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# Prehistoric Fishing Technologies and Species Targeted in the Aleutian Islands: Archaeological and Ethnohistoric Evidence

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## ABSTRACT

This paper pulls together all available evidence, ethnohistoric and archaeological, on Aleut fishing technologies and the species they targeted. The prehistoric Aleutian Islanders were obligate marine hunter-gatherers. Terrestrial foods, spring roots and shoots and summer berries, and littoral invertebrates, while important, particularly during inclement weather, provided only supplementary nutrition. The majority of the diet came from sea mammals — whales, sea lions, seals, sea otters — and fish. The most important fish species were salmon, cod and halibut, but many other fish were also caught. Fishing methods included various systems of hooks and lines, nets, and weirs. The methods used and critical species varied through space and time within the island chain. At least in the Shumagin Islands, where I have done my research, human settlement patterns were responsive to fish availability.

*Keywords:* ALEUTIAN ISLANDS, ETHNOHISTORY, ARCHAEOLOGY, FISHING.

## INTRODUCTION

In this paper I have pulled together all available information from ethnohistoric, fisheries management and archaeological reports and my own fieldwork, which relates to prehistoric Aleutian fishing technologies. The Aleutian Islands, which stretch like a chain across the North Pacific Ocean from the Alaska Peninsula towards the Kamchatka Peninsula (Fig. 1), were first occupied 8000 years ago. The two known early sites bear some resemblance to one another, but little resemblance to later Aleut sites. Beginning 5000–4000 years ago, sites in the islands are clearly related to one another, showing artefact and adaptation patterns that mirror the reports of the early Russian explorers and missionaries who came to the islands in the 1700s and 1800s.

The Aleut, who now prefer to be called Unangan, the autonym of one of the island groups, were obligate maritime hunter-gatherers. The prehistoric Aleut are distinguished from most maritime hunter-gatherers by an almost exclusive focus on resources of the sea, both for food and for industrial goods. The tundra-covered Aleutian Islands provided minor, though necessary foods such as roots and berries, and, most crucially, living space. All other

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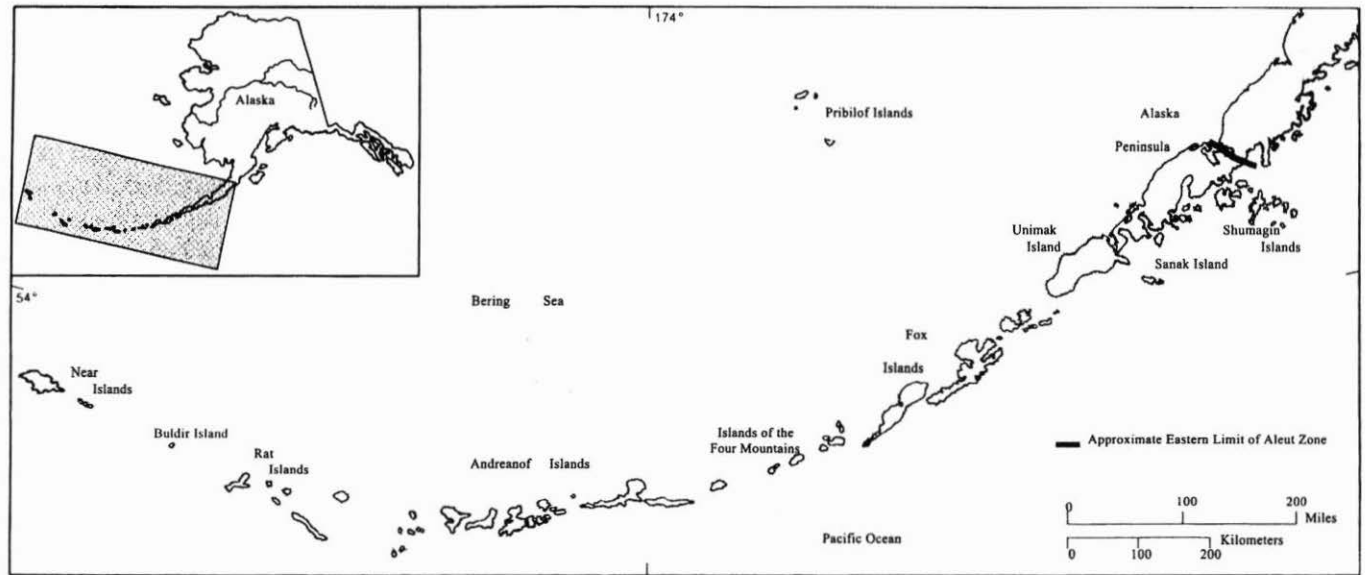


Figure 1: Map of the Aleutian Islands.

resources were littoral, including elymus grass, shellfish and driftwood, anadromous, comprising various species of salmon and salmon-trout, or marine, the most important component, which included sea birds, sea otters, seals, sea lions, whales, and fish.

The data to be presented below vary in quality and completeness, depending on the date of acquisition and the aims and competence of the investigators. Not reading Russian, I have had to depend on translations of important early documents, which are of variable accuracy, and unexamined documents still exist in Russian archives. Archaeological research began in the Aleutians in the late nineteenth century, but the total number of researchers before the past two decades can be counted on two hands, and the quality of the research has varied considerably. I have attempted to sift the data and provide as accurate a summary as possible of the fishing practices of these farthest northern Pacific inhabitants.

### **ETHNOGRAPHIC EVIDENCE**

Ethnohistoric information comes from the reports of early explorers, many of which were summarised by Hrdlicka (1945). Veniaminov (1984), the first ethnographer of the Aleuts, used both historical records and his own observations in discussing Aleut subsistence. Jochelson (1925, 1933) used both explorers' records and informants in his attempts to understand Aleut subsistence. Liapunova (1996) and Black (1998) compiled and analysed various early and obscure Russian reports. All of these sources report on Aleut classification of fish, the kinds of fish taken, the methods used for catching them and the ways in which they were preserved and prepared for consumption.

Black has analysed the Aleut classification of animals. These were divided into four domains: animals, whales, fish and birds. Aleut knowledge of fish species was extensive and Black reports that, although not all names have been recorded (Table 1), they had names for each. There were two classes of fish: "bottom fish" included ocean fish such as cod, halibut, flounder, sculpin, bass, skate, herring and Atka mackerel (Table 1) and such animals as crabs and octopuses; "freshwater fish" comprised all salmon and trout. There was also a class of "food from the sea", which encompassed anything that is edible from the bottom of the sea offshore or from the beach: kelp, seaweeds, shellfish, sea urchins and "whale food" (Black 1998: 127,132). Veniaminov (1984: 276) adds sea perch to the "bottom fish" and identifies the members of the "freshwater fish" as King salmon, the red or sockeye salmon, the Dolly Vardens, the humpbacked salmon, dog salmon, silver salmon, whitefish and herring (Veniaminov 1984: 361; see Table 2). Species were variably important depending on the island group, but cod were almost always a major food source, and a large halibut, up to 136 kg in weight, could feed a community for a week.

Modern studies indicate that the major oceanic species are variously available depending upon their annual cycles. Cod migrate 300–500 km annually, spawning in late winter at depths of 110–120 m and then moving into shallower waters, 37–55 m, for the summer months (Alaska Department of Fish and game 1985: 322–323). Halibut spawn between December and February off the continental shelf in 365–550 m of water and migrate into shallower water during the summer. In the eastern Aleutians, south of Unimak Island and southwest of the Shumagin Islands, Pacific perch feed heavily in large schools at depths of 200–300 m from May to September (Alaska Department of Fish and Game 1985: 346–347).

TABLE 1  
Aleutian sea fish

Islands from east to west: S=Shemya; B=Buldir; R=Rat Islands; A=Atka; Um=Umnak; Un=Unimak; C=Chernabura

S	B	R	A	Um	Un <sup>†</sup>	C	Common Name	Aleut name	Scientific name
c	p	c	-	c	-	c	Pacific Cod	atxíðax'	<i>Gadus macrocephalus</i>
c	c	c	-	-	-	p	Rock Greenling	-	<i>Hexagrammos lagocephalus</i>
-	-	-	-	-	-	-	Lingcod	ugúgim qâ	<i>Hexagrammus asper</i>
-	-	-	-	-	-	-	Lingcod	-	<i>Ophiodon elongates</i>
p	-	c	-	-	-	-	Red Irish Lord	-	<i>Hemilepidotus hemilepidotus</i>
c	-	p	-	-	-	p	Rockfish	-	<i>Sebastes</i> sp.
-	-	-	-	-	-	-	Sea/Pacific Perch	-	<i>S. alutris</i>
-	-	-	-	-	-	-	Black Rockfish	-	<i>S. melanops</i>
-	-	-	-	-	-	-	Yellow Eye Rockfish	-	<i>S. ruberrimus</i>
-	p	p	-	-	-	p	Pacific Halibut	cágix'	<i>Pleuronectes hippoglossus</i>
-	-	-	-	-	-	-	-	-	<i>Hippoglossus stenolepsis</i>
p	-	p	-	-	-	-	Flounder	ugágux'	Pleuronectidae
-	-	-	-	-	-	-	Flounder	tadimayux'	Pleuronectidae
-	-	p	-	-	-	-	Red Sculpin	-	<i>Cottus</i> sp.
-	-	-	-	-	-	-	-	-	<i>Scorpaena</i> sp.
p	-	-	-	-	-	-	Atka Mackerel	-	<i>Pleurogrammus monoptyerygius</i>

Recorded frequency of species: p=present; c=common; -=unrecorded

<sup>†</sup> No fish remains reported except salmonid

TABLE 2  
Aleutian Anadromous Fish

Common name	Aleut name	Scientific name <sup>†</sup>
Herring	ulñáx'	<i>Clupea harengus</i> or <i>Aupea pallasii</i>
Red/Sockeye Salmon	áñiux'	<i>Oncorhynchus tshawytscha</i> or <i>O. niarka</i>
King/Chinook Salmon	-	<i>O. tshawytscha</i>
Dog/Chum Salmon	kétax'	<i>O. lagocephalus</i> or <i>O. keta</i>
Humpback/Pink Salmon	adáyux'	<i>O. proteus</i> or <i>O. garbusha</i>
Coho/Silver Salmon	-	<i>O. kisutch</i>
Dolly Varden	sadgúnix'	<i>Salmo malma</i> or <i>Salvelinus malma</i>
Humpback Whitefish	-	<i>Coregonus oidschian</i>

<sup>†</sup> All variations found in the literature

The anadromous fish vary both in size and in spawning time, but some fish will be available in rivers from April to November. Herring, which are very small but school in large numbers, spawn in April and May, soon to be followed by the Red or Sockeye salmon, which weighs 1.8–3.6 kg and spawns from late April to August. The largest of the salmon, the King or Chinook, which is often larger than 13.5 kg, spawns from May to July, overlapping with the 4.5 kg Chum salmon. Also overlapping with these two are the 1.35–1.8 kg Humpback or Pink salmon, which run from late June to mid October. Next come the 3.6–5.4 kg Coho or Silver salmon from July to November, and finally the small 0.2–0.45 kg Dolly Varden from mid August to November and the 2.25 kg humpback whitefish in

October (Alaska Department of Fish and Game 1985). Some streams support multiple runs, some only one, and the number, presence and timing of fish in individual streams varies from year to year. Thus, the Aleut had to have ways to monitor the streams in order to fish them effectively.

In order to catch oceanic fish, the Aleuts had to get to them. Thus, the most critical fishing tool, and the most valued possession of an Aleut man, was his baidarka, or kayak, with its attendant gear, which was made by the hand of an expert. Of this boat, Tolstykh wrote:

For sea-going they make small baidarkas (skin-boats), the frames of which consist of hoops forming the ribs, covered with sea-lions' or seals' skins. In the middle of the boat is a rounded hatch, into which the hunter sits, stretching out his legs. Around the projecting rim of the hatch is fastened a skirt made of seal guts, the upper edge of which is tightly drawn around the body under the arm-pits of the hunter, who rows with double paddles. In the summer they go to sea, sometimes sailing as far as two and a half versts (2.65 km) from the shore, and catch halibut and cod, which are abundant; in winter they have to go as far as 20 versts (21.24 km) or more from the shore. (Cited in translation in Jochelson 1933: 11)

Veniaminov notes that the Aleut baidarkas were the best of all kayaks, and that traditionally "excellent riders had baidarkas so light that they were not outdistanced by birds. The baidarkas were so narrow and sharp-keeled that, without a rider, they could not remain on the water in an upright position. They were so light that a seven year old child could easily carry it [sic]" (Veniamov 1984: 271).

Using such small boats, halibuts presented a problem for the Aleuts. Langsdorff observed in 1805:

Holybutts, *Pleuronectes hippoglossus*, which are the sort held in the highest esteem, are sometimes of an enormous size, weighing even several hundred pounds. When an Aleutian has the good fortune to hook one of these enormous fish, as it is impossible for it to be taken into their small leather canoes, they kill it in the water, and either cut it to pieces and bring the pieces away at different times, or, if they can keep it hooked fast by the angle and line, tow it in this manner after the boat. (Cited in Hrdlicka 1945: 92)

To kill halibuts, the Aleuts used a small club, called a dregalka. An illustration by Elliott (1886) shows two Aleuts balancing each other's baidarkas while one of them dispatches a halibut.

Ocean fish were caught using bone hook and line, the line being, according to Tolstykh, up to 150 fathoms (274 m) long, made out of seaweed and twice as strong as a similar-sized hemp cord. Cook in 1778, on the other hand, saw line made of twisted sinews (Hrdlicka 1945: 91). The hooks were either single piece or composite, and varied according to the size of the fish being sought. Jochelson explains of his illustration of a composite hook made for him by an Aleut from Umnak Island (Fig. 2), that the shank and the hook were made of sea lion's tooth and the line of plaited sinew. There was also a sinew line to tie the bait, which was attached to the side of the hook by a bird quill. A plant root was wrapped in birch bark and tied to the hook in order to attract fish, particularly halibut. The threads binding the

hook and shaft together were covered by a bird-quill in order to prevent the fish from biting through the lashing. Birch bark was placed under the sinew lashings that held the two parts of the hook together and the line to the hook in order to prevent the line from slipping on the smooth bone (Jochelson 1933: 89). In addition to the plant root on the hook, fishing rods bore charms of albatross wing feathers, gum-rosin, octopus stomach and "the small sweet-smelling roots of a plant called amix"(Jochelson 1933: 77).

When the anadromous fish were running, women and children with old or sick men to guard them camped near the fish streams to harvest them. Weirs were built to trap the fish near the mouths of streams, and the fish were netted, speared and caught with bare hands. According to Tolstykh, Aleuts caught anadromous fish in streams "by means of small bags made of whales [sic] sinew and tied together like drag-nets"(Jochelson 1933: 11). These "bags" would seem to be floats to hold nets up; the nets being held down by stone net weights, which are common in the archaeological record of the islands. Dip nets were also used. The spears seem to include both tethered spears and leisters. Amulets were also used for luck in stream fishing: pieces of haematite were tied into nets in order to attract fish (Jochelson 1933: 78). The importance of anadromous fish is signalled by Soloviev's statement that no stranger was allowed to hunt or fish near a village (Hrdlicka 1945: 91).

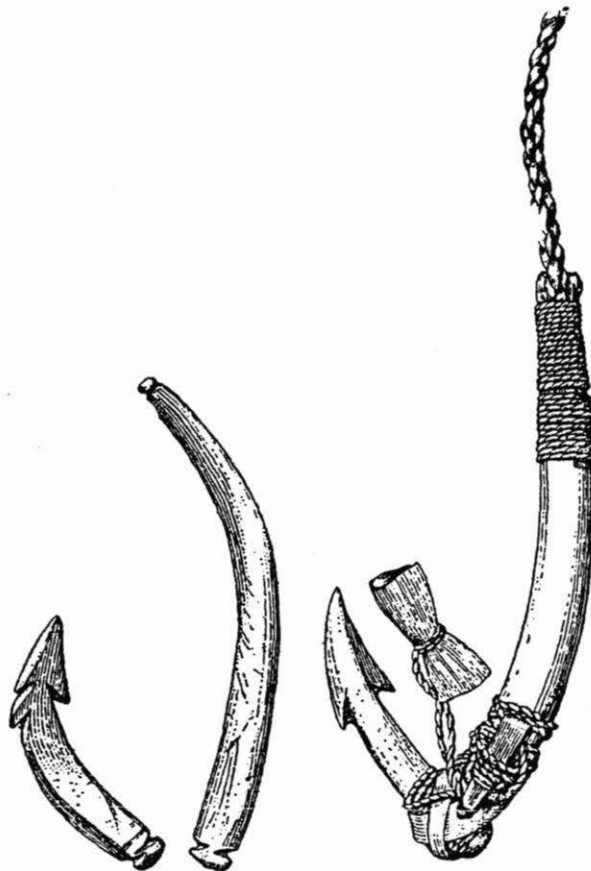


Figure 2: Aleut compound fishhook (from Jochelson 1925: 87).

The preservation of fish was simple but risky, given the inclemency of the Aleutian weather. Both Tolstykh (Jochelson 1933: 11) and Cook (Hrdlicka 1945: 91) mention that fish was sun-dried, Cook averring that "they dry quantities of fish during the summer, which they lay up in small huts for their use in winter." Veniaminov, on the other hand, states that no more than 500 seasonal fish were stored for each family, and that the weather "very often is an impediment" to air-drying. He adds that the drying was always woman's work and was done in the fishing camps (Veniaminov 1984: 278). The dried fish were stored in sea lion stomachs. These served to absorb moisture and keep the fish from becoming mouldy (L.M. Turner quoted by Jacka 1999: 219).

Food preparation was generally minimal. Tolstykh wrote: "Fish caught in summer as well as in winter is eaten with great greediness, sometimes cooked, but more often raw, as is true with meat" (Jochelson 1933: 11).

[Captain Cook] once happened to be present, when the chief of this island [Unalaska] made his dinner of the raw head of a large halibut, just caught. Before any part of it was given of the chief, two of his servants ate the gills, with no other dressing than squeezing out of the slime. After this, one of them having cut off the head of the fish, took it to the sea and washed it, then came with it and seated himself by the chief; but not before he had pulled up some grass, upon a part of which the head was placed, and the rest was strewed before the chief. He then cut large pieces off the cheeks, and put them within the reach of the chief, who swallowed them with great satisfaction. When he had finished his meal, the remains of the head being cut in pieces, were given to the servants, who tore off the meat with their teeth, and gnawed the bones like so many dogs. (Cook quoted in Hrdlicka 1945: 92)

Halibut cheeks still are considered a delicacy in the islands.

Veniaminov notes the necessity of consuming fish with fat:

However many fish an Aleut puts up, if, at the same time he has not fat, one can say with certainty that he is going to suffer either from actual hunger or illness, because with long usage dried fish, without fat, produces a bloody flux. Even the freshest fish without fat is not too nourishing. (Veniaminov 1984: 277)

He found their best dishes to be crowberries with fat, beaten until white; heads of seasonal fish fermented to some degree and fish roe prepared in the same way as the heads; the heads and fatty parts of the halibut; nura (a small sea weed), cooked with fat; and good quality dried fish with whale blubber. He notes that the fermented fish were also delicious to Russian taste. Finally, Veniaminov confirms that Aleuts eat almost everything raw except codfish, which, raw — and particularly not completely cooked — he avers, is very harmful. One way to cook cod was in a soup:

The traditional method of making soup was to dig a fire pit and place over it a stone, flush with the ground. Then a very thin beach stone was placed on the fire stone and clay walls built upon this base. The liquid was cooked in this. A bluish clay called qudii u was used for the walls of



this vessel which turned white when heated. This kind of fire pit was called *unaalu*. The same vessel was used more than once. One way of preparing the cod soup was with seaweed and seal oil. (C.I. Shade, in Jacka 1999: 220)

Fish were also cooked in hot springs on the islands on which these were available (Jochelson 1933: 7).

### ARCHAEOLOGICAL EVIDENCE

Archaeological studies in the Aleutians have produced a wide variety of fish remains. The species found include remains of rock greenling, red Irish lord, Pacific cod, sculpin, and rockfish prominent among more than 23 species from the Western Aleutians (Lefevre *et al.* in prep.); rock greenling, Red Irish lord, Pacific cod, Pacific halibut, rockfish, salmon, herring, sculpin and flounder among 31 species found in sites on Amchitka Island in the Central Aleutians (McCartney 1977); and Pacific cod, Pacific halibut, rockfish, salmon and sculpins from the Shumagins, far to the east. These are the same species reported ethnohistorically.

Tools found archaeologically also echo the ethnohistoric record. The Aleut practice of placing their dead in caves has led to the preservation of wooden and fibre artefacts. On Kagamil Island, boat parts, single-bladed paddles, spear shafts and foreshafts, clubs (Hrdlicka 1945) and nets (Settles 1945) were found, while at another burial cave in the Islands of the Four Mountains which I excavated, we found boat parts, single and double paddles, shafts and netting tools — a net gauge and netting needle. In his archaeological research, Jochelson (1925) found many bone heads for fishing-spears in the lower layers, while bone sections of the composite fishhook were discovered chiefly in the upper layers. He also notes that for catching small fish in shallow water there were simple hooks of one piece of bone. Shafts and points of compound hooks, of both bone and ivory, as well as simple hooks have been found at archaeological sites throughout the island chain. Also ubiquitous are stone line sinkers and, wherever bone tools are preserved, fish clubs for dispatching halibut or other large fish. Additional evidence of fishnets includes net weights from the Shumagins and from Port Moller (my research; Okada and Okada 1974: 120). Found all along the chain are ground stone knives, similar to Eskimo ulus, which were probably used in fish butchery.

The clearest evidence for preservation and storage comes from Hoffman's excavations at Agayadan Village on Unimak Island in the Eastern Aleutians, dating from 680–40 BP (Hoffman 1999). Here Hoffman discovered 50 sub-floor storage pits in the three houses that he partially excavated. They ranged in capacity from 4.5–307 litres, and the three houses, from small to large, contained 11.4, 22.7 and 26.9 litres of storage area per square metre. This represents a considerable storage capacity and contradicts ethnohistoric records that indicate minimal storage (Hoffman 1999: 158). This implies a diminution of storage by the Aleuts following Russian contact and possibly an effort by the Aleuts to hide their stored food from the early explorers.

Evidence of the cooking of fish lies in the presence of burned fish bone in many sites and of roasting pits, which may have been used for fish as well as sea mammals, at Agayadan Village (Hoffman 1999). In the Shumagin Islands, we found both fish bones and roasting pits. In addition, we found several small pockets of fish bone in association with flat griddle

stones, which are burned on one surface, but no burned clay features such as would be produced by the soup-making activities described by Shade (in Jacka 1999: 220) were encountered. Both at Agayadan and Nunik fish remains, as well as other garbage, are found on the house floors, corresponding to the lack of neatness inside Aleut houses reported historically (Samwell in Hoffman 1999: 53).

Detailed studies of fish remains from the Aleutian Islands are scattered in time and space, and those that exist are of variable quality. The Western Aleutians Archaeology Project has excavated several sites on Shemya Island, four of which have sufficient animal bones for analysis. Very few mammal bones were found, many birds, but most of them small and probably caught for their skins rather than for food, and many fish (60,770 NISP), which comprise 40% to 52% of the animal remains. Ninety-two to ninety-six percent of the fish remains are Gadidae (Pacific cod, Pollock and hake) and Scorpaeniformes (rockfish, greenlings, sculpins), with Pacific cod being by far the most common fish in all the quantified assemblages. Other common species include rockfish, not identified to species, and various greenlings (including Atka Mackerel), Irish Lords, and sculpins. Although present in all collections, halibut are not common.

Orchard (1998) has undertaken a detailed study of the codfish remains from two of the Shemya sites, one dating to about three thousand years ago (six dates on bone, 2570–3540 BP), the other to two thousand years ago (eight dates, six charcoal, 1720–2070 BP, and two bone, 2148 and 2555 BP). He derived linear regression formulae for estimating the length and weight of cod using 26 measurements on 13 elements of 13 cod skeletons of known length and weight (Orchard 1998: 7). He then measured 84 archaeological specimens from two sites on Shemya. Since all measurements were highly correlated with overall length, he was able to use incomplete skeletons in his analysis. The total length estimates for the cod at these sites ranged from 40–199 cm with an average length of 68.8 cm. Disaggregating the remains from the two sites showed that the fish from the later site were slightly smaller than those from the earlier site (1998: 11), possibly indicating that fishing pressure on the larger females was lowering the size of the Shemya cod population (1998: 23). The large size of these cod also indicates that the Shemya Aleuts were fishing from boats offshore, as the island is surrounded by shallow waters and the large fish tend to be at depths of 50 m or greater (1998: 21). Orchard's measurements and formulae will be valuable for other studies of human use of Pacific cod. Similar studies of halibut would be very useful.

On Buldir Island, a small island isolated from both the Far Islands to its west and the Rat Islands to its east, the Western Aleutians Archaeology Project found that, although the remains of many fish were recovered, their meat yield was almost insignificant. Their excavations indicated that sea lions provided 4053 kg of meat, birds 87–122 kg and fish 40 kg. The 1380 fish bones included Scorpaeniformes (rockfishes, greenlings, sculpins), with Rock Greenling (*Hexagrammos lagocephalus*) being most abundant, while Pacific cod and halibut were represented by only a few vertebrae. In its low number of fish, Buldir contrasts strongly with sites to its east. Buldir, however, is unusually isolated from other islands, and may have been a specialised sea mammal and bird hunting area for peoples from its east and its west.

In the Rat Islands, the most extensive work has been done on Amchitka Island, because it was a test site for atomic bombs during the mid-twentieth century. Only one Amchitka site has an analysed faunal sample, and here only the percentages of various faunal remains have been reported: 85% of the bones were fish, 10% sea mammal and 5% bird, indicating a much stronger presence of fish than on Buldir. Rock greenling, red Irish lord and Pacific cod were abundant in the site; Pacific halibut and rockfish were also present (McCartney

1977). Dall (1877) also identified salmon, herring, sculpin and flounder from Rat Island sites. Within the midden, there was no indication of changes in species preference over time (McCartney 1977).

On Atka Island, Veltre's excavation at the Korovinski site revealed many fishing tools: single-piece and compound bone and ivory fish hooks, bone harpoon socket pieces and foreshafts, stone line sinkers, stone tips for bone harpoons, line sinkers and ground stone knives for fish processing (1998: 226).

In their reports on sites on Umnak Island in the Fox Island group, neither Lippold (1972) nor Denniston (1974) identify the fish species present, though Denniston does mention that cod are the most common fish. In all sites, the relative importance of fish in the diet varies through time. At the Chaluka site fish are quite unimportant in the early layers but rise to prominence, comprising over 70% of recovered bones, in the later periods, while at Sheep Creek they rise from 45% to 83% over a comparable period of time (Lippold 1972). At Ashishik Point, on the other hand, sea mammals provided the bulk of the food in the early and late periods, while fish equalled them in importance in the intervening period, dating to about AD 1500. Birds and shellfish provided a minor supplement to the diet (Denniston 1974).

In their work at Peterson Lagoon on Unimak Island, Hoffman and his colleagues focused on salmon butchery. They excavated two roughly contemporaneous sites, both of which contained salmon remains. One was a large village site, the other a small site with minimal depressions located near a salmon stream. Their expectation was that the former was a location where salmon would be stored and consumed during the winter while the latter was a salmon processing site. At the village site they expected salmon tails and possibly fin elements, while at the fishing camp head parts would be found. Complicating the situation were ethnohistoric reports suggesting that the Aleut discarded fish bones in the sea. Their analysis supported their hypothesis: as expected, tail and fin elements were prevalent at the village site and head elements more common at the fishing camp, where, however, bones from all parts of the salmon were found. This suggests that what is found in the fishing camp is the remains of the meals the people were eating while at the camp, whole fish and heads, while the actual remains of the butchery, which were deposited back in the water, are not found. Thus, a salmon fishing camp will be recognised by its location, lack of permanent structures and the eating of whole fresh salmon, rather than by the remains of fish butchery (Hoffman *et al.* 2000).

Fishing camps in the Shumagin Islands echo this pattern. In the islands, archaeological sites can be recognised by the distinctive vegetation that grows on them as well as by depressions, which indicate past semi-subterranean houses. On Unga Island in the Shumagin group, I found many sites in which there were broad areas of anthropogenic vegetation adjacent to only one or two depressions. I interpreted these sites as the remains of seasonal fishing camps, on the basis of their location near stream mouths where Aleuts could take advantage of the seasonal salmon runs. In excavating a trench through one of these we encountered a concentration of crude notched pebbles, which I interpret as fishing net weights. They are all very similar in size, with a mean weight of 50 gm, and are very common at this site. No food remains at all have yet been encountered in this site, which may be due to the local absence of shellfish, whose shells serve to preserve fish bones.

On Chernabura Island, the southernmost of the Shumagin group, two sites are located on the south end of the sand spit which runs out to a small island at its north end. At the Periwinkle Mound, we found the remains of at least 14 species of fish, dominated by cod, and secondarily by halibut, rockfish and salmon. The large number of bones found,

particularly of 'bottom fish', indicates that the Aleuts living on Chernabura Island did not follow the ethnohistorically reported pattern of depositing fish bones back into the sea. Once an Aleut living site, the Periwinkle Mound was capped by a thick layer of, primarily, cod bone. The density of this layer of fish bones, and the fact that it contains 85% cod and basically no matrix, suggests seasonal processing of the fish, probably after the site was abandoned as a living site. As cod are found closer to the surface in the summer, this may be the time this deposit was formed. We have not yet analysed the otoliths from this deposit, which should allow us to verify the season of capture. Comparing cod to halibut, the presence of many cranial, pelvic and pectoral bones of cod suggest that they were being processed for drying, while the presence of caudal vertebrae, generally removed before hanging fish to dry, indicates that some cod were processed for immediate consumption. The halibut remains indicate that the heads were removed, and the delectable cheeks removed and eaten, but it is not possible to determine whether or not halibut were dried.

Given that the ethnohistoric record indicates that fish were minimally prepared for consumption, few archaeological indications of consumption patterns would be expected. However, griddle stones, or "stone frying-pans" according to Jochelson (1925), are found in Shumagin sites. At the Nunik site, just to the west of the Periwinkle Mound, interesting patterns of bone deposition were found at the larger of the two excavated houses of this residential site. Faunal remains were found in a number of distinct contexts. A large area of the house pit appears to have been used as a firepit following the collapse of the roof. This area, dated to the end of the nineteenth century, is characterised by burnt and crumbled granodiorite, mammal, bird, fish, and shellfish remains, and large, partially to completely burned, logs. The mammal bone, still to be analysed, appears to be cow, appropriate for a late historic occupation. Just below this area are a number of small middens, some covered with griddle stones, which possibly represent the use of the house roof during its occupation. The contents of these five pits were collected in their entirety and are quite varied in composition. These middens, as well as the ones reported below, were returned to the lab to be screened in nested geological screens down to 2 mm mesh. All contain various shellfish, while three are made up primarily of sea mammal bones; the other two of fish.

On the outer slope of the east berm of the house is a relatively large fish bone midden with mussels and sea urchins. This midden may well be the remnants of meals or a feast eaten during the occupation of the house. Within the house, the upper living layer recognised is either a prehistoric but post-house occupation or the latest occupation of the house. It has fish bone as a general wash on the floors, as at Agayadan village, as well as other food remains in small distinct midden pockets and in a post mould. Of the five midden pockets, in addition to shellfish, three are predominantly sea mammal, one is all fish and the last a mix of fish and mammal. The post mould deposit contains a fish and mussel midden.

The final layer opened up throughout the excavation is a definite interior living floor. It dates to the late prehistoric period, about 350 years ago. The trash layer had a number of bone washes, one mixed midden and a huge post mould, probably from the centre post of the house, capped by granodiorite, and containing mussel, chiton and sea mammal bones. The lack of fish in this midden might suggest that the mammal remains here comprise a dedicatory cache deposited when the house was built.

Finally, in the deep tests, which descended to approximately 2 m and revealed superimposed house floors dating to about three thousand years ago, a cod bone layer is associated with every lower living surface, usually beneath the main blackened living surface and on top of a lighter black surface. This, again, suggests messy living, though the



number of bones revealed in the test pit seems excessive even for the Aleuts. This area might be located near a major hearth, a location in which fish bones are most prevalent at Agayadan (Hoffman 1999: 53). The only way to verify this supposition would be to dig further in these early house deposits.

In looking at the various faunal deposits of the Nunik Site, the variability in the small middens is particularly intriguing. It suggests two, not necessarily mutually exclusive, interpretations: one, that people snacked or dined on what happened to be available, and two, that different people had different tastes and ate what they liked. The former explanation would seem to apply to the mammals and birds, whose capture requires some effort and which are likely to be eaten when available. The cod, which were likely to be caught in large enough numbers to dry and store, and which might have been processed on the Periwinkle Mound, were probably the mainstay of most meals and the fallback when other foods were unavailable. The other ocean fish were probably a by-catch of cod and would be enjoyed whenever available: a large halibut would provide a feast and might also be prepared for storage. The three major shellfish found at the sites, chiton, mussels and limpets, are all found in the intertidal zone and could be collected at the same time, suggesting that personal preference determined which ones were eaten at any particular meal.

In looking at Shumagin Island settlement and subsistence as a whole, large living sites with many house depressions are clustered in the outer group of islands, while the inner group, particularly Unga Island, is characterised by large depression-poor sites located adjacent to salmon streams. Considering that the Aleuts moved around the stormy seas by kayak, and that the inner islands are considerably less indented than the outer ones, I propose that the prehistoric population centres were located on the outer islands while the inner ones were inhabited primarily during the summer salmon runs. Not only were the outer islands easier to navigate around, but the codfish banks off of Simeonof Island are famously rich (Petroff 1884: 68), the up welling waters of the Shumagin trench providing ample nutrition both for them and for migrating whales, and the bay between the outer islands and Nagai provides a somewhat sheltered region for fishing and sea-mammal and bird hunting.

On the other hand, the small outer islands do not support large salmon runs as the larger inner islands do. Thus, when salmon were running, the Shumagin Islanders would move to the salmon streams and the women would catch salmon (using nets and possibly weirs) and dry them, while the men hunted in the vicinity. One or two families would live at the fish camps all year round, to guard the resource or to avoid the pomp and circumstance of the main site, and to inform the others when the salmon were running. This pattern appears to have persisted for a long period of time, as both Nunik on Chernabura Island, one of the largest surviving Shumagin sites (the largest being on Simeonof Island), and the fishing camp in Squaw Harbour, have beginning dates of 3,660 years ago. Thus, while sea mammals probably provided the majority of Shumagin Islanders' food, the distribution of fish, in time and space, determined their residence patterns.

This is a residential pattern very different from that of the historic period residents of the Shumagin Islands, although the latter remained and remains oriented to fish. Both the early Russian settlers (Johnson 1992), with their large sailing ships, and modern Shumagin Islanders, with their diesel-powered fishing boats, prefer to concentrate their occupation in the more protected inner Shumagin Islands where deep, and today artificially enhanced, harbours shelter their vessels during the worst storms. The speed of these vessels, and the ability to spend days at sea in them, allow efficient exploitation of close and distant

resources. During the middle of the historic period, when most residents of the Shumagin Islands were cod fishermen or fox farmers, small one or two family settlements were located on protected harbours around the islands, serviced by traders from the inner islands who collected the fox skins and salt cod and provided such necessities as flour, sugar and coffee (Dall 1870: 482–483; Elliott 1886: 123; Gronholdt pers. comm.). Today, the Shumagin fishermen live in Sand Point, on Popof Island in the inner islands, where processing plants and services for their boats and themselves are readily available.

The Aleutian Islands are a region with minimal resources on land and rich resources at sea. In order to inhabit them, the Aleuts had to be effective sea mammal hunters and fishermen, and they have succeeded admirably for the last 4000 years. Aleut subsistence has always been based on a combination of maritime resources and we are beginning to increase our understanding of how the combinations varied through time and across space within the Aleutian region.

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