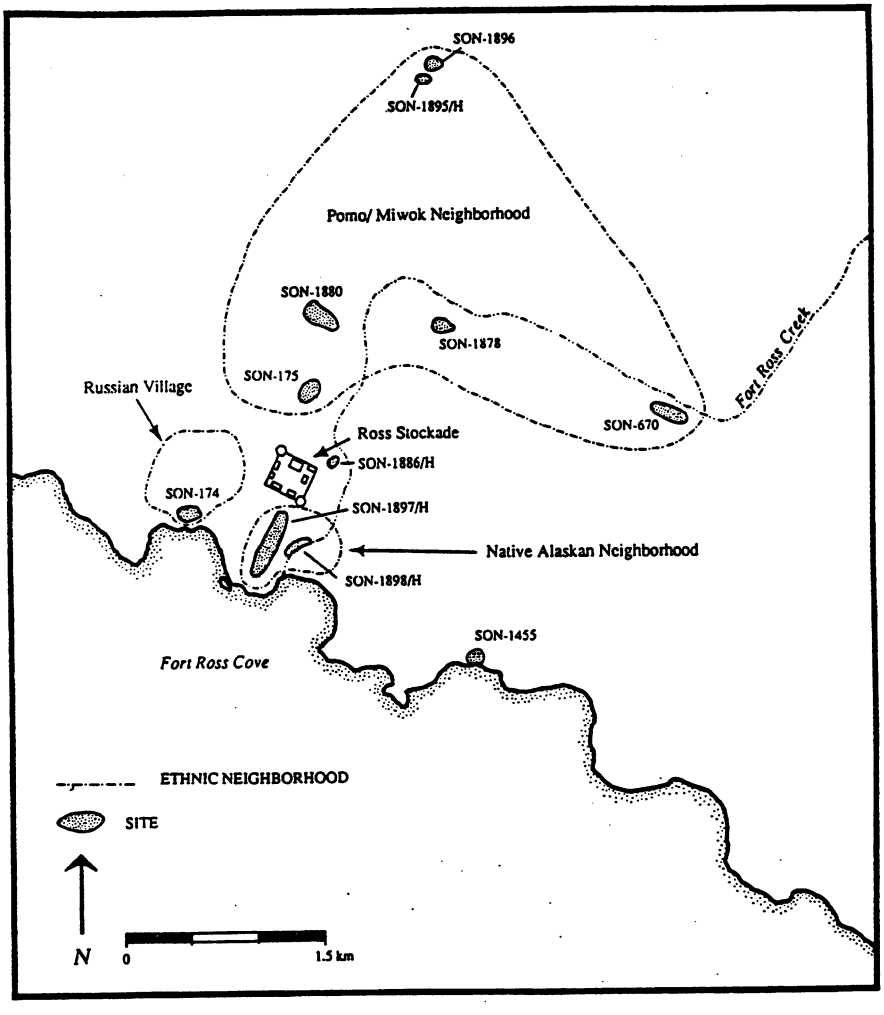

Figure 2. Ethnic Neighborhoods at Ross (after Lightfoot *et al.* 1991)

Profitability At Ross

The fundamental purpose of this colony's existence was strictly capitalistic; the Colony was established in order to make a profit (Chevigny 1965; Dmytryshyn *et al.* 1989; Okun 1951; Tikhmenev 1978). The profits made by the RAC stood quite literally on the backs of sea otters and their pelts. The luxuriant pelts of the sea otters were worth an incredible amount of money; one pelt was worth as much or more than the average company employee made in a whole year (Khlebnikov 1976, 1990; Tikhmenev 1978). In order to turn a profit, the company had to obtain as many pelts as it could in the most efficient fashion.

At first the Colony was quite profitable. However, as soon as the number of sea otter pelts provided began to wane, the colony began to become a financial burden to the RAC. It was only after the near demise of the California sea otter population in the early 1830s that the Colony began to emphasize its secondary purpose, agricultural production. While Ross was productive by the late 1830s, the majority of agricultural products received by the RAC were from the Spanish mission system and later, from Mexican ranchos (Gibson 1976; Khlebnikov 1976, 1990; Tikhmenev 1978).

In order to maximize the great wealth represented by the herds of sea otters in Alaska and California, the RAC had to capitalize on the resource while the market existed. To maximize the profits from this resource the company needed to come up with the greatest number of pelts in the shortest possible time. Russian agents and hunters quickly found that the existing European technology, namely large boats and firearms, was unsuited to large-scale exploitation of the sea otter resource for a variety of reasons (Davydov 1977; Khlebnikov 1976, 1990; Ogden 1941; Scammon 1874; Tikhmenev 1978). They soon discovered that the inhabitants of the Aleutian Islands and Kodiak possessed the skills and refined technology that was extremely well suited to the mass-hunting of sea otters.

The Russians also soon discovered that in order to obtain the numbers of sea otter pelts necessary to profit, they had to control the people who had the means to maximize the sea otter resource, the Native Alaskans of the Aleutian Islands and Kodiak. This they did quite directly, effectively, and at times brutally (Laughlin 1980; Tikhmenev 1978; Veltre 1990). To obtain the wealth it did, the RAC could not simply adopt the available Native Alaskan technology. Company representatives were fundamentally unfamiliar with the system these tools were a part of. The *promyshlenniki* (ethnic Russian hunters and frontiersmen) learned quite a bit about Native Alaskan technology. In order to profit, however, Russian representatives had to control an entire culture that over millennia had refined and produced a complex technological system geared towards marine mammal hunting and a general maritime existence.

The RAC did not have the luxury of borrowing a theoretical point, mechanical device, or computer program and adapting it to their needs. They could not exploit one specific technological attribute in order to profit in the sea otter trade. The Company had to control and exploit the entire hunting culture, its traditions, skills and complex, refined technology in order to realize the profits they were so hungry for. Furthermore, in order to profit from the control of this culture the RAC could not afford to obliterate that culture.

In fact, I would argue that the Company had a vested interest, whether they realized it or not, in making sure that the Native Alaskans they controlled continued to practice many of

their traditions, both technological and dietary. The result was short term profitability and controllable Native Alaskan laborers. Aspects of this control and the simultaneous continuity of key Native Alaskan cultural traditions can be seen in both the historical and archaeological records at Colony Ross, and the layout of the colony itself.

Cultural Interaction At Colony Ross

Many studies show that cultures do not tend to change overnight, even with a considerable amount of pressure and introduction of new and different material culture (Deagan 1983, 1987; McGuire 1982; O'Shea and Ludwickson 1992; Rogers 1990; Rogers and Wilson 1993). Acculturation (*sensu* Quimby 1951; Redfield *et al.* 1936; Rogers and Wilson 1993) is not unidirectional. It is clearly multidirectional, with cultural attributes and practices traveling from Native American to European, and *vice versa*, and at Colony Ross, Alaskan Native American to Californian Native American. People evaluate and incorporate new information, be it material or experiential, based on their knowledge of the past and pre-existing cultural norms (e.g. Piaget 1952, 1970; Sahlins 1985). These norms change in a complicated, dynamic fashion as contact continues (Sahlins 1981, 1985, 1990).

The degree of controlled persistence of traditional practices can be seen in the bone refuse and tools from Ross, especially at NAVS. Historically there are numerous accounts of Native Alaskan men continuing to practice aspects of their pre-Russian culture in California. For example, the use of *baidarkas* (skin boats) was of paramount importance at Ross. Skin boats were produced, maintained and stored at Ross (Khlebnikov 1976, 1990). All of the Russian officials at Ross, as well as some Native Californian women, were accustomed to travel in skin boats, an interesting example of what might be termed reverse acculturation in the classic sense (Khlebnikov 1976, 1990). Without *baidarkas*, not to mention the sophisticated hunting technology employed from them, sea otter hunting at the levels necessary for the profitability of the company would never have been possible.

A number of accounts of actual sea otter hunts exist (Khlebnikov 1976, 1990; Ogden 1941; Scammon 1874). The majority of these mention the use of *baidarkas* and other hunting technology such as waterproof garments, throwing boards, and sea otter darts. Some mention the hunting strategy and tactics used and the excitement generated by the presence of the sea otters (Scammon 1874). Historical accounts also refer to the actual production of waterproof garments at Colony Ross by Native Californian wives of Native Alaskan men (Khlebnikov 1976, 1990).

Such accounts beg the question of what else was produced and consumed at Ross that directly related to sea otter hunting and the persistence of Native Alaskan material culture. In order to answer this question we can turn to the archaeological record. The archaeological record discussed previously focuses on two important aspects of life at Colony Ross - diet and technology.

Dietary Remains

Analysis of dietary patterns seen in the archaeological record offers a great deal of information regarding the ethnic identity and behavior of the people who deposited the

archaeological remains. Study of vertebrate remains is integral to understanding the ethnic affiliations and cultural dynamics in the varied neighborhoods at Colony Ross, especially NAN. Analysis of vertebrate remains can provide information regarding both persistence and change in the inhabitants' diets that is simply unavailable in the historical record. Historical documents mention the consumption of marine mammals, domesticated mammals and wild game (Khlebnikov 1976, 1990; La Place 1986[1839]). Past *a priori* assumptions have pointed towards a generalized, agriculturally based diet, augmented by hunting, for the majority of the Colony's inhabitants (Spencer-Hancock 1980). Nowhere, however, are the relative contributions of these categories of animals to the colonists diets really discussed.

The study of vertebrate faunal remains can serve as a tool to help determine the ethnic composition of the Ross neighborhoods, and to gauge their relative degree of acculturation and social status. Persistence of precontact cultural traditions, often not reported in the historical record, can also be observed through the study of mammal remains and bone tools and debitage (Wake 1995, in press [b], 1997). A variety of studies have shown that "ethnicity" and social status at historical period archaeological sites can be determined rather broadly through observation of relative frequencies of dietary constituents and butchery patterns (e.g. Crabtree 1990; Crader 1984, 1990a, 1990b; Gust 1983; Jolley 1983; Langenwalter 1980, 1987; Lyman 1987; McKee 1987; Salls 1989; Schultz and Gust 1983) This is possible since so many authors agree that food and diet play such an important role in the definition and maintenance of group identity and ethnic boundaries (Barth 1969; DeVos 1975; Farb and Armelagos 1980; Fieldhouse 1986; Harris 1985; Hesse 1986; McKee 1987; Sanders; 1980; Spicer 1971; Veltre 1990).

The study of dietary remains and related procurement technologies provides a great deal of information regarding changing ethnic identities and can greatly enhance the study of culture change in general, especially at Colony Ross. The study of the dietary remains and bone artifacts recovered from Colony Ross examines how the more conservative, and yet at times most visible, aspects of culture are used as symbols in the ethnic identities and social relations at this multicultural community. Throughout, I will stress the significant contribution that the study of dietary remains and related bone artifacts makes to examining overall culture change, as well as persistence of selected cultural attributes.

Methods

Methods of analysis employed by Gobalet (1997), Simons (1997), and Wake (1995, in press) are generally quite similar. The field recovery methods of the three classes of vertebrate remains discussed in this chapter were exactly the same for each class from each site (Lightfoot *et al.* (in press). Common quantitative methods employed by these authors include the determination of numbers of identified specimens (NISP; Gobalet, Simons, and Wake), and minimum numbers of individuals (MNI; Simons and Wake). Evidence of modification such as butchery marks, impact and fragmentation, burning and tool production is also taken into consideration by Simons (1997) and Wake (in press). Identification of the specimens discussed here was confirmed using comparative osteological collections housed in the University of California at Berkeley Museum of Vertebrate Zoology, the California Academy of Sciences Department of Ornithology and Mammalogy, the California State University at Bakersfield Department of Biology, and the San Jose State University Department of Biology.

A number of authors have discussed the merits and the pitfalls of the use of NISP and MNI measurements in archaeological interpretation (Grayson 1984; Klein and Cruz-Uribe 1984). The scope of this article, and the forms of the data presented concerning the various Ross vertebrate faunas limit analysis in this article to the discussion of the available NISP and MNI measurements and the patterns visible in them. The identified fish, bird, and mammal taxa discussed in this chapter are discussed by site, and in combination, representing the entire Native Alaskan Neighborhood, for each class. The bone artifacts are treated similarly. All three classes of vertebrate remains and the bone artifact assemblage are then discussed together to provide a more complete interpretation of vertebrate subsistence patterns, persistence of cultural traditions, and social interaction at Ross.

Results

Fish

Fish remains from NAN, identified by Ken Gobalet (1997), are presented in Table 1. Individual site totals are presented, as well as a cumulative sum representative of the entire Native Alaskan Neighborhood fish fauna. Gobalet (1997) provides only straight counts of identified specimens (NISPs). No MNI measurements are currently available.

Gobalet identifies at least 18 species of fishes from NAN. Roughly 87.6% (1440 of 1662 elements) of the fish elements he identified were from NAVS. Consequently, greater species diversity is seen in the NAVS fish assemblage. Eleven taxa are present only at NAVS, and only one is found exclusively at FRBS. While a wider range of species is present at NAVS, the frequencies of the most common species (greater than 10% of the total assemblage) at both FRBS and NAVS are quite close (Table 1). This is an excellent example of some of the sample size effects Grayson (1984) discusses in *Quantitative Zooarchaeology*. Essentially, some general trends can be observed in the smaller FRBS sample. These same fundamental trends are seen at NAVS, while the greater overall sample size increases the actual number of identified taxa.

Initially, the greater sample of fish elements from NAVS appears simply to have increased the number of identified taxa. The importance of the larger NAVS sample should not be underestimated. A number of the taxa present at NAVS in low numbers provide interesting and important information regarding life in NAN. Gobalet points out that the two pacific barracuda (*Sphyraena argentea*) elements recovered from NAVS represent the northernmost known archaeological records of the species. This information, in turn, may relate to elevated water temperatures off of the Sonoma coast, or to transport of barracuda from warmer waters to Ross. Either way, this is an interesting aside.

Of potentially greater importance are the presence at NAVS of a few (4) cyprinid (minnow family) skeletal elements which are entirely fresh water species, as well as an anadromous salmon (*Oncorhyncus* sp.) element. Gobalet (1997) points out that the presence of these few elements expands the range of fishing indicated at Ross. It is apparent that at least some fish resources were obtained from fresh water, not exclusively marine environments as might be expected in an assemblage recovered a few hundred meters from the shore. Importantly, Gobalet notes that Fort Ross Creek, which runs along and is currently eroding the

base of FRBS, does not support either large cyprinids or salmonids and is probably too small to have done so in the past.

Gobalet (1997) states that the presence of these fresh water fish elements supports Wake's (1995) conjecture that the proximity of the village site to the stockade may have provided access to foods available from the Russians. However, it is equally, if not more likely that these few fresh water fish were brought to NAVS by Native Californians who were more familiar with them than either the Russian or the Native Alaskan occupants of Ross. The presence of these fresh water fish may indicate the continuation of traditional resource exploitation by Native Californians in the presence of new and perhaps less familiar Russian/ Native Alaskan procurement strategies.

The majority of the identified fish remains identified from both sites constituting NAN at Ross are from three marine species: cabezon (*Scorpaenichthys marmoratus*), rockfish (Genus *Sebastes*), and lingcod (*Ophiodon elongatus*) (Table 1). The close similarity in the distribution of these three species at both FRBS and NAVS is indicative of the close relationship between these two sites. Gobalet states that most of the remains recovered from the cabezon, rockfishes, and lingcod are from large individuals. The relative abundance of these species is what one would expect with hook and line fishing from shore rather than offshore.

It is quite likely that people did fish from the shore at Ross. There is ample evidence supporting fishing with hooks and lines, as opposed to nets. Bone fishing artifacts recovered from NAN are discussed in more detail below. In a paragraph discussing Native Alaskan subsistence Khlebnikov (1976:125) mentions that along the shore they [Native Alaskans] angle for such fish as perch, mackerel; herring come in seasonally. They catch sturgeon in the Slavianka [Russian] River when the channel is open. In an interesting note regarding the latter, Khlebnikov (1990:65) notes that while exploring the Slavianka River he saw large numbers of sturgeon, and the Aleuts shot their arrows at them but missed.

It is important to note, however, that the accounts of fishing at and around Ross mentioned in the historical record also mention line fishing from skin boats or *baidarkas*. Khlebnikov (1990:116) provides an account of fishing and suspicion on the part of Mexican officials in San Francisco Bay.

> They are so mistrustful that they do not even allow us to fish from the *baidarkas* and even look at them suspiciously. The Commandant, who often comes by ship, has never missed a chance to check the *baidarkas* and constantly makes remarks to the effect that he knows for what kind of fish we have the *baidarkas*.

Khlebnikov (1990:195) provides further information regarding the importance of fishing from *baidarkas* to the Native Alaskan inhabitants of Ross.

> The Aleuts must be provided with Company *laftaks* [cured sea lion skins] to construct *baidarkas* even if there are no sea otters to hunt, because the Aleuts need to eat fish, which they cannot hunt without *baidarkas*. The Company must enable them to feed themselves.

Table 1: Identified Fish Remains from the Native Alaskan Neighborhood

Common name	**Scientific name**	**FRBS** NISP	**NAVS** NISP	**NAN** NISP
Requiem Sharks	Carcharhinidae	0	5	5
Sharks and Rays	Elasmobranchi	1	2	3
Sturgeon	*Acipenser sp.*	1	0	1
Salmon	Onchorhyncus sp.	0	1	1
Herring	Clupeidae	1	39	40
Pacific Hake	*Merluccius productus*	0	19	19
Silversides	Atherinidae	0	1	1
Pile Perch	*Damalichthys vacca*	1	3	4
Surfperch	Embiotocidae	4	24	28
Pacific Barracuda	*Sphyraena argentea*	0	2	2
Monkeyface Prickleback	*Cebidichthys violaceus*	2	1	3
Prickleback	*Xiphister sp.*	0	19	19
Prickleback	Stichaeidae	0	2	2
Rockfish	*Sebastes sp.*	62	373	435
Greenling	*Hexagrammos sp.*	0	3	3
Lingcod	*Ophiodon elongatus*	32	235	267
Cabezon	*Scorpaenichthys marmoratus*	118	703	821
Buffalo Sculpin	*Enophrys bison*	0	2	2
Sculpin	Cottidae	0	1	1
Flatfishes	Pleuronectiformes	0	1	1
Sacramento Sucker	*Catastomus occidentalis*	0	2	2
Minnows	Cyprinidae	0	2	2
Total		**222**	**1440**	**1662**

All data from Gobalet (1996)

It is apparent from these two accounts that the use of skin boats to gather fish was of primary importance to the Native Alaskan population at Ross. Khlebnikov (1976:99) states that fishing from *baidarkas* was commonplace in Alaskan waters. Line fishing from *baidarkas* is certainly a plausible explanation for the relatively large sized individual fishes represented in the piscene assemblage from NAN.

Birds

Bird remains from NAN, identified by Simons (1997), are presented in Table 2. Individual site totals are presented, as well as a cumulative sum representative of the entire Native Alaskan Neighborhood bird fauna. Simons (1997) provides both NISP and MNI measurements.

Table 2: Identified Bird Remains from the Native Alaskan Neighborhood

		FRBS		**NAVS**		**NAN**
Common name	**Scientific name**	NISP	MNI	NISP	MNI	NISP
Loon	*Gavia sp.*	2	1	2	1	4
Sooty Shearwater	*Puffinus griseus*	2	1	0	0	2
Short-tailed Albatross	*Diomedea albatrus*	0	0	1	1	1
Pelican	*Pelecanus sp.*	2	1	16	2	18
Cormorant	*Phalacrocorax sp.*	4	1	4	1	8
Goose	Anserinae	2	1	3	2	5
Duck	Anatinae	7	2	12	2	19
California Condor	*Gymnogyps californianus*	0	0	1	1	1
Bald Eagle	*Haliaeetus leucocephalus*	5	1	2	1	7
Chicken	*Gallus gallus*	3	1	6	2	9
American Coot	*Fulica americana*	0	0	1	1	1
Willet	*Catoptrophorus semipalmatus*	1	1	0	0	1
Gull	*Larus sp.*	8	2	56	5	64
Common Murre	*Uria aalge*	93	11	260	26	353
Pigeon guillemot	*Cepphus columba*	3	1	2	1	5
Cassin's Auklet	*Ptychoramphus aleuticus*	0	0	2	1	2
Total		**132**	**24**	**368**	**47**	**500**

All data from Simons (1996)

The two sites comprising NAN contributed a total of 500 identifiable skeletal elements from at least 71 birds of 16 taxa (Simons 1997). FRBS produced 132 identifiable elements from 12 taxa, representing minimally 24 birds. As with fish, the greater overall sample of bird elements recovered from NAVS resulted in a more diverse range of identified taxa. A total of

368 identifiable elements representing 14 taxa and at least 47 individual birds were recovered from NAVS.

Simons (1997) divides the identified bird species into 7 broad groups based on ecological preferences, behavior, and taxonomic status. The majority of bird species identified by Simons (1997) from NAN are colonial nesting seabirds such as common murres (*Uria aalge*) and gulls (*Larus* sp.). Colonial nesting seabirds make up 81.8% (n=108) of the identified bird elements from FRBS, 88% (n=324) of the specimens from NAVS (Simons 1997: Table 13.3), or 86.4% (n=432) for the entire Native Alaskan Neighborhood. The second most common group of birds at NAN are anseriform waterfowl (ducks and geese). These species make up 6.8% (n=9) of the FRBS bird assemblage, 4.1% (n=15) of the NAVS assemblage, or 4.8% (n=24) for the entire Native Alaskan Neighborhood.

To help determine where the most common birds present in NAN assemblage could have been captured, Simons briefly reviews ecological requirements of colonial seabirds within 15 km of Ross. He concludes that both suitable habitats and considerable numbers of individuals are present today and probably in the past. He also notes that since no nesting colonies of murres or aucklets occur anywhere near Ross today, it is possible that fowling by Ross inhabitants may have taken place some distance from Ross.

Simons suggests that at least some of the colonial nesting seabirds found in NAN were captured on the Farallon Islands where the RAC had an artel active during much of the Ross occupation (Khlebnikov 1976, 1990; Ogden 1941; Riddell 1955). This conclusion is amply borne out in the historical record. When discussing feeding the occupants of Ross, Khlebnikov (1990:192) states very clearly that the diet here includes salted sea lion meat and dried fowl procured from the Farallon Rocks. Khlebnikov (1976:123) states that

> From 5,000 to 10,000 sea ducks are killed every year, but in 1828 50,000 were killed. They are dried and sent to the artel as food; some are also sent to the fort. In 1828 100 *puds* of meat was supplied from theseOne *pud* is equal to 16.38 kg. Therefore, the 100 *puds* of dried bird meat from the Farallones equates to 1638 kg, a considerable amount. If a dried sea duck weighs roughly 1 kg, then as many as 1638 individuals, if not more, may have been sent to Ross in 1828 alone. Based on the figures mentioned by Khlebnikov (1976:123), anywhere from 145,000 to 290,000 birds were killed for feathers and meat on the Farallones during the 29 years the Russians occupied Ross.

The Farallones, however, were not the only place in California that Native Alaskan occupants of Ross may have hunted fowl. Khlebnikov recounts hunting geese in San Francisco Bay. Simons suggests that bird hunters may have also have exploited suitable rookery habitats in Marin and San Mateo Counties far to the south of Ross. Simons suggests parallels between Native Alaskan fowling practices at Ross and co-harvesting strategy postulated by Yesner (1976, 1981) and Yesner and Ainger (1976) for bird hunting in the Aleutian Islands.

Simons (1997) points out that the species composition of NAN bird assemblage is not dissimilar to other northern California coastal sites. According to Simons (1997), the typical Californian coastal site is dominated by migratory anseriform waterfowl (ducks and geese). The noteworthy difference seen in NAN bird assemblage is the overwhelming dominance of colonial nesting marine fowl such as murres.

Mammals

Mammal remains from NAN, identified by Wake (1995, 1997a), are presented in Table 3. As with the fish and the birds, individual site totals are presented, as well as a cumulative sum representative of the entire Native Alaskan Neighborhood mammal fauna. Both NISP and MNI measurements of the mammal remains from NAN are available and presented.

The data summarized in Table 3 show a number of intriguing patterns. The mammal assemblage in general is considerably different from other coastal Californian archaeological sites. NAN has a pattern found nowhere else at Colony Ross (Wake 1995, 1997a). Faunal remains from this area are dominated by marine mammals, specifically seals and sea lions, followed closely by domesticated and wild artiodactyls.

Seals

Of all the mammal groups represented, the seals show some of the most interesting patterning. Seals are well represented in both the NAVS and FRBS mammal assemblages (see Table 3), with relative numbers greater than the majority of late prehistoric northern Californian coastal sites (Gifford and Marshall 1984; Hildebrandt 1979; Hildebrandt and Jones 1992; Langenwalter *et al.* 1989; Schwaderer 1992; Simons 1990, 1992). The frequency of pinniped remains is indicative of the strong maritime resource focus of NAN.

A total of 400 seal skeletal elements were recovered from the Fort Ross Beach Site, or roughly 55% of the identified mammal remains. Some 626 seal skeletal elements were recovered from the Native Alaskan Village Site, representing approximately 40% of the sites identified mammal elements. These totals include all skeletal elements from the site that are identified as seal or to a more discrete level. If the numbers of seal remains from these two sites are combined, a total of 1,026 pinniped skeletal elements are represented. Seals make up roughly 47% of the identified mammals recovered from NAN at Colony Ross. Seals rank first in both sites separately and combined. Seals are clearly the most important mammalian taxon in NAN.

While there is a 14% difference in the total frequency of seal elements between these two sites, the actual frequency distribution of individual skeletal elements at both sites is virtually the same (Wake 1995, in press). This indicates that when seals were being used or consumed, they were treated similarly in both areas. Hand and foot bones, or flipper elements, make up the majority of the seal bones recovered (Wake 1995, in press). Meatier portions of these animals (Lyman *et al.* 1992) such as, pelves, long bones and vertebrae, are poorly represented. Ribcage elements make up only approximately 11% of all seal remains, yet are ranked first in meat utility by Lyman *et al.* (1992). Vertebrae make up roughly 8% of the seal remains. According to Lyman *et al.* (1992:531) vertebrae rank third out of five classes in food utility. It should be noted that vertebrae, according to Grinnell (1901), are typically left at butchery sites.

Table 3: Identified Mammal Remains from the Native Alaskan Neighborhood

		FRBS		NAVS		NAN
Common name	**Scientific name**	NISP	MNI	NISP	MNI	NISP
Broad-Handed Mole	*Scapanus latimanus*	2	1	1	1	3
Black-Tailed Jackrabbit	*Lepus californicus*	0	0	1	1	1
Brush Rabbit	*Sylvilagus bachmani*	1	1	0	0	1
Botta's Pocket Gopher	*Thomomys bottae*	0	0	156	7	156
Bushy-Tailed Woodrat	*Neotoma fuscipes*	1	1	0	0	1
California Vole	*Microtus californicus*	1	1	8	2	9
Porpoise	Phocoenidae	4	1	8	2	12
Whale	Cetacea	1	1	11	1	12
Wolf	*Canis cf. lupus*	1	1	0	0	1
Coyote	*Canis latrans*	0	0	1	1	1
Dog	*Canis cf. familiaris*	1	1	0	0	1
Dog	*Canis sp.*	2	1	6	1	8
Canid	*Canidae*	0	0	1	1	1
Bobcat	*Felis rufus*	0	0	2	1	2
Mountain Lion	*Felis concolor*	0	0	6	1	6
Grizzly Bear	*Ursus arctos*	0	0	2	1	2
Bear	*Ursus sp.*	2	1	0	0	2
Sea Otter	*Enhydra lutris*	14	1	6	1	20
Mustelids	Mustelidae	1	1	3	1	4
Carnivore	Carnivora	4	1	12	2	16
Steller's Sea Lion	*cf. Eumatopias jubatus*	*3*	1	13	2	16
California Sea Lion	*Zalophus californianus*	*61*	2	71	6	132
Northern Fur Seal	*Callorhinus ursinus*	*0*	0	1	1	1
Eared Seals	Otariidae	125	2	258	3	383
Elephant Seal	*cf. Mirounga angustirostris*	1	1	0	0	1
Harbor Seal	*Phoca vitulina*	88	4	98	4	186
Earless Seals	Phocidae	1	1	0	0	1
Large Seal	Large Pinniped	5	1	4	1	9
Seals	Pinnipedia	116	2	181	2	297
Pig	*Sus scrofa*	5	1	9	2	14
Wapiti	*Cervus elaphus*	2	1	9	1	12
Black-Tailed Deer	*Odocoileus hemionus*	158	5	272	6	430
Cow	*Bos taurus*	41	3	87	4	126
Goat	*Capra hircus*	1	1	0	0	1
Sheep	*Ovis aries*	22	3	58	5	80
Cow/Sheep/Goat	Bovidae	62	2	7	1	69
Artiodactyl	Artiodactyla	9	1	268	2	277
Total		**735**	**44**	**1560**	**64**	**2294**

All data from Wake (1995, in press)

The fact that flipper elements dominate these assemblages is especially interesting. Lyman *et al.* (1992:531) state clearly that flippers rank as the lowest part of a seal in potential food value. With consideration of Native Alaskan seal consumption practices, this may not actually be the case at Colony Ross. Seal flippers were consumed as specially prepared delicacies in various parts of coastal Alaska (Birket-Smith and De Laguna 1938:99; Boas 1921; De Laguna 1972:396-7; Grinnell 1901; Hughes 1984; Lantis 1984; Nelson 1899:268). For example, Birket-Smith and De Laguna (1938:99) state that seal flippers were considered the best part of the seal. They further emphasize that flippers were never given to children. Edward William Nelson (1899:268) describes walrus flippers as choice bits. The high status of seal flippers as food items among the Kwakiutl is indicated by Franz Boas (1921:458) who states that flippers were chiefly foods.

Frederica De Laguna (1972:396-397) provides a detailed description of seal butchering, preparation and consumption. She emphasizes that seal flippers were carefully curated, specially prepared, and preferred by older individuals. George B. Grinnell (1901:160) was similarly impressed with the contribution of seal meat to the diet and especially with the importance of flippers.

> The flippers appear to be regarded as especially choice. We saw many women roasting them over the fire. After they were cooked the women pulled them out of the ashes, and heating an iron in the fire singed the hair which remained on the skin and then tore the flippers to pieces and picked the meat from the bones (Grinnell 1901:160).

This information is very important since it provides insight on two important points regarding the Colony Ross seal assemblages. First of all, seal flippers were retained when seals were butchered, and perhaps curated, despite their low meat utility (Lyman *et al.* 1992). The flippers were cut off at the joint. This practice helps explain the preponderance of seal flipper elements, from the astragalus to the terminal phalanges, in the Ross seal assemblages. Secondly, the flippers, fore and hind, were eaten, and often treated as a delicacy. Children apparently did not like them, or could not appreciate them (Birket-Smith and De Laguna 1938:99; De Laguna 1972:396-7; Grinnell 1901). With the ethnographic record in mind, it would appear that Lyman *et al.* (1992) do not take into account potential culturally directed motives for consumption of low utility seal parts in their analysis.

Artiodactyls

Deer were an important part of the diet in NAN. They rank second in importance to the seals. It is possible that these deer were brought to the site by Native Californian extended family members, or hunted by Native Alaskan men. The bulk of the butchery marks found on the deer bones appear to be made by metal edged instruments. A number of the deer long bones appear to have been purposely opened to extract the marrow.

The domesticated mammals present at Ross (horses, pigs, sheep and cattle) represent the European influence on the diets of the Native American inhabitants of the colony. Domesticated mammals, especially cattle, and secondarily sheep, did play an important role in the diets of the Native American inhabitants of Colony Ross (Wake 1995). This is clearly reflected in the historical record (Gibson 1969, 1976; Khlebnikov 1976, 1990; La Place

1986[1839]; Tikhmenev 1978) and the zooarchaeological data. It is clear that both the Native Alaskans and the local Native Californians accommodated to the presence of European foods represented by the domestic mammals present in the archaeological assemblage. It is quite interesting to note, however, that pigs were apparently not exploited to any meaningful degree by the Native American inhabitants of Colony Ross (Wake 1995, Figure 4.20). This may be due to traditional belief systems of the Native Americans (Davydov 1977[1810]) or simply to the poor quality of the Ross pigs' meat (Khlebnikov 1976, Tikhmenev 1978).

The majority of terrestrial wild and domestic herbivore long bones from NAN exhibit characteristics commonly associated with marrow extraction such as proximal or distal impact points and flake scars. The major limb bone elements of the terrestrial domestic mammals, cattle and sheep, show similar types of modification. These bones exhibit morphologies indicative of purposeful, high velocity impact (Johnson 1983, 1985). This is consistent with the bone breakage patterns observed ethnographically and experimentally during marrow extraction activity such as spiral fracturing and well defined impact zones at the distal and proximal ends of long bones exhibiting focused concoidal fractures (Binford 1978, 1981; Enloe 1993; Johnson 1983, 1985; Lyman 1991). Furthermore, the characteristics of these broken bones resemble what Enloe (1993) refers to as an immediate consumption pattern, as opposed to a mass-processing pattern. The extraction of marrow was a practice considered common among the majority of non-maritime adapted Native Californians, such as the Pomo, who depended on relatively large terrestrial mammals such as deer and elk for their protein.

None of the marine mammal skeletal elements showed any evidence of marrow extraction activity whatsoever. Evidence of marrow extraction is not usually observed amongst groups that depend on pinnipeds as their main source of meat, since seal bones do not have medullary cavities that yield the kind of marrow attractive to humans (Lyman 1991; Lyman *et al.* 1992). The marrow cavities of marine mammals are filled with bony cancellous tissue. The presence of such structures provides support for the bones and keeps them from collapsing under the great pressures exerted on mammal bodies by diving to great depths in the ocean.

In sum, there is some evidence of dietary accommodation of European foods by Native Americans at Colony Ross. For example, analysis of cutmarks shows that the vast majority of butchering was done with metal tools, and domestic mammals such as sheep and cattle were important parts of the diets in all areas of Colony Ross examined. However, it is evident that while under the control of Europeans, the Native Alaskan and Native Californian occupants of the colony preserved a great deal of their traditional diets. The evidence so far points to the retention of basic traditional dietary patterns by the Alaskans, as indicated by a high percentage of seal remains, and flipper elements in particular. There is also strong evidence of the use of Native Californian foods. It appears that the ethnic groups at Colony Ross continued to consume animals they were familiar with, and process them in traditional ways, no matter how far from home they were.

Bone Artifacts

A wide variety of tool types and forms, as well as diverse stages of production, are seen in the bone artifact assemblage from NAN. A number (n=79) of complete and broken diagnostic tools have been recovered. The majority of diagnostic bone implements from NAN are related

in some way to marine mammal hunting or fishing. There are also a number of utilitarian objects such as buttons, awls and fasteners represented (Wake 1995, in press). A larger number (n=146) of worked bone objects indicative of various stages of implement production have also been recovered. The vast majority of worked bone artifacts recovered from these investigations are clearly culturally modified, but relatively amorphous bits and flakes of bone that defy classification as formal tool types. The bone artifacts are detailed and illustrated in Wake (1995, in press [b], 1997).

Fishing implements

Some (n=14) of the bone artifacts from NAN are fishing implements. The most common fishing implements are barbed portions of compound fishhooks (Figure 3, a). The three relatively complete barbs and the fragment with a basal portion of a barb are all simple unibarbs, reminiscent of fish hook barbs from Kodiak Island (Clark 1974a, 1974b, personal communication 1995).

Utilitarian items

A variety of non-hunting or fishing related bone artifacts have also been recovered (Wake in press [b]). These artifacts include broken awl tips, buttons, fasteners, crosshatched decorative objects, a brush fragment, a whale bone platter, and an antler baton or club.

Bird Bone Tubes

A considerable number (n=25) of bone tube ornaments have been recovered from NAN. These are all hollow bone tubes of small to medium size. Few are complete, most are fragmentary. These bone tubes can be broken down into four main groups, based on presence or absence of design elements. The majority of the bone tubes recovered from the Native Alaskan neighborhood at Ross have simple latitudinal incisions. Other types include (in order of abundance): plain tubes, tubes with intricate, zoned crosshatch designs, and tubes with diffuse latitudinal and diagonal incisions.

Four examples of tubes with intricate, zoned crosshatch designs have been recovered from NAVS (Wake in press [b]: Figure 11.4, d-g). These tubes are very distinctive. They have a basic zoned design consisting of areas of no decoration and areas of decoration. The decorated areas are filled with fine crosshatching. The decorated and undecorated areas usually alternate. These alternating areas are in the form of narrow bands, lozenges, or compressed lozenges.

Tubes of this type are apparently not found in coastal Alaska. However they are well-known from California (Gifford 1940:180). Tubes of this nature are classed as type EE2b by Gifford (1940:180, 227). The four tubes from NAVS are very similar to intricately designed tubes illustrated by Barrett (1952:Plate 37, #'s 1-5). These artifacts are ethnically quite distinctive. They clearly indicate a Native Californian presence at NAVS.

Marine Mammal Hunting Implements

Many of the diagnostic bone artifacts from Ross were used to hunt marine mammals. The marine mammal hunting assemblage consists of various projectile points and point fragments, dart socket pieces and fragments, and finger rests. The majority of these artifacts are specifically associated with sea otter hunting (for more illustrations and detailed descriptions see

Wake 1995, in press [b]). These points are well defined late precontact styles rarely found outside the Aleutian Island chain (Jochelson 1925), but are present at Ross and on the Farallon Islands, where the Russians had established a small outpost (Riddell 1955; Wake 1995).

Non-Diagnostic Worked Bone Artifacts

The majority of worked bone artifacts recovered from NAN at Ross are not typically diagnostic tool types or implements. They are, however, directly related to the production and manufacture of the identifiable tools noted above and bone tools in general. These non-diagnostic worked bone artifacts include bone and antler cores, hand holds, chopped and carved bone chunks, and split bone. The majority of the non-diagnostic bone artifacts consists of various chopped and carved bone flakes (Wake 1995, in press [b], 1997).

Cores

Various bone objects that appear to be large chunks of raw material from which smaller pieces have been removed for further reduction and/or use have been recovered from NAN. These objects have numerous cut and chop marks on them. Such treatment is indicative of the intensive reduction of the original skeletal element to a useful size, and eventually into an artifact. These large, heavily modified bone objects are classed as cores.

One core is a large sectioned whale rib which exhibits evidence of numerous encircling and splitting blows delivered by metal tools (Wake 1995, in press). Other objects include basal portions of extremely large elk (*Cervus elaphus*) antlers. These antler pieces have been thoroughly abused by metal tools during the removal of smaller bits for whatever purpose (Wake 1995, in press [b]). Two grizzly bear (*Ursus arctos*) elements show signs of use as cores. The distal portions of both of these bones have been removed by chopping all around the circumference of the shaft of the element with a heavy-bladed metal tool such as a large knife or a cleaver (Wake 1995, in press [b]).

Flakes

Approximately 594 bone flakes have been recovered from NAVS (Wake 1995, in press [b]). None have been found to date at FRBS. These flakes come in a variety of shapes and sizes. Bone flakes from Ross are subdivided into two classes: chopping flakes and carving flakes. The chopping flakes have a wider range of sizes, indicating a lesser degree of control of individual blows than the relatively standard carving flakes. The chopping flakes tend to be more or less square or rectangular in plan view, and generally polygonal in cross section. The variety of sizes and forms of the chopping flakes implies rapid, coarsely controlled, patterned removal of excess bone material. The characteristics of the carving flakes are somewhat different. They are generally triangular or very slim polygons in cross section and of roughly similar lengths, implying relatively finely directed and controlled force, much more so than the chopping flakes.

Amorphous Bone Chunks

A variety of amorphous worked bone chunks and pieces are represented. All of these objects have indications-sometimes quite obvious-of reduction and working by metal cutting and chopping tools (Wake 1995, in press [b]). The artifacts of this category, although difficult to classify, are important for they further illustrate the intensity of bone implement production occurring in NAN at Ross.

Hand Holds

A number of artifacts exhibiting various stages of production have been recovered from both NAVS and FRBS (Wake 1995, in press [b]). The term "hand hold" best describes this artifact class. These artifacts appear to be remnant, less modified portions of the original raw bone material which may afford some purchase to the carver. Items similar to these, still attached to a nearly complete bone implement, have been recovered from the Oregon Coast (Lyman 1991:191, Figure 5.1,c).

The hand hold artifacts all have two main attributes in common; a narrowed, scored, cut, chopped, or snapped-off end, and the presence of cutting and carving marks indicative of more than one stage of production of an artifact. Some of these objects exhibit as many as four stages of tool production including splitting, rough carving, fine carving, and hand hold removal. Hand holds are the last piece of material removed from a tool prior to its actual completion. Final smoothing and sharpening would be the last stage of production, after the hand hold is removed.

The number of hand holds present at a site is a better measure of production intensity, in general, than counting the finished or broken tools recovered. Finished tools often leave the areas where they were made and do not return. There is no definite way of determining whether tools were actually being manufactured at a site *in lieu* of debitage. Broken tools may return to a site, but do not say much about tool production. Discarded artifacts representative of finished tools and their final production stages (such as hand holds) would most likely tend to stay at the site of manufacture, and be the best measure of tool production at that site.

Scoring and Snapping

The scoring and snapping method appears to be one of the primary reduction and fabrication techniques used in bone artifact production at Ross. At least 110 of the amorphous worked bone pieces and identifiable artifacts recovered from NAVS and FRBS show evidence of circumferential chopping or carving, or scoring and snapping. The scoring of these bone pieces appears to have been done using metal edged tools that could be well controlled. Most of the scored and snapped artifacts appear to have been worked by small to medium metal knives, and rarely saws (Walker and Long 1977).

The availability of small saws would mitigate against the use of the scoring and snapping technique since saws can quickly and efficiently do the job they are designed to do; cut through wood or bone items at right angles. The historical record shows that saws were available at Ross (Khlebnikov 1990:18). However, it would appear, based on the great number of artifacts exhibiting signs of scoring and snapping (n=110), that saws were not used very often for bone working at Ross. This could point to very limited access to saws, but that is probably not likely.

The presence of the scoring and snapping technique at Ross, where the technology to mitigate it was present, indicates the strength of the traditional approach to the sequence of manufacture of bone tools at the Colony. The saws that were used on bones at Ross were not used in the way Europeans would typically be expected to use them. It is likely that they were not used by Europeans. The saws in question were used in a way that reflects the mindset of the user, a non-European (probably Native Alaskan) person who practiced the scoring and snapping

technique of separating bone objects. The fact that the use of the scoring and snapping technique was so prevalent is, I believe, indicative of the persistence of much of the traditional Native Alaskan worldview at Ross.

This may simply be another example of traditional practice overriding modern technology. It would appear that the persons producing the bone tools at Ross essentially substituted their traditional manufacturing tools, which were most likely stone cutting and grinding tools, with more efficient, European introduced metal edged blades (Walker and Long 1977). While the manufacturing tools are different, the production techniques appear to have changed little. One might say that the production tools were replaced, but the mental template and the manufacturing techniques remained similar to the precontact tradition.

Discussion

Ethnic Patterns at Ross

A compelling model for studying the complex interrelationships at Ross is found in Marshall Sahlins's (1981, 1985, 1990) concept of the "structure of the conjuncture." Sahlins's model interprets the continuing dynamic cultural changes that occur in contact situations between ethnicity and class conscious indigenous societies and Europeans. Such a model works well at Colony Ross where Europeans are in constant close contact with a variety of Native American peoples of different social classes and genders. All the inhabitants of Colony Ross had to cooperate at one level or another in order for the settlement to function as a viable entity. One of the main questions to be answered at Ross involves determining the degree that each group affected the others. There is no doubt that the cultures in contact at Ross underwent a variety of changes, some profound, and others less so.

While the fish present at NAN differ in species composition from Alaskan sites, they also differ markedly in frequency distribution from more typical California coastal sites (Gobalet 1997). The techniques used to gather these fish also appear to be different from those implied for much of northern California. There is convincing evidence, in the form of fish hooks, for the use of line fishing techniques at Ross to catch large numbers of dominant species of fish. Exactly how these fish hooks were used by the inhabitants of NAN is debatable. They may have been used attached to lines cast from the shore. There are, however, historically recorded accounts of line fishing from skin boats near Ross and in Russian California. However the hooks were used, the techniques reflect some persistence of traditional Native Alaskan fishing practices and food preferences (big fish).

The bird remains from NAN are markedly different from other northern Californian coastal sites. In general the species present at NAN are not unexpected for northern California. The dominance of colonial nesting seabirds, specifically murres, however, is atypical and reminiscent of bird assemblages from coastal Alaska. It is apparent that Native Alaskan dietary preferences and hunting practices are clearly reflected in the bird assemblage at NAN (Simons 1997). It is likely that at least some of the bird remains at NAN represent individuals captured on the Farallon Islands, processed and dried, and consumed at Ross.

The preponderance of marine mammal remains at NAN is even more indicative of a Native Alaskan ethnic signature at Ross. Pinnipeds were clearly the most important mammals

at NAN. The high frequency of these mammals and especially the distribution of their skeletal elements are strongly indicative of the persistence of traditional Native Alaskan consumption practices at Ross (Denniston 1974; Lippold 1972). The continued consumption of flippers may represent a kind of passive symbolic resistance to Russian acculturation in the sense of continuing a practice which Europeans found distasteful (Deagan 1990; Ferguson 1991, 1992; Greenwood 1980; McGuire and Paynter 1991; Mouer 1993). Russians in America disdained many of the customary Alaskan dietary practices, especially those involving the consumption of fermented flippers and fish (Davydov 1977; Gibson 1976). On the other hand, the persons occupying NAN may simply have had the opportunity to continue a practice they enjoyed. At the very least, this practice points to the continuation of pre-contact Native Alaskan cultural traditions at Colony Ross.

Consumption and processing of deer was also an important aspect of the diet of the people occupying NAN. Historical records state that deer were hunted by many different people at Colony Ross (e.g., Khlebnikov 1976, 1990). However, it is possible that the presence of deer in NAN is a reflection of the close association of Native Alaskan men and their Native Californian wives and their extended families. Evidence of processing observed on deer remains from this area, specifically marrow extraction characteristics such as impact points found close to the proximal and distal ends of long bones, is indicative of traditional Native Californian consumption patterns.

The presence of domesticated mammals at these two sites indicates partial dependence on a Russian controlled resource by the occupants of these areas. However, it also suggests acceptance of these food sources into the NAN occupants group identity. As discussed in the introductory section, food is integral to peoples' individual and group consciousness (Farb and Armelagos 1980; Fieldhouse 1986; Hesse 1986:17; McKee 1987:32; Sanders 1980:33; Veltre 1990). You are what you eat, and you show people who you are by what you eat. The inclusion of domesticated mammals in the diet of the inhabitants of NAN reflects changes in these Native American people's group identity and their relationships to each other and the Russians at Colony Ross (e.g., Sahlins 1985).

A wide variety of diagnostic bone tools and other identifiable artifacts have been recovered from NAN. An equally wide variety, and a larger number, of non-diagnostic worked bone artifacts, bone cores, and bone flakes have been recovered from the same area. The diagnostic artifacts, the less diagnostic artifacts, and the cores, chunks, and flakes provide a great deal of information regarding the importance of bone tool technology and production at this site.

The worked bone assemblage from Ross helps to determine the ethnicity of the occupants of NAVS and FRBS, and their respective activities. It is clear that bone tools and ornaments were important to the occupants of NAN. The diagnostic bone artifacts recovered from this area provide information regarding a portion of the subsistence and day-to-day activity at the site. They also provide excellent information regarding the ethnicity of the persons who produced tools and other diagnostic artifacts. Ethnic identity of the diagnostic tool types is assigned on the basis of the stylistic details of the Ross artifacts compared to artifacts from the Aleutian Islands, Kodiak Island, and north-central coastal California.

Analysis of the diagnostic bone artifacts recovered from the Native Alaskan Village Site and the Fort Ross Beach Site indicates that two general ethnic groups, Native Alaskans and

Native Californians, contributed to the worked bone assemblage at Ross. The fishing and marine mammal hunting assemblages appear to be exclusively Native Alaskan in origin. The artifacts in these assemblages appear to have no Californian homologies (Bennyhoff 1950; Gifford 1940). All of the artifacts included in the hunting and fishing assemblages compare favorably to artifacts from the Aleutian Islands and Kodiak Island. Each of these broad ethnic classifications have specific worked bone sub-assemblages associated with them.

Within this broader Native Alaskan hunting and fishing tool group there appear to be further, ethnically based, divisions. The small dart point series from NAVS and FRBS bears a strong resemblance to artifacts found primarily in the Aleutian Islands (Jochelson 1925), implying possible Aleut dominance of sea otter hunting at Colony Ross, or at least production of dart points at the colony. Similar sized points from Kodiak Island appear to be temporally and stylistically distinct from those in the Aleutians and at Ross, and have not been found at the Colony. It appears that this type of small dart point (type 1 series, Wake 1995) and its associated technology, was accepted by the RAC as the optimal sea otter hunting technology. Such acceptance could result in generalized production of artifacts in this style by tool carvers of different ethnicities.

The fish hook barbs from NAN also show strong ethnic affinities. They do not resemble styles from the Aleutian Islands in any way (Jochelson 1925). Neither are they reminiscent of Californian fishing technology outside of the Northwest Coast tradition areas of the state (artifacts Bennyhoff 1950; Gifford 1940). These artifacts bear the strongest stylistic resemblance to fishhooks from Kodiak Island (Clark 1974a, 1974b; Heizer 1956). These simple barbs imply a possible Koniag domination of fishing at Ross, the production of fishing related technology, a preference for Koniag tool types, or at least in the fishing techniques used at the Colony.

The bird bone tube ornaments are also strongly tied to certain ethnic groups. As stated previously, three of the four types of bird bone tube ornaments (undecorated, latitudinally incised, and diffuse latitudinal and diagonally incised) are essentially ethnically indistinguishable. These types are found in both California and Alaska (Clark 1974a 1974b; Gifford 1940; Heizer 1956). However, the intricately incised crosshatch zoned bone tube fragments appear to be exclusively Native Californian in origin (Bennyhoff 1994; Gifford 1940).

The worked bone assemblage recovered from NAVS and FRBS, while interesting in and of itself, offers information regarding two important points. Intensive bone tool production occurred at Ross during the tenure of the RAC. The intensity of bone tool production at Ross is indicative of the profound importance of bone tools and technology to the inhabitants of NAVS and FRBS, and the company's operation in California. Hunting tool kits must be maintained and losses replaced in order to keep hunting viable.

Apparently, bone tools were preferred for hunting marine mammals at Ross. No metal marine mammal hunting tools have been found at Ross. In fact no mention of the use of metal tools in the hunting of marine mammals is found in the historical record (Khlebnikov 1976, 1990). Bone tool kits were undoubtedly easier to maintain and produce than metal ones, and certainly less costly. Raw bone was probably more readily attainable than processed metal at Ross. The techniques involved in producing tools and useful implements of bone as opposed to metal are much more simple and portable.

It is quite clear that metal cutting tools were used almost exclusively in the manufacture of bone tools and technology at Ross. An example of a metal knife from NAVS is illustrated in Lightfoot *et al.* (in press). Such tools are undoubtedly more efficient and superior to their non-metal precursors in a variety of ways. The evidence that traditional tool types were still being manufactured at Ross in relatively traditional ways, and that not all of the applicable European tools available, such as saws, were used in their most efficient ways indicate that the persons who manufactured these tools were by no means fully acculturated to the European worldview. They were using European tools within the production modes they were familiar with from their traditional, pre-contact cultures.

Life in the RAC demanded that the Alaskan hunters be ready to hunt or board ships to take them to hunting grounds on a moments notice (Khlebnikov 1976, 1990). The bone elements of the hunting kit must therefore also be constantly ready, necessitating continued production and maintenance of such artifacts, and resulting in a great deal of production related detritus. In reality the bone tools used by the Alaskan hunters were responsible for the early successes in sea otter hunting and the continued provisionment of marine mammals for food.

Conclusions

Analysis of the fish, bird, and mammal remains from Ross Native Alaskan Neighborhood provides much insight into aspects of life at the Colony that are poorly documented or not recorded at all in the historical record. Some of the dietary preferences of the Colony's inhabitants are referred to in passing by Khlebnikov (1976, 1990) and others (Essig 1933; LaPlace 1986; Ogden 1941). However, little is known about the level of dietary conservatism and accommodation of the various ethnic groups present at Ross. Information regarding what was actually consumed as food at Ross and how it was treated is available only in the archaeological record.

There are certain aspects of the diets of the people who lived at Colony Ross that appear to be quite conservative. These may help to distinguish the ethnicities of the inhabitants of various areas of Colony Ross (Hesse 1986; McKee 1987; Sanders 1980). The archaeofaunal assemblages from FRBS and NAVS include a variety of marine mammal and bird species preferred by Native Alaskan peoples including sea lions, harbor seals, murres, and gulls (Clark 1974a; De Laguna 1972; Denniston 1974; Hughes 1984; Lantis 1984; Lippold 1972; Simons 1997). Marine mammals, especially the seals, were treated in a similar fashion at both sites. The similar skeletal element distributions and emphasis on flipper elements in both Native Alaskan Neighborhood assemblages is indicative of a standardized approach to the butchery and consumption of marine mammals by the Native Alaskan persons present at Colony Ross. The continued consumption of marine birds and mammals by Native Alaskans is indicative of a desire to maintain traditional dietary habits by consuming the familiar food resources available along the California coast. Additionally, the large size of the individual fish from NAN (Gobalet 1997) indicates the continuation of hook and line fishing at Ross, possibly from *baidarkas*.

Both the Native Californians and the Native Alaskans appear to have accommodated to the consumption of European food resources represented by cattle, sheep and pigs. There is no evidence of a strong shift towards European foods to the exclusion of more traditional Native

American mammal foods in these faunal remains. Both Native American groups apparently continued to consume the locally available foods they were familiar with.

The bone tools and worked bone from Ross tell us a great deal about the ethnicity of the persons occupying NAN and the importance of bone technology at the Colony. At least three ethnic groups were involved in producing the bone tool and artifact assemblages found at Ross; Aleutians, Koniags, and Native Californians. Some of the artifact styles present at NAN are clearly associated with specific ethnic groups: the zoned crosshatched patterned tube fragments are associated with Native Californians, the sea otter dart points with Aleutians, and the fish hook barbs with Koniags.

The hunting of sea otters at Ross, according to the historical and archaeological records, remained purposely focused on traditional Alaskan pre-contact techniques. This is confirmed in the archaeological remains recovered from NAN. The majority of diagnostic bone mammal hunting tools from NAN are specifically designed for the capture of sea otters. These tools strongly resemble pre-contact and ethnographic sea otter hunting tools known from coastal Alaska (Clark 1974a, 1974b; Heizer 1956; Jochelson 1925). The form and function of these tools remained purposefully unchanged at Ross, with the exception of the use of metal edged implements in their production. Furthermore, I would argue that the more than 600 worked bone flakes and other artifactual remains of bone tool production are primarily the result of maintenance and replacement of elements of sea otter hunting kits.

Bone artifacts manufactured in NAN provide good evidence of continuity and change, where European metal cutting implements were employed in the production of bone tools that maintained traditional styles, forms, and functions. While portions of the manufacturing process may have been changed by the use of metal tools, the underlying mental templates operating in this process resulted in the production of bone tools in pre-contact styles, for unmodified functions. The persistence of the scoring and snapping technique as a major stage in the production of bone tools at Ross, where saws were clearly available, is especially intriguing. Saws were used only rarely in the manufacture of bone artifacts at Ross. A saw will do what scoring and snapping with a metal knife will do much more efficiently in a much shorter period of time. When saws were used, they appear not to have been used to cut cleanly through bone artifacts, but to score them, prior to snapping.

Bone artifacts clearly assignable to Native Californian cultural affiliation have also been recovered from NAVS. While few in number, the incised bird bone tubes decorated in Native Californian style are important in three respects. First, these artifacts point to the presence of Native Californians at NAVS. Second, artifacts of this type are commonly associated with Native Californian women, as ear ornaments, thus implying the presence of female Native Californians. Third, design elements such as those seen on the Californian style incised bone tube fragments are found throughout thousands of years of California's prehistory (e.g., Bennyhoff 1950, 1994; Moratto 1984). The presence of such design elements is indicative of the persistence of certain Native Californian, as well as Native Alaskan, traditions at NAVS.

In conclusion, there is substantial evidence of culture change visible in the rich archaeological and historical records of Colony Ross. Native Alaskan peoples contributed the technology necessary for the exploitation of the sea otter and development of a colonial empire. In a way, the cultures that coastal Native Alaskans had developed over millennia ultimately

resulted in their conquest and collapse. Conversely, the ability to hunt sea otters that these people had developed allowed for the preservation of many aspects of their traditional cultures in the face of European domination.

This article demonstrates that the detailed examination of the vertebrate faunal remains and bone technology, viewed together, has a great deal of valuable information to contribute to the overall study of culture change and ethnicity, more than analyzing represented classes separately. The information to be had from zooarchaeological study in contact situations is important specifically because little attention, if any, is paid to species frequencies, food processing, and subsequent bone tool production in historical accounts (e.g., Khlebnikov 1976, 1990). Detailed zooarchaeological analysis at Colony Ross has demonstrated that important information regarding the ethnicity, persistence of prehistoric cultural traditions in contact situations, and culture change and interaction is available from vertebrate remains, and the bone artifacts generated from them.

Acknowledgments

I would like to extend my appreciation to Peter Mills and Antoinette Martinez for their persistent encouragement to produce this article. Many thanks to Kent Lightfoot for his support, advice, and stimulating discussions regarding the Native Alaskan Neighborhood. This research was funded in part by an NSF grant to Kent Lightfoot (SBR-9304297) and by the Stahl Endowment to the U.C. Berkeley Archaeological Research Facility.

References Cited

Barth, Fredrik

1969 *Ethnic Groups and Boundaries*. Boston: Little, Brown, and Company.

Barrett, Samuel A.

1952 Material Aspects of Pomo Culture, Parts 1 and 2. *Bulletin of the Public Museum of the City of Milwaukee* 20(1, 2):1-508.

Bennyhoff, James A.

1950 Californian Fish Spears and Harpoons. *University of California Anthropological Records* 9(4):i-iv, 295-337.

1994 Central California Augustine: Implications for Northern California Archaeology. In *Toward a New Taxonomic Framework for Central California Archaeology: Essays by James A. Bennyhoff and David A. Fredrickson*, edited by Richard E. Hughes, Pp. 65-74. Berkeley, California: Contributions of the University of California Archaeological Research Facility, Number 52.

Binford, Lewis R.

1978 *Nunamuit Ethnoarchaeology*. New York: Academic Press.

1981 *Bones: Ancient Men and Modern Myths*. New York: Academic Press.

Birket-Smith, Kaj and Frederica De Laguna

1938 *The Eyak Indians of the Copper River Delta, Alaska*. Copenhagen: Levin & Munksgaard.

Boas, Franz

1921 *Ethnology of the Kwakiutl*. Bureau of American Ethnology, 35th Annual Report, Volume 1, 1913-1914. Washington, D.C.: U.S. Government Printing Office.

Chevigny, Hector

1965 *Russian America: The Great Alaskan Adventure, 1741-1867.* New York: Viking Press.

Clark, Donald W.

1974a *Koniag Prehistory: Archaeological Investigations at Late Prehistoric Sites on Kodiak Island, Alaska.* Tubinger Monographien zur Urgeschichte, Band 1. Verlag W. Kohlhammer, Stuttgart.

1974b Contributions to the Later Prehistory of Kodiak Island, Alaska. National Museum of Man, Mercury Series. *Archaeological Survey of Canada, Paper Number* 20.

Crabtree, Pam J.

1990 Zooarchaeology and Complex Societies: Some Uses of Faunal Analysis for the Study of Trade, Social Status, and Ethnicity. *Archaeological Method and Theory, Volume* 2. pp. 155-205. Michael B. Schiffer, editor.

Crader, Diana C.

1984 The Zooarchaeology of the Storehouse and the Dry Well at Monticello. *American Antiquity* 49(3):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(4):690-717.

Davydov, Grigorii I.

1977 [1810] *Two Voyages to Russian America,* 1802-1807. Translated by Colin Bearne, edited by Richard A. Pierce. Materials for the Study of Alaskan, Number 10. Fairbanks, Alaska: Limestone Press.

Deagan, Kathleen A.

1983 *Spanish St. Augustine: Archaeology of a Colonial Creole Community.* New York: Academic Press.

1987 *Artifacts of the Spanish Colonies of Florida and the Caribbean, 1500-1800, Volume 1: Ceramics, Glassware and Beads.* Washington D.C.: Smithsonian Institution Press.

1990 Accomodation and Resistance: The Process and Impact of Spanish Colonization in the Southeast. In *Columbian Consequences, Volume 2, Archaeological and Historical Perspectives on the Spanish Borderlands East.* pp. 297-314. David H. Thomas, editor. Washington D.C.: Smithsonian Institution Press.

Deetz, James F.

1991 Archaeological Evidence of Sixteenth- and Seventeenth-Century Encounters. In *Historical Archaeology in Global Perspective.* pp. 1-10. Lisa Falk, editor. Pp.1-10. Washington D.C.: Smithsonian Institution Press.

De Laguna, Frederica

1972 *Under Mount Saint Elias: The History and Culture of the Yakutat Tlingit.* Smithsonian Contributions to Anthropology Volume 7, Part 1. Washington D.C.: Smithsonian Institution Press.

De Vos, George

1975 Ethnic Pluralism: Conflict and Accomodation. In *Ethnic Identity: Cultural Continuities and Change.* pp.5-41. George De Vos and Lola Romanucci-Ross, editor. Palo Alto, California: Mayfield Publishing Company.

Denniston, G.B.

1974 The Diet of the Ancient Inhabitants of Ashishik Point, an Aleut Community. *Arctic Anthropology* 11(supplement):143-151.

Dilliplane, Timothy

1985 Studying Russian America: Research Problems in Need of Attention. In *Comparative Studies in the Archaeology of Colonialism*. pp. 177-183. Stephen L. Dyson, editor. BAR International Series 233. Oxford: B.A.R.

Dmytryshyn, Basil, E.A.P. Crownhart-Vaughan, and Thomas Vaughan

1989 *To Siberia and Russian America: Three Centuries of Russian Eastward Expansion. Volume 3: The Russian American Colonies: A Documentary Record, 1798-1867*. Portland: Oregon Historical Society Press.

Enloe, James G.

1993 Ethnoarchaeology of Marrow Cracking: Implications for the Recognition of Prehistoric Subsistence Organization. In *From Bones to Behavior: Ethnoarchaeological and Experimental Contributions to the Interpretation of Faunal Remains*. pp. 82-100. Jean Hudson, editor. Center for Archaeological Investigations, Occasional Paper Number 21. Southern Illinois University at Carbondale.

Essig, E. O.

1933 *The Russian Settlement at Ross*. California Historical Society, Special Publication Number 7, San Francisco.

Falk, Lisa

1991 *Historical Archaeology in Global Perspective*. Washington, D.C.: Smithsonian Institution Press.

Farb, Peter and George Armelagos

1980 *Consuming Passions: The Anthropology of Eating*. Boston: Houghton Mifflin Company.

Farris, Glenn J.

1983 Fathoming Fort Ross. *Historical Archaeology* 17(2):93-99.

1989 The Russian Imprint on The Colonization of California. In *Columbian Consequences, Volume 1, Archaeological and Historical Perspectives on the Spanish Borderlands West*. pp. 481-498. David H. Thomas, editor. Washington, D.C.: Smithsonian Institution Press.

Ferguson, Leland

1991 Struggling with Pots in Colonial South Carolina. In *The Archaeology of Inequality*. pp. 28-39. Randall H. McGuire and Robert Paynter, editors. Cambridge: Basil Blackwell, Inc.

1992 *Uncommon Ground: Archaeology and Early African America*, 1650-1800. Washington, D.C.: Smithsonian Intstitution Press.

Fieldhouse, Paul

1986 *Food and Nutrition: Customs and Culture*. London: Croom Helm Ltd.

Gibson, James R.

1969 *Feeding the Russian Fur Trade: Provisionment of the Okhotsk Seaboard and the Kamchatka Peninsula, 1639-1856*. Madison: University of Wisconsin Press.

1976 *Imperial Russia in Frontier America: The Changing Geography of Supply of Russian America, 1784-1867*. New York: Oxford University Press.

Gifford, Diane P. and Francine Marshall

1984 Analysis of the Archaeological Assemblage from CA-SCR-35, Santa Cruz County, California. *Archives of California Prehistory, Number* 2. Salinas, California: Coyote Press.

Gifford, Edward Winslow

1940 Californian Bone Artifacts. *University of California Anthropological Records* 3(2):i-iv,153-237.

Gobalet, Kenneth W.

1997 Fish Remains from the Excavation of Early 19th Century Aleut and Pomo Habitations of Fort Ross, Sonoma County Coast, California. In *The Archaeology and Ethnohistory of Fort Ross, California. Volume 2, The Native Alaskan Neighborhood*, edited by Kent G. Lightfoot, Ann M. Schiff, and Thomas A. Wake. Contributions of the University of California Archaeological Research Facility, Number 55. Berkeley, California.

Grayson, Donald K.

1984 *Quantitative Zooarchaeology: Topics in the Analysis of Archaeological Faunas.* New York: Academic Press.

Greenwood, Roberta S.

1980 The Chinese on Main Street. In *Archaeological Perspectives on Ethnicity in America.* pp. 113-123. Robert L. Schuyler, editor. Farmingdale, New York: Baywood Publishing Company.

Grinnell, George B.

1901 Natives of the Alaska Coast Region. In *Harriman Alaska Expedition*, Volume 1:137-183. New York: Pembridge.

Gust, Sherry M.

1983 Problems and Prospects in Nineteenth Century California Zooarchaeology. In *Forgotten Places and Things: Archaeological Perspectives on American History.* pp. 341-348. A. Ward, editor. Center for Anthropological Studies, Albuquerque, New Mexico.

Harris, Marvin

1985 *Good to Eat: Riddles of Food and Culture.* New York: Simon and Schuster.

Heizer, Robert F.

1956 Archaeology of the Uyak Site, Kodiak Island, Alaska. *University of California Anthropological Records* 17(1):i-vi,1-199.

Hesse, Brian

1986 Animal Use at Tel Miqne-Ekron in the Bronze Age and Iron Age. *Bulletin of the American School of Oriental Research* 264:17-27.

Hildebrandt, William R.

1979 Vertebrate Faunal Analysis. In *Report of the Archaeological Investigations of Shelter Cove.* pp. 212-242. Valerie A. Levulett, editor. California Coastal Zone Conservation Commission, North Coast Region, Eureka, California.

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.

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. Washington D.C.: Smithsonian Institution Press.

Istomen, Alexi A.

1992 *The Indians at the Ross Settlement; According to the Censuses by Kuskov, 1820-1821.* Fort Ross Interpretive Association, Jenner, California.

Jackson, Robert

1983 Intermarriage at Fort Ross: Evidence from the San Rafael Mission Baptismal Register. *Journal*

of California and Great Basin Anthropology 5:240-241.

Jochelson, Waldemar

1925 Archaeological Investigations in the Aleutian Islands. *Carnegie Institution of Washington Publication Number* 367.

Johnson, Eileen

1983 A Framework for Interpretation in Bone Technology. In *Carnivores, Human Scavengers and Predators: A Question of Bone Technology*. pp. 55-93. Genevieve M. LeMoine and A. Scott MacEachern, editors. Proceedings of the Fifteenth Annual Chacmool Conference. The Archaeological Association of the University of Calgary.

1985 Current Developments in Bone Technology. In *Advances in Archaeological Method and Theory, Volume* 8. pp.157-235. Michael B. Schiffer, editor. New York: Academic Press.

Jolley, Robert L.

1983 North American Historic Sites Zooarchaeology. *Historical Archaeology* 17(2):64-79.

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. Portland: Oregon Historical Society.

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, Translated by J. Bisk. Fairbanks: University of Alaska Press.

Kirch, Partick V.

1992 *The Archaeology of History*. Volume 2 of: *Anahulu: The Anthropology of History in the Kingdom of Hawaii*. Patrick V. Kirch and Marshall Sahlins, editors. Chicago: University of Chicago Press.

Klein, Richard G and Kathryn Cruz-Uribe

1984 *The Analysis of Animal Bones From Archaeological Sites*. Chicago: University of Chicago Press.

Langenwalter, Paul E.

1980 The Archaeology of 19th Century Subsistence at the Lower China Store, Madera County, California. In *Archaeological Perspectives of Ethnicity in America*. pp. 102-12. Robert L. Shuyler, editor. New York: Baywood Publishing Company.

1987 Mammals and Reptiles as Food and Medicine in Riverside's Chinatown. In *Wong Ho Leun: An American Chinatown*, Volume 2: Archaeology. pp. 53-106. San Diego: The Great Basin Foundation.

Langenwalter, Paul E., II, Richard L. Reynolds, Brenda Bowser, and Richard W. Huddleston.

1989 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*. pp. 97-126. Gary S. Breschini and Trudy Haversat, editors. Appendix 1, pp. 97-126. Archives of California Prehistory, Number 29. Salinas, California: Coyote Press.

Lantis, Margaret

1984 Aleut. In *Arctic*. pp. 161-184. David Damas, editor. *Handbook of North American Indians, Volume* 5, William C. Sturtevant, general editor. Washington D.C.: Smithsonian Institution Press.

La Place, Cyrille

1986 [1839] Description of a Visit to an Indian Village Adjacent to Fort Ross by Cyrille La Place, 1839 (translated by Glenn J. Farris). In *Cultural Resource Survey at the Fort Ross Campground, Sono-*

ma County, California. pp. 66-81. Glenn J. Farris, editor. Report on file at the California Department of Parks and Recreation Archaeology Laboratory, West Sacramento, California.

Laughlin, William S.

1980 *Aleuts: Survivors of the Bering Land Bridge*. New York: Holt, Rinehart and Winston.

Lightfoot, Kent G.

1995 Culture Contact Studies: Redefining the Relationship Between Prehistoric and Historic Archaeology. *American Antiquity* 60(2):199-217.

Lightfoot, Kent G., Ann M. Schiff, and Thomas A. Wake (editors)

In Press *The Archaeology and Ethnohistory of Fort Ross, California.* Volume 2, The Native Alaskan Neighborhood. Contributions of the University of California Archaeological Research Facility, Number 55. Berkeley, California.

Lightfoot, Kent G., Thomas A. Wake and Ann M. Schiff

1991 *The Archaeology and Ethnohistory of Fort Ross, California*. Volume 1, Introduction. Contributions of the University of California Archaeological Research Facility, Number 49. Berkeley, California.

1993 Native Responses to the Russian Mercantile Colony of Fort Ross, Northern California. *Journal of Field Archaeology* 20:159-175.

Lippold, L.K.

1972 Mammalian Remains from Aleutian Archaeological Sites: A Preliminary Report. *Arctic Anthropology* 11(2):113-114.

Lyman, R. Lee

1987 On the Zooarchaeological Measures of Socioeconomic Position and Cost-Efficient Meat Purchases. *Historical Archaeology* 21(1):58-66.

1991 *Prehistory of the Oregon Coast: The Effects of Excavation Strategies and Assemblage Size on Archaeological Inquiry*. New York: Academic Press.

Lyman, R. Lee, James M. Savelle, and Peter Whithridge

1992 Derivation and Application of a Meat Utility Index for Phocid Seals. *Journal of Archaeological Science* 19:531-555.

McGuire, Randall H.

1982 The Study of Ethnicity in Historical Archaeology. *Journal of Anthropological Archaeology* 1:159-178.

McGuire, Randall H. and Robert Paynter

1991 The Archaeology of Inequality: Material Culture, Domination, and Resistance. In *The Archaeology of Inequality*. pp. 1-27. Randall H. McGuire and Robert Paynter, editors. Cambridge: Basil Blackwell, Inc.

McKee, Larry W.

1987 Delineating Ethnicity from the Garbage of the Early Virginians: Faunal Remains from the Kingsmill Plantation Slave Quarters. *American Archaeology* 6(1):31-39.

Moratto, Michael J.

1984 *California Archaeology*. New York: Academic Press.

Mouer, L. Daniel

1993 Cheasapeake Creoles: The Creation of Folk Culture in Colonial Virginia. In *The Archaeology of 19th-Century Virginia*. pp. 105-166. Theodora R. Reinhart and Dennis J. Pogue, editors.

Nelson, Edward William
1899 The Eskimo About the Bering Straight. In *18th Annual Report of the Bureau of American Ethnology*, 1896-1897. pp. 3-518. Washington D.C.: United States Government Printing Office.

Ogden, Adele
1941 *The California Sea Otter Trade, 1784-1848*. Berkeley: University of California Press.

Okun, S. B.
1951 *The Russian-American* Company. Translated by Carl Ginsburg. Cambridge: Harvard University Press.

O'Shea, John M. and John Ludwickson
1992 *Archaeology and Ethnohistory of the Omaha Indians: The Big Village Site*. Omaha: University of Nebraska Press.

Piaget, Jean
1952 *The Origins of Intelligence in Children*, translated by M. Cook. New York: International University Press.
1970 Piaget's Theory. In *Carmichael's Manual of Child Psychology, Volume 1*. pp. 703-732. P.H. Mussen, editor. New York: John Wiley and Sons.

Quimby, George I, and Alexander Spoehr
1951 Acculturation and Material Culture-I. *Fieldiana: Anthropology* 3(6):107-147.

Redfield, Robert, R. Linton, and Melville J. Herskovits
1936 Memorandum for the Study of Acculturation. *American Anthropologist* 38:149-152.

Riddell, Francis A.
1955 Archaeological Excavations on the Farallon Islands, California. Paper on California Archaeology 34. *University of California Archaeological Survey Report Number* 32.

Rogers, J. Daniel
1990 *Objects of Change: The Archaeology and History of Arikara Contact with Europeans*. Washington D.C.: Smithsonian Institution Press.

Rogers, J. Daniel and Samuel M. Wilson
1993 *Ethnohistory and Archaeology: Approaches to Postcontact Change in the Americas*. New York: Plenum Press.

Sahlins, Marshall
1981 *Historical Metaphors and Mythical Realities: Structure in the Early History of the Sandwich Islands Kingdom*. Association for the Study of Anthropology in Oceania, Special Publication Number 1. Ann Arbor: University of Michigan Press.
1985 *Islands of History*. Chicago: University of Chicago Press.
1990 The Political Economy of Grandeur in Hawaii from 1810 to 1830. In *Culture Through Time: Anthroplogical Approaches*. pp. 26-56. Emiko Ohnuki-Tierney, editor. Stanford: Stanford University Press.
1992 *Historical Ethnography*. Volume 1 of: *Anahulu: The Anthropology of History in the Kingdom of Hawaii*. Patrick V. Kirch and Marshall Sahlins, editors. Chicago: University of Chicago Press.

Salls, Roy A.
1989 The Fisheries of Mission Nuestra Senora de la Soledad, Monterey County, California. In *Research in Economic Anthropology*, Volume 11. pp. 251-284. Barry L. Isaac, editor. Washington D.C: JAI Press.

Sanders, R.

1980 E Pluribus Unum: A Review of the Harvard Encyclopaedia of American Ethnic Groups. *The New Republic* 183(23):29-33.

Scammon, Charles M.

1874 *The Marine Mammals of the Northwestern Coast of North America, Described and Illustrated: Together with an Account of the American Whale Fishery.* San Francisco: John H. Carmany and Company.

Schultz, Peter D. and Sherry M. Gust

1983 Faunal Remains and Social Status in Nineteenth Century Sacramento. *Historical Archaeology* 17(1): 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.* pp. 55-72. Terry L. Jones, editor. Center for Archaeological Research at Davis, Publication Number 10.

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.* pp. 37-51. Thomas N. Layton, editor. 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.* pp. 73-104. Terry L. Jones, editor. Center for Archaeological Research at Davis, Publication Number 10.

1997 Avian Remains from the Native Alaskan Neighborhood at Fort Ross. In *The Archaeology and Ethnohistory of Fort Ross, California. Volume 2, The Native Alaskan Neighborhood.* Kent G. Lightfoot, Ann M. Schiff, and Thomas A. Wake, editors. Contributions of the University of California Archaeological Research Facility, Number 55. Berkeley, California..

Spencer-Hancock, Diane

1980 *Fort Ross: Indians - Russians - Americans.* Jenner, California: Fort Ross Interpretive Association.

Spicer, Edward H.

1971 Persistant Cultural Systems. *Science* 174:795-800.

Tikhmenev, Petr Aleksandrovich

1978 [1861-63] *A History of the Russian American Company.* Translated and edited by Richard A. Pierce and Alton S. Donnelly. Seattle: University of Washington Press.

Veltre, Douglas W.

1990 Perspectives on Aleut Culture Change during the Russian Period. In *Russian America: The Forgotten Frontier.* pp. 175-184. Barbara Sweetland Smith and Redmond J. Barnett, editors. Tacoma, Washington: Washington State Historical Society.

Wake, Thomas A.

1995 *Mammal Remains from Fort Ross: A Study in Ethnicity and Culture Change.* Unpublished Doctoral dissertation, University of California, Berkeley. Ann Arbor, Michigan: University Microfilms International.

in press Mammal Remains from Colony Ross. In *The Archaeology and Ethnohistory of Fort Ross, California. Volume 2, The Native Alaskan Neighborhood.* Kent G. Lightfoot, Ann M. Schiff, and Th-

omas A. Wake, editors. Contributions of the University of California Archaeological Research Facility, Number 55. Berkeley, California.

in press (b) Bone Artifacts from the Fort Ross Beach Site (CA-SON 1878/H) and the Native Alaskan Village Site (CA-SON-1879/H), with Comments on Tool Production. In *The Archaeology and Ethnohistory of Fort Ross, California. Volume 2, The Alaskan Neighborhood.* Kent G. Lightfoot, Ann M. Schiff, and Thomas A. Wake, editors. Contributions of the University of California Archaeological Research Facility, Number 55. Berkeley, California.

1997 Exploitation of Tradition: Bone Tool Production and Use at Colony Ross, California. In *Making Culture: Essays on Technological Practice, Politics and World Views*. Marcia-Ann Dobres and Chris Hoffman, editors. New York: Plenum Press.

Walker, P.L. and J.C. Long

1977 An Experimental Study of the Morphological Characteristics of Tool Marks. *American Antiquity* 42(4):605-616.

Yesner, David R.

1976 Aleutian Island Albatrosses: A Population History. *Auk* 93:263-280.

1981 Archaeological Applications of Optimal Foraging Theory: Harvest Strategies of Aleut Hunter-Gatherers. In *Hunter-Gatherer Foraging Strategies: Ethnographic and Archaeological Analyses.* pp. 148-170. Bruce Winterhalder and Eric A. Smith, editors. University of Chicago Press.

Yesner, David R. and Jean S. Aigner

1976 Comparative Biomass Estimates and Prehistoric Cultural Biology of the Southwest Umnak Region, Aleutian Islands. *Arctic Anthropology* 13(2):91-112.