

The 1985 Subsistence Harvest of Northern Fur Seals, *Callorhinus ursinus*, on St. Paul Island, Alaska

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Introduction

Northern fur seal, *Callorhinus ursinus*, meat has been the dietary staple of Aleuts living on the Pribilof Islands, Alaska, since their ancestors were first taken there by Russian explorers in 1786. This tradition continues unchanged; on both St. Paul Island and St. George Island, fur seals remain the most heavily used animal resource (Veltre and Veltre, 1981).

Aleut dietary requirements for fur seal meat have traditionally been met from animals taken in the annual commercial harvest for skins. This harvest (which ranged between 22,000 and 25,000 animals during 1980-84) has always exceeded subsistence¹ requirements. Hence, little has been known of the specific number of seals or the amount of seal meat needed to meet dietary requirements.

¹"Subsistence," as used in this report, means the customary and traditional uses of fur seals taken by Pribilofians for direct personal or family consumption or for sharing as food.

Estimates of the number of seals needed for human consumption for both islands (total native population is 636) have ranged from 3,358 to 15,264 (USDC, 1985; Veltre and Veltre, 1981). Using household surveys, the Tanadgusix Corporation² estimated in 1981 that roughly 2,000 seals or 32,000 kg (70,000 pounds) of seal meat would be needed to meet local food requirements on St. Paul Island (Veltre and Veltre, 1981).

In 1984 the Interim Convention on Conservation of North Pacific Fur Seals expired. This Convention was the international agreement under which fur seals had been commercially harvested since 1957. Because the United States Senate did not ratify the Protocol which would have extended the Convention, a commercial harvest for seal skins could not be conducted in 1985. Without authority to hold a commercial harvest,

²A private corporation on St. Paul Island. Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

the National Marine Fisheries Service (NMFS) attempted to ensure that the dietary requirements of natives would be met, and the fur seal population would be protected, by providing interim regulations (USDC, 1985) under which a purely subsistence harvest of fur seals could be held on St. Paul Island. The resulting harvest was the first subsistence-only harvest held on St. Paul Island since 1916 (Engel et al.³).

This paper summarizes observations made during the 15-day subsistence harvest held on St. Paul Island from 8 July through 6 August 1985. It also details the number of seals harvested, the weight of seal meat taken for food, and the average percentage of each seal carcass which was butchered for human consumption.

Methods and Materials

The interim regulations required that the harvest be closely monitored by NMFS representatives. In addition to making general observations on each day's harvesting activities, the regulations required NMFS representatives to

³Engel, R. M., R. H. Lander, A. Y. Roppel, P. Kozloff, J. R. Hartley, and M. C. Keyes. 1980. Population data, collection procedures, and management of the northern fur seal, *Callorhinus ursinus*, of the Pribilof Islands, Alaska. National Marine Mammal Laboratory, Northwest and Alaska Fisheries Center, NMFS, NOAA, 7600 Sand Point Way N.E., Seattle, WA 98115. NWAFC Processed Rep. 80-11, 235 p.

ABSTRACT—Meat from northern fur seals, *Callorhinus ursinus*, is a major food source for Aleuts living on the Pribilof Islands, Alaska. Since 1916, Aleut requirements for seal meat have been met from animals killed in the commercial harvest of seals for skins. In 1985, the commercial harvest was not held and a subsistence-only harvest of seals was authorized to meet Aleut dietary needs. From the 3,384 seals killed on St. Paul Island during this harvest, 42,381 kg (93,435 pounds) of meat were butchered for human consumption. After meat losses

due to spoilage or transportation to other villages were subtracted from this total, a theoretical mean consumption of 0.2 kg of seal meat per person per day for 1 year was possible for residents of St. Paul Island. This rate of consumption would be less than in previous years (1912-16) when subsistence-only harvests were held on the Pribilof Islands. It would also be less than the theoretical mean rates of consumption in other northern villages which are dependent on meat from subsistence harvests of marine mammals.

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compile data on: 1) The number of seals killed each day, 2) the weight of seal meat taken daily for immediate or eventual human consumption, and 3) the average proportion of each seal used.

During the first 3 days of harvest, all seal meat taken for human consumption was weighed. After day 3, only representative samples were weighed to estimate daily totals because data from the first 3 days had shown little variance. Beginning on day 4, the following procedure was followed each day for the rest of the harvest:

1) The weight of all meat taken for human consumption was estimated from one block of 50 butchered animals; on all but the fifth day of the harvest (Table 1) this represented a 25 percent sample of harvested seals. Scales calibrated in pounds were used to weigh each bag of butchered meat. These weights were later converted to kilograms.

2) It was usually not possible to weigh carcasses before the pelts had been removed because skinning proceeded quickly. Therefore, mean weights of pelts (with blubber still attached) and mean weights of their corresponding nonbutchered carcasses were calculated separately each day from a 10 percent sample of harvested animals. When mean pelt and carcass weights were combined, an estimate of the mean weight of nonbutchered animals was obtained following lancing of the heart (which involved some loss of blood).

3) The mean weight of a 10 percent sample of butchered parts which were not used for human consumption (hind quarters, heads and necks, viscera) also was determined from each day's harvest.

An estimate of the total amount of meat harvested each day was calculated from data derived from the first step. This total was divided by the number of animals killed each day to determine the average weight of meat per seal being taken daily for human consumption. This value (meat yield per seal) was then divided by the total carcass weight (step two) to estimate the average percent of each animal used. Data from step three provided information on the average weight of discarded parts—another mea-

sure of proportional use. Summing mean values for pelt weight, meat weight, and weight of discarded parts never equaled the total estimated weight of nonbutchered animals following lancing of the heart (step 2). The difference is believed to result from further loss of blood and other body fluids during the butchering process.

Results

General Observations

Subadult male seals were killed using the traditional method of stunning followed by lancing of the heart (Hansen, 1982). About 200 animals were killed each day except for 23 July when 500 animals were harvested. Animals were killed in blocks of 50 and then butchered. Although there was some variation, butchering was usually done after pelt removal and in the following manner.

The front flippers were removed by bending and cutting along the wrist joint between the carpal bones and the distal radius and ulna. The remainder of each anterior limb and its associated shoulder were then removed by cutting the musculature between the scapula and the antero-dorsal surface of the rib cage. After removal of shoulders, the chest was cut away in one piece by slicing through the cartilaginous extensions of the ribs which support the sternum on each side of the body. All of these parts (flippers, shoulders, chests) were saved for human consumption.

Removal of the chest exposed the viscera (digestive system, respiratory tract, heart, liver, kidneys) which were removed as a unit by lifting up on the posterior end of the organ mass and cutting forward through the mesentery tissue to the throat. Viscera were discarded except for the hearts and livers which were later removed.

The skull and hind quarters were then chopped from the carcass with a machete-like knife and also discarded. The remaining rib cage and backbone was then split along the left or right vertebral-costal articulations and saved. During the last week of the harvest, large numbers of tongues (an estimated 50 percent), and rear flippers (an esti-

mated 10-20 percent) were also taken for human consumption.

Meat which was not taken from the field for immediate personal consumption was placed in large plastic bags and transported to the seal skin processing plant located in the City of St. Paul. After arriving at the plant, the meat was removed from the bags and spread out on large sheets of plastic to cool. During the cooling process, each piece was inspected and grass and other foreign matter were removed. For the first 5 days of the harvest the meat was then either salted or placed in large wooden boxes (capacity of about 700 kg or 1500 pounds) for freezing. During the last 10 days of the harvest, individual pieces of butchered meat were chilled overnight and then packed into "wetlock" boxes, each weighing about 100 pounds. About 500 such boxes were filled during the harvest; all were stored in the community freezer.

Harvest Totals

During the 15-day harvest on St. Paul Island, 3,384 subadult fur seals were taken (Table 1). All but five of the seals taken were males. Most (about 80 percent) of the harvested seals were 3-year-old animals.

The total weight of meat taken for subsistence purposes was 42,381 kg (93,435 pounds) (Table 1). An unmeasured percentage of this was taken each day for immediate personal consumption. The remainder was either sent to St. George Island (estimated 8,200 kg or 18,000 pounds); or other Aleut villages (estimated 2,000 kg or 4,000 pounds); salted (estimated 3,900 kg or 8,500 pounds); or frozen (estimated 22,500 kg or 50,000 pounds). About 4,760 kg (10,500 pounds) of the meat sent to St. George Island spoiled. An estimated 3,400 kg (7,500 pounds) of the meat on St. Paul Island also spoiled. In both cases spoilage was due to the packing of meat into large boxes while it was still too warm.

An average of 12.5 kg (27.5 pounds) of meat (with bone) were butchered from each seal (Table 1). This represented an average use rate of 43.8 percent of the mean weight of harvested

Table 1.—Northern fur seal 1985 subsistence harvest data.

Date	Area	Number of animals taken	Mean carcass plus pelt wt. (kg)	Total weight of meat taken (kg)	Weight of meat per animal taken (kg)	Percent use of entire animal after lancing the heart
7/17	Northeast Point	200		2,594	13.0	
7/18	Polovina	200	28.4	2,490	12.4	43.8
7/19	Little Zapadni	197		2,482	12.6	
7/22	Zapadni	203	29.4	2,614	12.9	43.8
7/23	Reef	500	28.8	6,389	12.8	44.3
7/24	Northeast Point	202	28.7	2,400	11.9	41.5
7/25	Kitovi	200	27.3	2,588	12.9	47.4
7/26	Tolostoi	200	28.5	2,499	12.5	43.8
7/29	Zapadni	200	29.9	2,245	11.3	37.9
7/30	Reef	200	27.8	2,598	13.0	46.8
7/31	Northeast Point	202	28.5	2,518	12.5	43.7
8/01	Polovina	225	28.2	2,950	13.1	46.5
8/02	Tolostoi	216	29.5	2,802	12.9	44.0
8/05	Zapadni, L. Zap.	238	28.0	2,623	11.0	39.3
8/06	Zolotoi Sands	201	27.3	2,589	12.9	47.1
Totals		3,384	28.5	42,381	12.5	43.8%

Table 2.—Relative weights of tissue and organs of harvestable seals taken just prior to the 1985 subsistence harvest.

Item	Animal #1 (103.5 cm)	Animal #2 (100.7 cm)	Animal #3 (114.2 cm)	Animal #4	Mean % of body wt.	Range % of body wt.
Weight of the entire animal (kg)	22.1	22.2	29.1	21.8		
Weight of pelt with blubber attached (kg)	4.62	3.7	5.3	3.68	18.2	16.7-20.9
Weight of organs and tissues removed for food during 1984 harvest (kg)						
Front flippers + shoulders	4.8	5.2	7.08	5.1		
Liver	1.35	1.45	1.44	1.4		
Heart	0.246	0.174	0.267	0.196		
Total	6.396	6.824	8.787	6.696	30.2	28.9-30.7
Weight of additional organs and tissues (kg)						
Gut	1.05	1.637	1.242	0.949		
Stomach	0.400		0.416	0.351		
Spleen	0.050	0.040	0.107	0.045		
Pancreas	0.060	0.055	0.084	0.027		
Kidneys						
Right	0.121	0.128	0.127	0.118		
Left	0.117	0.123	0.133	0.112		
Eyes (2)	0.096		0.089	0.086		
Tongue, larynx, Glottis, lungs	1.00	1.026	1.375	1.104		
Brain	0.302					
Bone (entire skeleton)	1.2			1.7		
Age	3	3	3	3		

seals (which was 28.5 kg or 62.8 pounds per seal, not including blood loss during the heart lancing process). When the mean weights of pelts with blubber (6.1 kg or 13.4 pounds), meat taken (12.5 kg or 27.5 pounds), and discarded parts (8.6 kg or 18.9 pounds) were added (27.2 kg or 59.8 pounds), and then divided by the

mean overall weight of seals (28.5 kg or 62.8 pounds), approximately 5 percent of the beginning weight was left unaccounted for. This is believed to represent loss of blood and other body fluids during the butchering process (which occurs in addition to the blood loss following lancing of the heart).

Discussion

Throughout the 15-day harvest there was little daily variation in any of the parameters being measured. Calculated weights of animals before pelt removal (mean 28.5 kg; range 27.3-29.9 kg), the weight of meat taken for human consumption per seal (mean 12.5 kg; range 11.0-13.1 kg), and the percentage of each carcass used (mean 43.8 percent; range 37.9-47.1 percent) all remained quite stable (Table 1).

Although almost all parts of the seal historically have been found of some use (Veltre and Veltre, 1981; Scheffer, 1948), certain parts of each carcass are more desired than others. The most popular items during the 1985 harvest were front flippers, followed by hearts and then livers. The popularity of these items was such that very few ever reached the processing plant for community salting or freezing.

Observations (by the senior author) during the 1984 commercial harvest had indicated that front flippers, hearts, livers, and shoulders comprised most of what was taken from each carcass. In preparing for the 1985 subsistence harvest, we dissected four harvestable sized seals (which had died during other research activities 1 week prior to initiation of the harvest) and determined that the combined weights of the front flippers, hearts, livers, and shoulders amounted to about 30 percent of the weight of an animal following lancing of the heart (Table 2; also see Scheffer, 1960). The difference between the 43.8 percent use of carcasses in 1985 and the 30 percent (estimated) use of carcasses during 1984 occurred because backs, ribs, and chests were taken in addition to flippers, hearts, livers, and shoulders in 1985.

The average weight of meat taken for human consumption from each seal (12.5 kg or 27.5 pounds) equals or exceeds estimates from previous harvests. During 1912-16, the last period during which purely subsistence harvests were held on the St. Paul Island, it was noted that a subadult male fur seal "dresses about 25 pounds" (11.3 kg) (Clark, 1914). The relatively high yield of meat (27.5 pounds) from each animal killed during 1985 appeared to result from

diligent attempts by St. Paul residents to avoid any meat wastage during the butchering process.

Of the 42,381 kg (93,435 pounds) of seal meat taken for human consumption, about 29,000 kg (64,000 pounds) remained available for human consumption on St. Paul Island after losses due to spoilage (about 3,400 kg or 7,500 pounds) and meat flown to St. George Island (about 8,100 kg or 18,000 pounds) or to other Aleut Villages (about 2,000 kg or 4,000 pounds) were subtracted from the total. This 29,000 kg (64,000 pounds) value is relatively similar to the 32,000 kg (70,000 pounds) which Veltre and Veltre (1981) report the Tanadgusix Corporation had estimated would be needed by the residents of St. Paul Island following a household survey in 1981. A household survey conducted by the Tanadgusix Corporation just prior to the end of the 1985 harvest indicated that the perceived needs of St. Paul residents were met by the amount of meat which had been taken (McCorkle⁴).

Assuming that the population of St. Paul Island is 551 (USDC, 1981), of which 483 are permanent native residents (Dames and Moore⁵), the 1985 harvest would allow a theoretical daily average consumption of approximately 0.2 kg (0.4 pounds) of seal meat (with bone) per native inhabitant of St. Paul Island for 1 year. This is less than previous estimates of seal meat consumption for the Pribilof Islands. Elliot (1881) estimated an average consumption of 600 pounds of seal meat "by each person large and small during the year" (= 0.7 kg or 1.6 pounds per day). Osgood et al. (1915) reported that the amount of seal meat needed was "one pound of meat free of bone per day for each person." G. A. Clark, former Secretary of the Bering Sea Fur Seal Commission, testified in 1914 that, "one pound of [seal] meat a day would be nothing but a taste for them (natives)" (Clark, 1914).

⁴Vern McCorkle, City Manager, City of St. Paul, St. Paul Island, Alaska 99660. Personal commun.

⁵Dames and Moore. 1983. Economic strategies plan. St. Paul Island, Alaska. Report prepared for the City of St. Paul by J. R. Christopherson, D. C. Clarke, S. A. Johnston, and S. R. Braund, 97 p.

Although this anecdotal information lacks scientific verification, it is apparent that more seal meat per person was taken during the last period of subsistence-only harvests on St. Paul Island (1912-16) than was taken in 1985. During the 1912-16 subsistence harvests, the smallest number of seals (1,764) was taken in 1914 (Bower and Aller, 1915), and the largest number (3,483) was taken in 1916 (Bower and Aller, 1917). During both years the native population on St. Paul Island was 192 (Bower and Aller, 1915; 1917). Assuming that seals taken during that period dressed to 25 pounds (Clark, 1914), about 0.3 kg (0.6 pounds) of meat (with bone) would have been available per person per day as a result of the 1914 harvest; about 0.6 kg (1.2 pounds) per person per day would have been available as a result of the 1916 harvest.

It is not surprising that Aleuts in 1985 took less seal meat for human consumption than their ancestors did in 1912-16. Prior to the 1950's, the native diet on the Pribilof Islands was partially controlled by Governmental agencies which provided goods and services to Aleuts in return for harvest labor. During months when seals were available, these agencies did not issue items such as canned meat, salt beef, ham, or salt salmon (Wentz, 1946), thereby forcing a dietary reliance on seal meat. All such enforced reliance on seal meat has since disappeared because the Government has phased out its management of the Pribilof Islands. With modernization and economic independence have come increased opportunities for Aleuts to choose a more varied diet (Veltre and Veltre, 1981).

There is a wide range of meat consumption among cultures (FAO, 1983; OECD, 1983). A daily per capita consumption of 0.2 kg (0.4 pounds) of seal meat on St. Paul Island would approximately equal the level of meat consumption calculated for low-cost food plans in Alaska (0.2 kg or 0.4 pounds) (University of Alaska, 1984). It would be less than the average daily per capita consumption of meat in households in the western United States (0.3 kg, 0.6 pounds) (USDA, 1983). The harvest of 0.2 kg (0.4 pounds) per person on St.

Paul Island in 1985 would be less than the amount harvested per person in other northern and western Alaskan communities which depend on subsistence lifestyles: The average resource harvest of fish, land mammals, marine mammals, and other similar species in 17 Arctic villages during the 1980's has been 0.8 kg (1.8 pounds) per person per day; in 17 Aleutian-Pacific coast villages it has been 0.5 kg (1.1 pounds) per person per day (Wolfe and Walker⁶).

In those Alaska villages which depend primarily on marine mammals as the principle source of protein, recent harvest levels have substantially exceeded the level of the 1985 seal harvest on St. Paul Island: In Kivalina, Alaska, where marine mammals comprised 64.4 percent and 57.2 percent of the Eskimo subsistence harvest during 1982 and 1983, respectively, the daily per capita harvest was about 0.9 kg (1.9 pounds) with bone (Burch, 1985); in Stebbins, Alaska, where marine mammals accounted for 32 percent of the Eskimo subsistence harvest, the daily per capita harvest during 1980-81 was 0.4 kg (0.9 pounds) with bone (Wolfe, 1981); in the Soviet Union, the daily animal protein requirements for Eskimos subsisting on whale meat has been reported to be 0.53 kg (1.2 pounds) without bone (Sapronov, 1985)⁷.

Based on these comparisons with other Alaskan villages, and with historical levels of take in the Pribilof Islands,

⁶Wolfe, R. J., and R. J. Walker. 1985. Subsistence economies in Alaska: Productivity, geography, and developmental impacts. Paper presented at the symposium Modern Hunting and Fishing Adaptations in Northern North America. 84th Annual Meeting of the American Anthropological Association, Washington, D.C., 7 December 1985. Avail. from Subsistence Division, Alaska Department of Fish and Game, P.O. Box 3-2000, Juneau, Alaska 99802. 21 p. + tables.

⁷Comparisons between Aleut and Eskimo villages in Alaska are inexact because of cultural differences. Eskimos use seal blubber for food; residents of St. Paul Island do not. Eskimo residents of some villages kill large numbers of walrus for ivory and use only the flippers for human consumption. Data from Stebbins, Alaska (Wolfe, 1981), are somewhat anomalous because of the large number of walrus taken in 1982-83, and the bowhead whale taken in 1983-84. The Burch (1985) data are reported in round weights; after discussions with Robert Wolfe, Director of Research, Subsistence Division, Alaska Department of Fish and Game, these were multiplied by 0.6 to provide an estimate of average dressed weights.

it appears that the amount of seal meat taken on St. Paul Island in 1985 was less than the amount of meat harvested in other similar cultural or historical situations. Additional subsistence resources (halibut, sea lions, reindeer, birds, and eggs; see Veltre and Veltre, 1981) and commercially available foods will likely be used to achieve more comparable levels of meat harvest and consumption.

Conclusions

During the 15-day subsistence seal harvest on St. Paul Island, 3,384 seals and 42,381 kg (93,435 pounds) of northern fur seal meat were taken for human consumption. The average proportional yield per animal (43.8 percent) and the amount of meat dressed out from each animal (12.5 kg or 27.5 pounds per seal) were high; however, the amount of meat harvested per person was less than in other northern and western Alaskan villages which depend on subsistence lifestyles.

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