ALASKA DEPARTMENT OF FISH AND GAME

JUNEAU, ALASKA

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MARINE MAMMAL INVESTIGATIONS

by

John J. Burns, Leader
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Volume III
Annual Project Segment Report
Federal Aid in Wildlife Restoration Act
Project W-6-R-3, Work Plan J

The subject matter contained within these reports is often fragmentary in nature and the findings may not be conclusive; consequently, permission to publish the contents is withheld pending permission of the Department of Fish and Game.

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State: Alaska

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Job No. 1-a Title: Walrus Biology and Population Status

PERIOD COVERED: April 1, 1962 to June 30, 1962

ABSTRACT

Harvest data indicate that the major northward migration of walruses past Gambell occurred between May 8 and May 24. At Savoonga, the largest harvest occurred between May 3 and May 23. The major kills at Diomede were made during the one week period of June 1-7. At least 80 per cent of all cows observed by Department personnel were accompanied by calves. Biological specimens, including 694 pairs of lower canine teeth, 163 female reproductive tracts and 200 sets of eyes, were collected for later examination.

RECOMMENDATIONS

Work directed toward the stated objectives should be continued with particular emphasis on composition of wintering herds, population size and status, reproductive physiology and migration.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: J Title: Marine Mammal Investigations

Job No: 1-a Title: Walrus Biology and Population Status

PERIOD COVERED: April 1, 1962 to June 30, 1962

OBJECTIVES

To obtain additional information about the life history of the walrus, with special attention to breeding biology and growth, to develop methods for estimating productivity, population size and trend, and to determine the ecological and physiological significance, size and composition of the walrus herds that haul-out on the Walrus Islands.

TECHNIQUES

Work directed toward the above objectives was begun, by this investigator, during April. To date, it has consisted of literature review, biological specimen collection and observation of walruses migrating through Bering Strait. Future work planned includes collection, examination and interpretation of specimens.

FINDINGS

Migration, one of the most easily observed occurrences with respect to walrus life history, was recorded by Department personnel at Gambell, Savoonga and Little Diomede. Our knowledge of herd migration is fragmentary, but indicates that migratory patterns differ from year to year depending on winds, currents and ice conditions. This is supported by the fact that during certain years, walruses are numerous at one location while during other years, they are comparatively scarce. In the spring of 1958, 117 walruses were killed and retrieved by Diomede hunters (Kenyon 1958). During the same period in 1960, approximately 900 animals

were taken (Harbo, 1961), this great difference can be partially attributed to differences in hunting conditions. Of greater importance was the marked difference in the numbers of walruses passing Diomede. The same conditions with respect to annual fluctuations in numbers were found to be true at Gambell, Savoonga and King Island.

During the 1962 northward migration, walruses were known to have been taken at Savoonga from March 7 to June 12. The largest harvests occurred from May 3 to May 23. The 1962 spring harvest at Savoonga amounted to 263-293 animals. At Gambell, 20 walruses were taken prior to May 4. From that date to May 28, an additional 360 animals were killed and retrieved. Most were females taken between May 8 and May 24.

The major migration past Little Diomede Island (approximately 150 miles north of St. Lawrence Island) occurred between June 1 and 7. In that period 212 of the total harvest of 255 walruses were taken. Most of the animals observed passing north at that time were cows accompanied by calves.

Figure 1 illustrates the numbers of walruses taken at the three points mentioned above, and the periods during which they were taken.

One reason for the extended duration of the hunting period on St. Lawrence Island (Gambell and Savoonga) is that walruses can often be found wintering near there. They are usually south of the Island but, as last winter, are occasionally on the north side.

At the present time, an overall and accurate picture of walrus migration cannot be drawn solely on observations made in Alaskan waters. Diomede hunters report that the period during which walruses are killed by peoples of the Siberian coast is much longer than on the Alaskan side, and that more men participate in the hunt. Consequently, more walruses are killed by Siberian hunters.

Sex Composition of Animals Killed

At Little Diomede Island, the majority of walruses observed during the first week of June were females. My observations indicate that of the herds actually approached by hunters (approximately 1,100 animals in all), 80 - 85 per cent of the cows were accompanied by calves. A similar situation prevailed at Gambell,

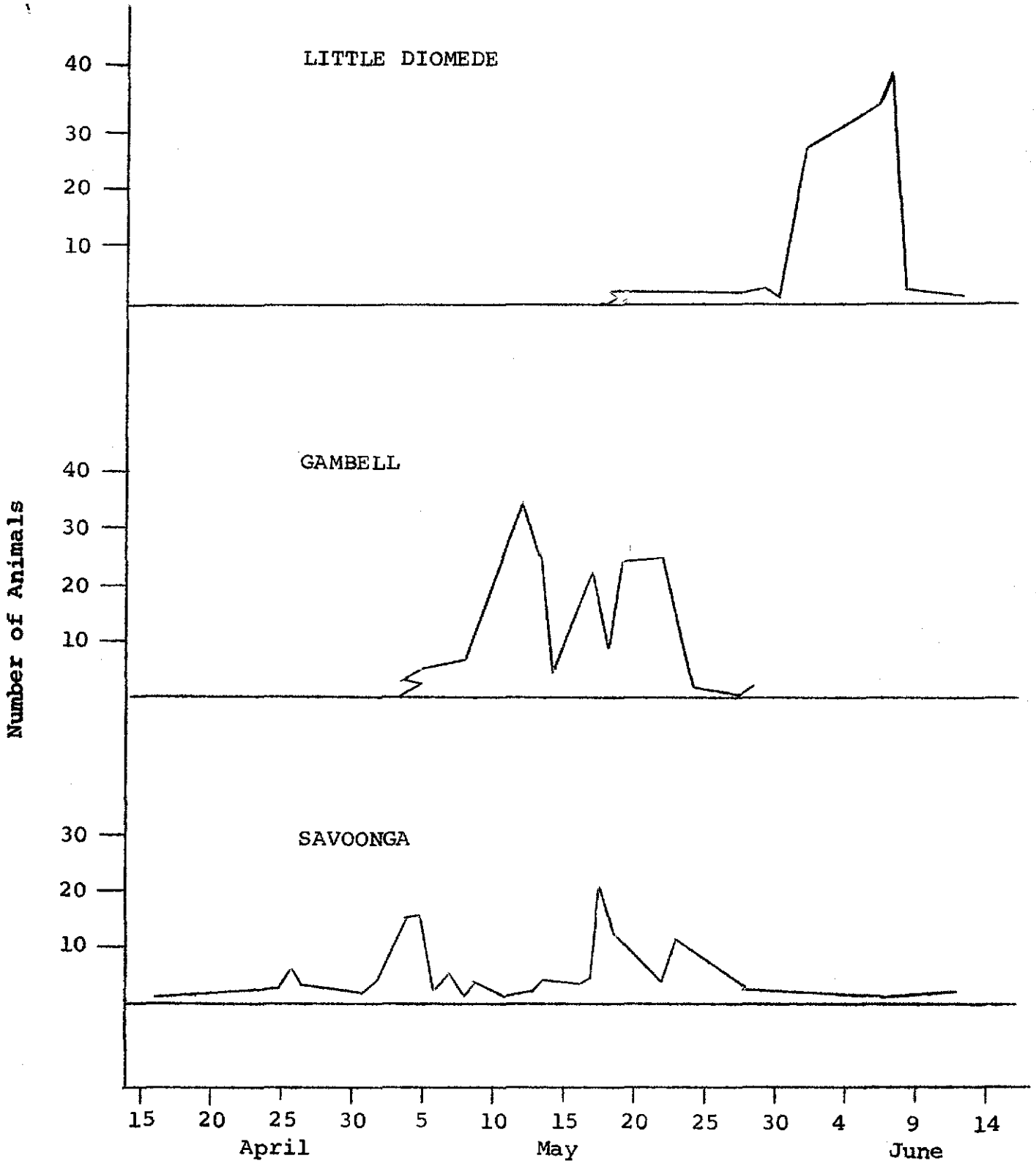

Figure 1. The duration and extent of walruses harvested at Little Diomede, Gambell and Savoonga during 1962 spring hunts.

where in the known kill of 360 animals, 143 (39.7 per cent) were adult cows and 145 (40.2 per cent) were young-of-the-year calves. More calves can be taken than cows due to the fact that cows may sink whereas calves are almost always retrieved. There is apparently greater selection by Gambell hunters for cows accompanied by calves. The above figures, as well as those reported by Fay (1958) indicate that during most years the cow:calf ratio in the harvest is 1:1.

At the present time, conclusions concerning the cow:calf ratio of the entire walrus population cannot be drawn as we have no information about sex and age composition of wintering herds, nor do we have adequate large segments of spring migrants under observation.

Concerning the sex composition of new-born calves, our limited observations indicate that the sex ratio may approach 50:50. Of 93 known-sex calves taken at Little Diomede, Gambell and Savoonga, 44 were males (47 per cent) and 49 were females (53 per cent).

Biological Collections

In addition to observations made by Department personnel, biological specimens including female reproductive tracts, canine teeth, eyes and tusk measurements were obtained. In the course of collecting activities, approximately 694 pairs of lower canine teeth, 163 female reproductive tracts and 200 sets of eyes were cataloged for later examination and interpretation.

Samuel Harbo, Jr. is working on age composition of the walrus harvest, using sectioned canine teeth as an age determining criterion. The method employed is discussed in the 1961 project report (Harbo, 1961).

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LITERATURE CITED

Fay, F. H. 1958. Pacific walrus investigations on St. Lawrence Island, Alaska. Arctic Health Research Center, U. S. Public Health Service. 54 pp. (Unpubl.).

Harbo, S. J. 1961. Walrus harvest and utilization. W-6-R-2, Vol. II, No. 9. 30 pp. (Unpubl.).

Kenyon, K. W. 1958. Walrus and other marine mammal studies at Little Diomede Island, Alaska. Bureau of Sport Fisheries and Wildlife, Branch of Wildlife Research. 112 pp. iii. 16 figs. (Unpubl.).

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: J Title: Marine Mammal Investigations

Job No. 1-b Title: Walrus Harvest and Utilization

PERIOD COVERED: May 1, 1961 to June 30, 1962

ABSTRACT

During the 1961 spring walrus hunting season 1,201-1,486 walruses were harvested by residents of northwest Alaska. The majority of this harvest occurred at the villages of Diomede, King Island, Gambell, Savoonga and Wainwright. On the basis of a conservative estimate of a 50 per cent hunting loss, 2,402-2,972 walruses were killed.

The 1962 total kill of walruses amounted to 2,829-3,064 with a recovered harvest of 1,263-1,353 animals (44.6 per cent). The degree of utilization varied depending on size of the village, and number of walrus killed. Utilization ranged from 10-50 per cent at villages normally taking relatively large numbers of walruses. This figure approached 100 per cent at points where walruses are only occasionally taken.

Estimated potential value of the 1962 winter and spring walrus harvest is $251,687.00.

RECOMMENDATIONS

In view of the rapid changes taking place in population size of some of the Island Villages, more information concerning effects of these changes on the total walrus kill should be

obtained. Increasing numbers of residents who have left their original villages, return during the spring walrus hunts solely to obtain ivory. This type of hunting will further decrease the degree of utilization of animals killed.

More emphasis should be placed on the enforcement of existing ivory regulations in an attempt to decrease trade in raw ivory. At present, the ease with which raw ivory can be sold is a big factor contributing both to excessive head hunting and to the selling of ivory before it is carved. The monetary gain involved in selling carved as opposed to raw ivory would, in the long run, greatly benefit hunters and carvers.

Additional information is needed concerning harvest characteristics including total kill, hunting loss from one cause or another and actual extent of dependency of the Eskimo upon the walrus. This information when applied to our knowledge of dynamics of the walrus herd is our only means for outlining a successful management program.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: J Title: Marine Mammal Investigations

Job No: 1-b Title: Walrus Harvest and Utilization

PERIOD COVERED: May 1, 1961 to June 30, 1962

OBJECTIVES

To determine the magnitude, utilization and value of the walrus harvest in Alaska.

TECHNIQUES

Personal interviews, correspondence and direct observation by Department biologists provided the majority of information concerning numbers of walruses taken, degree of utilization, and value of the harvest in northwestern Alaska.

During the 1961 spring walrus hunting season, two Department biologists were stationed on Little Diomede Island and one at Gambell, on St. Lawrence Island. During May and June of 1962 there was one biologist at Gambell, one at Savoonga and one at Diomede. The only other points where large numbers of walruses were taken were at King Island and Wainwright. There were no observers at these points during 1961 or 1962.

Reports of previous investigators supplied much of the information concerning sex and age ratios of previous harvests, and the value of walrus parts and products.

FINDINGS

The harvest of walruses during the past two spring hunting seasons closely coincides with what has been found to be an average annual harvest of approximately 1,300 animals (Collins, 1939; Brooks, 1954; Fay, 1955; Harbo, 1960). During certain years the harvest has varied considerably. Harbo (1961) found that 1960 was a year of unusually high walrus harvests. This was largely due to a take of approximately 900 adult and sub-adult walruses by hunters from Little Diomede Island. During the winter and spring of 1960, 2,266 to 2,356 walruses were killed and retrieved. This was approximately half of the total number of walruses killed.

Information obtained from Samuel Harbo, Game Biologist in charge of walrus investigations during 1961, indicates that during the winter and spring of that year 1,201 to 1,486 walruses were taken by hunters in northwestern Alaska. During part of the 1961 spring season, biologists Harbo and Gittings were at Little Diomede Island, and Charles Lucier was at Gambell on St. Lawrence Island.

Field notes of Harbo, Gittings and Lucier, and a brief summary by Harbo have supplied most of the information concerning the walrus harvest during the winter and spring of 1961.

1961 Walrus Harvest

Little Diomede Island: During the 1961 spring walrus hunts at Diomede, 3 boat crews composed of 22 hunters took an estimated 460 to 560 animals. Of 319 known sex animals killed between May 18 and June 6, approximately 178 were females and 141 were males (126 females : 100 males). During this same period, 100 walruses of unknown sex were taken. Five calves were reported as being brought back to the village. For the season as a whole, the number of calves returned to the village was probably between 15 and 25.

Until May 25, the Diomede hunters were using small skin boats in the 20 foot class. At this time the large walrus kills had not yet occurred. By May 25, ice conditions were favorable enough to permit use of the large skin boats which are in the 30 foot class. The larger boats are capable of carrying more crew members and much more freight than the smaller boats.

On May 26, the first large kills of the spring occurred when 3 boats took 74 walruses. On that day, returning hunters reported many herds of walruses hauled out on the ice. Between May 26 and June 4, 345 walruses were reported killed and retrieved.

Gambell: Lucier, Department observer at Gambell during most of the 1961 spring season, estimated the harvest of walruses to be from 250 to 275 animals. The majority of walruses were taken during late April and early May. The last walrus taken during Lucier's stay was killed on May 21. The largest kills occurred between May 1 and May 12.

Sixteen boats with a total of 86 regular crew members hunted during the spring of 1961. Boats used by Gambell hunters are generally smaller than those used on Diomede. Fay (1958) explains in detail the hunting equipment and procedures employed by Gambell hunters.

Of 127 walruses of all ages for which sex was known, 94 were females and 33 were males (35 males:100 females). As yet, we have not compiled all the information pertaining to the age composition. For information concerning the probable composition of the total walrus harvest at Gambell, we have to rely on previous information recorded by Fay (1958). He found that from 1952-1958, the harvests were composed of 35 per cent adult females, 35 per cent new born young, 20 per cent adult males and 10 per cent juveniles.

Applied to the total take of 275 animals, the breakdown is 97 adult females, 96 new-born young, 54 adult males and 28 juveniles.

Savoonga: Size of the 1961 winter and spring harvest of walruses at Savoonga was not definitely known, but Harbo's field notes indicate that it was less than the harvest of 350 animals taken in 1960. He estimates that there were probably 200-250 walruses killed and retrieved. The majority of these animals would have been bulls. Fay (1958) states that the main harvest is usually taken between May 15 and June 15, and is composed of 90-95 per cent bulls. Females, when available, are extensively sought but are never numerous enough to comprise more than one-fourth of the total harvest in any one year.

Assuming that 90 per cent of the walruses killed at Savoonga were adult males, 180-225 adult males were killed and retrieved during the spring of 1961.

We have no estimate of the hunting effort during the 1961 spring season, but it would probably approximate that expended during the 1962 season. Information for 1962 is contained in a later section.

King Island: During the winter of 1960-1961, only four hunters resided on King Island. This drastic decrease in the resident population of King Island was due to the fact that the Bureau of Indian Affairs' school on the Island was closed after the 1959-1960 school year. Most of the King Island people spent the winter of 1960-1961 in Nome.

During the 1961 spring hunting season, unfavorable weather and ice conditions delayed the arrival of 2 boat loads of hunters (16-20 men) from Nome.

The total estimated take of adult walruses at King Island was 60-120 animals. Previous investigations indicate that 65-75 per cent of the harvest is composed of females (Harbo, 1959). Estimating the proportion of females killed during 1961 to be 70 per cent, and the 60-120 animals killed to be adults and sub-adults (calves are usually not counted in the take by hunters), the number of females killed was 42-84.

Other Areas: Other villages from which hunters kill walruses include Mekoyruk on Nunivak Island, Wales, Shishmaref, Kivalina, Point Hope, Wainwright, Point Barrow and Nome.

The summer of 1961 was unusually good for hunting walruses at Wainwright and hunters from that village took 131 animals. With the exception of Wainwright, hunters from the other villages mentioned above probably did not take more than 100-150 walruses combined.

At points like Mekoyruk, Wainwright, and Point Barrow, the majority of walruses killed are males, comprising about 85 per cent of the harvest. Applying this percentage to the kill of 131 walruses at Wainwright and 100-150 walruses at other areas, 196-239 males and 35-42 females and calves were killed and retrieved.

Table 1 indicates hunting success and hunting loss during the 1962 spring hunting season. It is felt that in general, the calculated hunting loss at various villages can be applied to the 1961 harvest.

Table 1. Estimated total kill of walruses during the spring of 1962.

Village	Walruses Retrieved	Per cent Hunting Loss	Total Killed
Diomede	255	55	567
King Island	215-225	55	479-500
Gambell	380	50	760
Savoonga	263-293	65	723-837
Other Areas	150-200	50	300-400
	1263-1353		2829-3064

1962 Walrus Harvest

Harvest information for the winter and spring of 1962 was obtained by Richard Bishop and Stuart Marks, both observers on St. Lawrence Island, and by this investigator at Little Diomede Island. Information from other areas was obtained through correspondence and personal interview.

The total number of walruses killed and retrieved during the late winter and spring of 1962 was 1,263-1,353 animals. The villages of Gambell, Savoonga, Diomede and King Island accounted for 1,113-1,153 of the total number of walruses taken (85-88 per cent).

The total harvest of 1,263-1,353 animals closely coincides with the previously mentioned average number of animals harvested (1,300 animals).

Little Diomede Island: In contrast to the spring hunt of 1961, there were some very definite changes in hunting effort which will probably have a pronounced effect on the future take of walruses by Diomede hunters. Kenyon (1958) reports that during the spring of that year, 4 skin boats were used by 29 regular crew members to hunt walruses. Harbo's field notes for 1960 indicate that during the spring of that year there were also 4 boats with approximately 28 regular crew-men. This changed in 1961 when three boats were actively hunting. The total number of regular crew members was 22. During the 1962 hunting season there were only 2 boats with 21 regular crew members hunting walruses.

Of these 21 crew-men, 4 were elderly men and 2 were boys. During former years when there were more young men on the Island, 21 men would have been able to operate 3 boats. As it was, the older men contributed only firepower and their knowledge of the sea but could not do the hard and heavy work that hunting walruses entails.

Prior to my arrival on May 27, 28 walruses had been taken. This figure would undoubtedly have been higher except that one boat went to Wales on May 18 and was unable to return to Diomede until May 28. From May 28 to June 13, 224 walruses were taken. Most of these animals were taken on the 4 days of June 1, 5, 6 and 7. Of these days a total of 212 walruses were killed and retrieved.

On June 13, five hunters went to work for the Bureau of Indian Affairs and this marked the virtual end of the 1962 spring walrus hunt at Diomede. Subsequent to my departure from Diomede on June 13, there were three walruses killed.

At Diomede, the total kill for this spring was 255 animals of which 144 were males of all ages and 111 were females of all ages. The allowed limit of five females or calves per hunter was reached on June 7, and subsequent to that date, many large herds of females were passed up in search of bulls.

This limit was probably one of the biggest factors in restricting the size of the harvest by Diomede hunters. Their compliance with Department regulations was extremely satisfactory.

The sex ratio of 130 males : 100 females in the harvest is relatively meaningless in view of the selective hunting that occurred. By contrast, Brooks (1954) observed that the harvest at Little Diomede included many more females than males. As Harbo (1960) points out, "This pronounced change in sex composition undoubtedly resulted from a change in the Alaska Game Regulations."

Of the 255 walruses killed and retrieved, 15 were new-born calves consisting of 8 males and 7 females. This closely approached the expected ratio of 100:100 in new-born walruses.

Gambell: Richard Bishop, biologist observing the spring walrus hunting at Gambell, reported that prior to his arrival on May 3, 20 walruses had been taken. From May 4 to May 28, 360 additional animals were killed and retrieved bringing the total harvest to 380 animals. No walruses were killed from May 28 to the time Bishop departed on June 10.

The known composition of walruses taken consisted of 143 adult females (40 per cent), 62 adult males (17 per cent), 145 new born calves (40 per cent) and 10 juveniles (3.0 per cent). In general, these figures closely approximate Fay's (1958) data which were mentioned in an earlier discussion of the 1961 harvest at Gambell.

Eighteen boats were used for spring walrus hunting at Gambell. The number of crew members varied from three to six, four being most common. The maximum number of active hunters

on any one day was 84. This occurred on May 12 when 41 walruses were taken (the largest kill for any one day during the 1962 spring season).

Savoonga: To our knowledge, 1962 was the first year during which a Federal or State agency had a game biologist at Savoonga during the spring walrus hunting season. During this spring, Stuart Marks reported a total take by Savoonga hunters of 263-293 walruses. These figures were derived through personal observation, hunter interviews and from information acquired with biological specimens collected by the village storekeeper. Lower canine teeth were being collected by the storekeeper prior to Mark's arrival and he felt that in some cases, teeth in addition to the canines were being turned in. This slightly exaggerated the number of walruses actually taken.

Of 293 walruses reported taken, the sex composition was 240 males, 40 females and 13 animals of undetermined sex. Of this number, 19 were calves of the year consisting of 9 males and 10 females (approaching equal sex ratio of new-born walruses). Of 261 adult walruses taken at Savoonga, 231 were males (88.5 per cent). This closely approximates Fay's (1958) composition estimates of 90-95 per cent bulls in most years. The consistency of these proportions cannot be explained in any other way except different migratory routes taken by an unknown segment of the adult male walrus population. The same is true of the adult sex composition of animals taken at Gambell.

During the 1962 spring walrus hunting season 16 boats were the most recorded hunting on any one day with 78 hunters. Between May 18 and May 31 an average of 10 boats were hunting on favorable days with approximately 40 crew members.

Table 2 shows the hunting effort and success during 1961 and 1962 for those locations where data are available.

King Island: Information concerning the walrus harvest at King Island was obtained from several hunters as they returned from King Island to Nome at the end of the hunting season. The store manager from King Island stated that approximately 200 adult walruses were taken. Of these, 60-75 were adult bulls and the remainder cows.

As reported by Harbo (1961) the take of walruses during the spring of 1960 amounted to 196 adult and sub-adults, and 29 calves. During that year the composition of known sex animals taken was 142 females (75 per cent) and 47 males (25 per cent). The 1959 harvest of 274 walruses produced a known adult sex composition

Table 2. Spring walrus hunting effort and success during 1961 and 1962*.

Village	No. of Hunting Days	No. of Boat Hours	No. of Man Hours	Man Hours per Walrus
		1961		
Gambell	13 of 35	910	4,641	14.5
Diomede	18 of 26	399	2,730	6.8
Savoonga	-	-	-	-
		1962		
Gambell	19 of 33	947	4,863	13.5
Diomede	8 of 16	140	1,398	5.5
Savoonga	11 of 28	537	2,263	17.5

* Data include only those hours expended and animals taken while an observer was at the respective villages.

of 63 per cent females and 37 per cent males. Sex composition of the 1962 spring take was essentially the same as that for 1959. Assuming 75 of the 200 adult walruses taken were males, the adult sex ratio of the 1962 spring harvest was 63 per cent females and 37 per cent males.

From past records it is estimated that in addition to the 200 adult animals, 15 to 25 calves were taken bringing the take of walruses by King Island hunters to 215-225 animals.

Twenty-six hunters, hunting with two large and one small skin boat, were responsible for the take. The only figures available for hunting effort and success are for 1959 (Harbo, 1959). During that year 217 boat-hours and 1,242 man-hours were required to take 256 adult walruses. This amounts to approximately five man-hours per adult walrus retrieved. Comparison of the above figures with Table 2 indicates that King Island and Diomede Island hunters are the most successful with respect to the number of animals taken per unit of effort expended.

Other Areas: At the time of this writing, data concerning the take of walruses at Mekoryok, Shishmaref, Kivalina, Wainwright Point Barrow and Nome are incomplete. A take of 25 walruses was reported at Wales, and 6 walruses were reported killed and retrieved at Point Hope. The limited data obtained indicate that the harvest is in the neighborhood of 150-200 animals. During average years, approximately 85 per cent of the walruses taken at the villages mentioned above are males.

Utilization of the Harvest

The extent of utilization of walruses at any particular village depends largely on the population of the village (both humans and dogs) and the magnitude of the walrus kill during any given year. Gambell and Savoonga, and two largest villages taking walruses in any numbers, utilize these animals to a much greater extent than do people from King Island or Diomede Island. At the latter two villages, large walrus kills also occur.

On other villages mentioned as occasionally taking walruses, or taking them in small numbers, the degree of utilization is very high, regardless of the sex or age of animals killed.

This discussion of utilization refers only to the portions of walruses considered usable by the hunters and not to the amount of meat saved from the whole animal. Walrus parts are here considered utilized if they are returned to the village.

Little Diomede Island: At Diomede Island, virtually none of the meat from bull walruses is saved except for an occasional stomach, kidney, heart or liver. Utilization of calves is almost 100 per cent as most of them are returned to the villages unbutchered.

Utilization of cows varied depending on the number that are killed and conditions under which they are killed. Utilization is greatest when cows are killed close to the village and ice conditions are such that hunters anticipate little or no difficulty in arriving home. The opinion was expressed by one of the Diomede hunters that an average family on that Island required the meat from four to five female walruses, to last them through the winter. At that rate, 32-40 female walruses would provide their meat supply as well as the necessary number of skins for boat covers, tarpauline and other uses to which female walrus skins are put.

However, other factors must be considered. Living at the present time requires money with which to purchase food staples, outboard motors, guns, ammunition and other items considered necessary. The only relatively sure source of income for the people of Diomede and King Island is through the sale or barter of ivory. Essentially, there is nothing ethically or morally wrong with utilizing a natural resource as a source of income. On the contrary, walruses are a renewable resource which, under proper management, could supply the food and income needs of the island Eskimo for a long time to come. The problem with respect to walruses lies in the fact that "head hunting" at certain locations results in an income in excess of what the people actually need. This extra money is often spent on non-essentials. Removing large numbers of reproductively active females from the population for reasons other than actual need cannot be condoned either biologically or economically. As will be discussed in a later section, this problem may be self-eradicating at least at certain locations.

For the 1962 walrus harvest at Little Diomede Island, the estimated degree of utilization of the 255 animals killed

and retrieved was 12-15 per cent. Previous investigators including Brooks (1954), Fay (1958), Kenyon (1958) and Harbo (1959 and 1961) have commented on parts most often saved, and each has made estimates of the degree of utilization.

Utilization of walruses killed during the fall is excellent, often approaching 100 per cent. The fall harvest of walruses at Diomede ranges from 5-15 animals.

King Island: The degree of utilization at King Island during the 1962 spring hunts is a matter of conjecture. Estimates can be made only on the basis of past records and conditions during the hunting season. The King Island people, most of who reside in Nome during part of the year, hunt walruses primarily for their ivory. They receive a good value for their ivory as most of it is sold in a carved state. The King Island people supply the majority of the carved ivory handled by Nome merchants.

During 1959 when the village on King Island was occupied to a much greater extent than it was during this spring, the degree of utilization of walrus was estimated by Harbo (1960) to be on the order of 10 per cent of meat from 162 females with none of the meat from 94 males being saved. During 1960, the walrus take decreased to 142 females and 47 males. The rate of utilization of females increased to 24 per cent; again almost none of the male meat was saved (Harbo, 1960).

During the spring of 1962 there were approximately 35 people on King Island of whom 26 were hunters. Meat was put away by the people of King Island for the possibility of resettlement of the village during the winter of 1962-63. Many of the people are talking about going back to the village because of the high living costs and poor conditions existing on the outskirts of Nome, where they are presently living.

In view of the expected demand for meat during the coming winter, a factor increasing the utilization of walruses, and the limited manpower available during the hunting period on the Island (a factor decreasing utilization) it is assumed that approximately 10-15 per cent of the take of 125 adult females was actually returned to the village.

Gambell: Gambell, a large village when compared to Diomede and King Island, has a much greater record of utilization than both of them. Fay (1958) estimated that the amount of meat used, expressed as a per cent of the live-weight, was 47 per cent. When considering only the usable weight of walruses, this figure rose to 56 per cent. Field notes of Richard Bishop, Biologist at Gambell during the 1962 spring season, relate the following concerning a hunt he accompanied: "About 1/2 of the total mass of the animal was saved and at least 2/3 to 3/4 of the usable portions. Vertebral column, hand flippers, pelvis, most of 'guts' and humerus were discarded."

When the hunt is successful, the amount of meat taken from the last animals killed usually decreases. It was Bishop's opinion that approximately 50 per cent of utilizable parts of walruses were saved by hunters from Gambell, regardless of the sex of animals taken.

Savoonga: There are no estimates of the degree of utilization of walruses at Savoonga but general observation by Stuart Marks, Department representative at Savoonga during the 1962 spring hunts, indicates that it is good. As at other areas, females are better utilized than males. Considering such things as the size of the village of Savoonga, the number of walruses killed by Savoonga hunters and the preponderance of male walruses in the harvest, it is estimated that 35-50 per cent of the usable portions of walrus are saved.

Table 3 illustrates the differences in the degree of utilization with the differences in size of the villages.

Other Areas: The utilization of walruses at other points where they are taken is usually good, ranging from 85-100 per cent of the total utilizable portions. As an example, on June 7, 1962, three hunters from Wales shot and killed an adult bull walrus. In the course of hunting activities one of the boats from Diomede observed the butchering procedure and were amusingly impressed by the number and variety of meat pieces saved by the Wales hunters. The remark was made that they (Diomeders) wouldn't save that much meat from a cow. Utilization of that particular bull walrus was 100 per cent.

Table 3. Comparison of village size, walrus harvest and utilization by four island villages in Northwest Alaska during 1962*.

Village	Population	Number of Dogs**	Number of Walruses Taken	Percent Utilization
Diomede	66	26	255	12-15
Gambell	361	460	380	50
Savoonga	360	600-700	263-293	35-50
King Island***	35 ± 3	5	215-225	10-15

* Population statistics supplied by the Bureau of Indian Affairs indicating population during the 1961-1962 school year.

** Obtained by Department personnel through direct observation or inquiry.

*** Information obtained through discussion with King Island hunters. There were reported to be 26 hunters and 9 women to take care of animals killed.

Total Kill - Spring 1962

Accurate figures for the total kill of walruses are hard to obtain but, as Harbo (1959) points out, estimates of this nature are essential in interpreting and predicting the effects of native hunting on the walrus population.

Information of this nature has been obtained by almost every investigator working on walruses in northwest coastal Alaska, and there are well documented records of the reasons for, and differences in hunting loss of walruses of different age and sex groups, and at different hunting locations along the migration routes. Unbiased information concerning hunting loss must, of necessity, be obtained by an impartial observer accompanying the hunters. Estimates expressed by other interested parties usually reflect their background. Thus, the native hunter reports losses as minimal and other observers report them as maximum. As an example, two estimates of sinking losses were given to Bishop at Gambell. One estimate was that of a native hunter. He estimated the loss to be 10 per cent of the total kill. A photographer accompanying the hunters estimated the loss at 90 per cent. In actuality, hunting loss at Gambell has been found to be about 50 per cent (Fay, 1958).

The situation at Savoonga is different than that at Gambell in that a large proportion (88.5 per cent) of the animals taken are adult bulls. Hunting loss is by far the greatest among adult male walruses and in many cases exceeds the number of animals killed and retrieved. This was generally found to be the case when hunting herds of bull walruses in the vicinity of Little Diomede Island.

Field notes of Marks, Department representative at Savoonga during part of May and June 1962, contain some comments on hunting loss. His notes indicate that on May 19, the hunting party he accompanied managed to hit at least 11 walruses. Of these, one was a cow with a calf. Both the cow and calf were retrieved as was one bull. None of the other either animals (comments indicate that they were all bulls) were retrieved. On this particular hunt, loss amounted to 73 per cent of the animals known to be hit. For the season in general, a conservative estimate of 65 per cent hunting loss at Savoonga, is assumed.

Diomede and King Islands are here treated together as the hunting procedures and practices are similar enough to be called identical. At both places there is only a limited demand for calves; hence, little attempt is made to secure orphaned calves after their dams have been killed. Eighty per cent of the cows observed passing through Bering Strait during May and June 1962, were accompanied by calves or yearlings. Evidence indicates (see report on Walrus Biology and Population Status) that the vast majority of orphaned calves do not survive.

Observations made by this author on hunting losses in the Bering Strait area indicate they are approximately 55 per cent. During June 5, 6, and 7, when herds were predominantly females with calves, the proportion of animals hit and retrieved was high and in 3 instances no less than 16 cows of a herd were killed on the ice before the remainder could escape to water. In cases like these, much of the hunting loss is due to the orphaning of calves.

The walrus hunt of June 5, 1962, indicates to what extent hunting loss does occur. During the course of that day and the following, 71 walruses were known to have been struck by rifle fire. Of these, 32 (45 per cent were retrieved) and 39 (55 per cent) were either orphaned, wounded or killed and sunk. As far as could be determined, of the 39 animals lost, 15 were orphaned calves, 15 adult bulls and 9 adult cows.

Hunting loss becomes much greater when herds containing numerous young bulls are attacked. When these animals become alarmed and flee to water, they often regroup and swim after the boat. On these occasions they are killed as rapidly as possible, to protect and insure the safety of the boat. Most of these animals sink or escape, probably to die later.

At other areas where little is known about the extent of hunting loss, it is assumed that loss accounts for 50 per cent of the kill.

Using the data mentioned above, the total kill of walruses during the spring of 1962 was calculated and is shown in Table 1.

Value

At the time of this writing, little information has been obtained concerning the realized value of walruses harvested during the 1962 spring hunting season. Potential value of

various parts of walruses has been calculated by both Fay (1958) and Harbo (1961).

Potential value of the harvest is listed in Table 4, and is based on the following values set forth by Fay (1958) and Harbo (1961):

Tusks of adult females valued at $10.00/pair
Tusks of adult males valued at $24.00/pair
Tusks, carved, either sex valued at $125.00/pair
Bacula valued at $7.00 each
Walrus meat valued at $.10/pound
Skins of female walruses valued at $20.00 each

The value of $.10 per pound for meat is probably the most questionable point in calculating the potential value of the 1962 walrus harvest. If the meat from walruses or other marine mammals was not available, this source of food would have to be replaced by "store bought" food which could not be purchased at anywhere near this low price. Walrus meat is a necessity, the abundant supply of which insures the security of the island Eskimo of Northwestern Alaska by supplying him with food for himself and his dogs.

SUBMITTED BY:

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APPROVED BY:

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James W. Brooks (EO)
Director, Division of Game

Table 4. Potential value of the 1962 spring walrus harvest.

Village	Harvest			Ivory		Bacula	Meat*	Skins	Greatest Potential Value
	Males	Females	Calves	Raw	Carved				
Gambell	72	153	155	$4,392	$28,125	$ 504	$17,387	$3,060	$49,076
Savoonga	241	33	19	6,114	34,250	1,687	26,203	660	62,800
King Island	75	125	25	3,050	25,000	525	15,212	2,500	43,237
Little Diomede Island	136	104	15	4,304	30,000	952	19,937	2,080	52,969
Other Areas	170	20	10	4,280	23,750	1,190	18,265	400	43,605
Totals	694	435	224	$22,140	$141,125	$4,858	$97,004	$8,700	$251,687

* Utilizable weight is calculated on the basis of 1,000 pounds for adult males, 600 pounds for adult females and 65 pounds for calves.

LITERATURE CITED

Brooks, J. W. 1954. A contribution to the life history and ecology of the Pacific walrus. Spec. Rpt. No. 1, Alaska Coop. Wildl. Res. Unit. 103 pp.

Collins, G. 1939. Report on Pacific walrus (Odobenus divergens). Unpubl. MS. 11 pp. (Copy on file U. S. Fish and Wildl. Service, Juneau, Alaska).

Fay, F. H. 1955. The Pacific walrus (Odobenus rosmarus divergens): Spatial ecology, life history, and population. PhD thesis, Univ. Brit. Columbia. 171 pp. (Orig. not seen).

_____. 1958. Pacific walrus investigations on St. Lawrence Island, Alaska. Arctic Health Research Center U. S. Public Health Service. 54 pp. (Unpubl).

Harbo, S. J. 1959. A study of the walrus and the King Island economy. Alaska Dept. Fish and Game. 47 pp. (Unpubl).

_____. 1960. Walrus harvest and utilization. Fed Aid. Completion Report. Alaska Dept. Fish and Game. 16 pp. (Unpubl).

_____. 1961. Walrus harvest and utilization. Fed. Aid Completion Report. Alaska Dept. Fish and Game. 30 pp. (Unpubl).

Kenyon, K. W. 1958. Walrus and other marine mammal studies at Little Diomede Island, Alaska. Bureau of Sport Fisheries and Wildlife, Branch of Wildlife Research. 112 pp. iii. 16 figs. (Unpubl).

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESOTRATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: J Title: Marine Mammal Investigations

Job No: 3 Title: Sea Otter Investigations

PERIOD COVERED: October 1, 1961 to June 30, 1962

ABSTRACT

Between the dates of January 16, 1962, and February 25, 1962, 150 sea otter were collected at Amchitka Island, Aleutian Archipelago. The most successful method of harvest was shooting from the beach. Retrieving was accomplished by use of swimmers and an eight foot punt. The pelts were case skinned, brined, dusted with borax powder and packaged in plastic bags for transport. The pelts were tanned prior to being placed on the commercial fur market.

RECOMMENDATIONS

There is some indication that the pelts collected under this project are not at their peak of primeness, and there is strong evidence to suggest that the animals collected from Amchitka are not as large in body size as those residing in areas having a lower population density. For these reasons it is recommended that a moderate collection of animals and specimens be made from an area of lower population density and at different times of the year.

A means of providing mobility for the hunting crews should be provided. A tracked vehicle, similar to a "weasel" a "bombadier," or a "Snow Trac," a vehicle that will traverse the

tundra terrain and provide the needed carrying capacity, would provide access to the entire shore line and allow a more evenly distributed harvest.

The severe winter mortality being recorded on the island of Amchitka indicates that the population there should be harvested more heavily. Therefore, it is suggested that 200 to 300 animals be taken during the months of January and February. As soon as the most desirable season for cropping is determined it is suggested that operations be expanded to include Kiska Island.

Based upon the experience gained in the field during this project a few recommendations are suggested that would expedite the collecting and handling of the pelts and other biological data.

The majority of the hunting should be done from the beaches, retrieving to be accomplished with a small punt or rubber life rafts or by the use of swimmers, if qualified persons can be recruited.

A large number of animals can be taken from the reefs and shore while they are hauled out during violent storms.

Animals should not be skinned and processed in the immediate vicinity of the hauling out grounds.

Large wood barrels should be provided for brining. Barrels similar to those used for salting herring would be adequate. Pelts should be brined for a period of seven days. About 1,000 pounds of salt for each one hundred pelts collected should be provided.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: J Title: Marine Mammal Investigations

Job No: 3 Title: Sea Otter Investigations

PERIOD COVERED: October 1, 1961 to June 30, 1962

OBJECTIVES

To collect sufficient reproductive tracts from all age classes of animals for the purpose of determining present productivity in the population; to examine critically the physiological condition of sufficient animals representing both sexes and all age groups in order to evaluate parasitological and nutritional factors; to develop methods of collecting and handling pelts for purposes of ascertaining present and potential commercial values.

TECHNIQUES

Several methods of collection were employed to measure their effectiveness. Extremely stormy weather during the winter months excluded extensive use of small boats. It was possible to use a 16 foot dory on only 5 of the 32 days devoted to this collection. A 13 foot aluminum skiff was used 2 days in one of the more protected bays. The dory and the skiff were used only for transportation. It was found to be nearly impossible to accurately shoot a rifle from either of these crafts. An attempt was made to employ a 12 gauge shotgun using number 2 shot, but the effective range of that weapon was found to be only 20 yards. Very few otters could be approached that closely. The most satisfactory method of hunting proved to be shooting animals in the water from the beach or shooting animals that had hauled out on the beach.

The pelts were case skinned, usually at the kill site, were hung until all body heat had dissipated, then immersed in a saturated salt (NaCl) solution and allowed to cure for a minimum of seven days. They were then drip dried, liberally dusted with powdered borax, rolled fur side in, and packaged, four pelts to a bag, in heavy plastic bags, which in turn were placed in heavy fiber polyethylene lined bags, securely tied for transport.

Harvest: Three Alaska Department of Fish and Game personnel, and two persons representing the U. S. Fish and Wildlife Service, Bureau of Sport Fish and Wildlife, traveled to Adak Island, Aleutian Archipelago, in October 1961, for the purpose of collecting a representative sample from the sea otter population there. The initial phase of the project consisted of an aerial survey using a U. S. Navy aircraft. During the first flight the aircraft crashed killing one Department personnel and three of the U. S. Navy aircraft crew members. Two additional members of the project crew were injured necessitating abandonment of that phase of the project.

On January 16, 1962, a party, again consisting of two members of the U. S. Fish and Wildlife Service, and three employees of the Department of Fish and Game traveled to Amchitka Island where all work reported here was accomplished.

This being the first sea otter harvest accomplished in 51 years, and there being a dearth of available information on techniques used during the years of extensive exploitation of this fur animal prior to 1911, it was deemed essential to formulate and field test effective techniques.

The most successful method of collection proved to be shooting swimming animals from the beach or shooting animals that were hauled out on the beach. Two different caliber rifles were used and both were satisfactory, although inherent short comings were found in each. A .243 caliber rifle equipped with a variable 3-8 X telescopic sight and a .22 Hornet rifle equipped with a 4 X telescopic sight were used. The .22 Hornet was adequate in range and power and was more desirable in that its noise level was lower than that of the larger caliber .243. The larger rifle did have the advantage of being more accurate when shooting in high wind conditions.

The floating carcasses were retrieved from the water by a swimmer using a "dry suit" or a "wet suit", of the type used by Scuba divers, and by use of an eight foot punt. An eight per cent loss was experienced by inability to retrieve killed animals or by wounding. Each of these methods of retrieving had their disadvantages. Swimming in those waters requires a high degree of swimming ability and skill, but proved to be the most versatile method. The use of a punt was limited to the more protected waters and even there could not be used during the frequent periods of high winds. Too, it was necessary to exercise extreme care to prevent the small craft from being swept out to sea by the strong tidal currents ever present around the island. Another factor limiting the use of such a craft is the difficulty of transporting it from the road system to the hunting areas.

One of the greatest difficulties encountered was in accessibility of the hunting areas. The remainder of the coast line can be reached only by traveling by foot. This limited the areas hunted to only nine points of population concentration. The green pelts averaging 7.08 pounds each, together with the hunting equipment needed, limited the number of animals that could be taken from any area which was accessible only by foot.

Specimen collection: Because of the extensive work on sea otters already accomplished by the U. S. Fish and Wildlife Service, the responsibility for collection, preservation and analysis of all reproductive, skeletal, and pelt primeness data was delegated to that agency. Karl Kenyon made those collections and will be responsible for their subsequent analyses. Samples were collected from both sexes and all age classes. Table 1 is a tabulation of sex, age classes, as determined by gross examination, weights, measurements and areas from which the specimens were collected.

Parasitological specimens were collected and will subsequently be analyzed by Kenneth Neiland, Alaska Department of Fish and Game parasitologist.

Pelt collection: The animals were case skinned, the majority of the skinning being done at the kill site. The pelts were hung until all body heat had been dissipated. They were then

Table 1. The sex, age, weights, measurements, and general condition of sea otters collected at nine locations on Amchitka Island, 1962.

Date	Skin Collection Number	KWK* Collection Number	Sex	Age	Tail Length in cm.	Body Length in cm.	Body Weight in lbs.	Raw Skin Weight	General Body Condition	Location of Collection
Jan.										
22	001	62-1	M	Ad			66		Fat	St.Makarius Pt.W.
22	002	62-2	F	Ad			48		Fat	" " " "
22	003	62-5	M	Juv		1064	29		Fat	Rifle Range Pt.
22	004	62-6	F	Ad		1217	45		Fat	" " "
23	005	62-8	F	Ad		1304	44		Fat	Constantine Harb.
23	006	62-9	F	Juv		1142	31		Fat	" "
23	007	62-10	M	Ad		1360	80		Fat	St.Makarius Bay
23	008	62-11	F	Ad		1275	45		Fat	" " "
23	009	62-12	F	Ad		1270	51		Lactating	" " "
23	010	62-13	F	Juv		905	15		Fat	" " "
24	011	62-14	F	Ad		1285	41		Thin	Constantine Harb.
24	012	62-15	F	Ad		1265	47		Fat	" "
24	013	62-16	F	Ad	305	1235	45		Fat	" "
24	014	62-17	F	Juv	207	1070	29		Fat	" "
24	015	62-18	M	Juv	250	1040	28.5		Fat	" "
24	016	62-19	F	Ad	310	1230	42		Fat	Constantine Pt.
24	017	62-20	F	Juv	290	1200	39		Fat	" "
25	018	62-21	F	Ad	295	1236	43		Lactating	Constantine Harb.
25	019	62-22	F	Ad	320	1255	46	7	Fat	Constantine Pt.
25	020	62-23	F	Ad	285	1250	49	8	Fat	" "
25	021	62-24	F	Ad	310	1145	35	7.5	Fat	" "
25	022	62-25	F	Kit	215	755	13	2	Thin	" "
25	023	62-26	F	Juv	270	1120	36	5.5	Fat	" "
25	024	62-27	F	Ad	295	1225	47	7.5	Pregnant	" "
25	025	62-28	F	Juv	245	1005	26	4	Fat	" "
25	026	62-29	F	Ad	320	1250	51	7	Pregnant	" "
25	027	62-30	F	Ad	285	1200	50	8	Pregnant	" "
25	028	62-31	F	Ad	310	1225	51	7.5	Pregnant	" "
25	029	62-32	F	Ad	305	1360	58	9	Fat	" "

Table 1 (continued)

Date	Skin Collection Number	KWK* Collection Number	Sex	Age	Tail Length in cm.	Body Length in cm.	Body Weight in lbs.	Raw Skin Weight	General Body Condition	Location of Collection
Jan.										
25	030	62-33	F	Ad	300	1230	52	8.5	Pregnant	Constantine Pt.
25	031	62-34	F	Ad	295	1215	47	7	Fat	" "
25	032	62-35	F	Ad	295	1250	56	8.5	Pregnant	" "
25	033	62-36	F	Ad	290	1265	48	7.5	Fat	" "
26	034	62-37	F	Ad	305	1175	45	7	Pregnant	" "
26	035	62-38	F	Ad	310	1248	44	6	Fat	" "
26	036	62-39	F	Ad	295	1270	51	7.5	Pregnant	" "
26	037	62-40	F	Ad	315	1335	47	8	Pregnant	" "
26	038	62-41	F	Ad	310	1240	55	8.5	Fat	" "
26	039	62-42	F	Ad	295	1210	38.5	6.5	Fat	" "
26	040	62-43	F	Ad	330	1275	45	8	Pregnant	" "
26	041	62-44	F	Ad	295	1295	48	8	Fat	" "
28	042	62-46	F	Ad	330	1220	40	6.5	Pregnant	Kirilof Bay
28	043	62-47	F	Ad	310	1330	59	8.5	Pregnant	" "
28	044	62-48	F	Ad	335	1260	39	8	Pregnant	" "
28	045	62-49	M	Ad	305	1340	54	7	Fat	" "
29	046	62-50	F	Ad	330	1270	49	7	Lactating	East Cape
29	047	62-51	F	Juv	305	1230	37	5	Lactating	" "
29	048	62-52	F	Ad	330	1333	51	8	Fat	" "
29	049	62-53	F	Ad	290	1255	44	7	Fat	" "
29	050	62-54	F	Ad	310	1285	45	6	Lactating	" "
29	051	62-55	M	Ad	340	1350	68	10	Fat	" "
29	052	62-56	F	Kit	220	815	11	3.5	Fat	" "
29	053	62-57	F	Juv	290	1192	37.5	6.5	Fat	" "
29	054	62-58	M	Kit	220	820	15	3	Fat	" "
29	055	62-59	F	Juv	260	1050	29	4.5	- -	" "
29	056	62-60	F	Ad	300	1225	45	8	Fat	" "
29	057	62-61	F	Ad	340	1260	49	7	Fat	" "
29	058	62-62	F	Juv	330	1230	35	6	Fat	" "
29	059	62-63	F	Ad	330	1305	53	7	Fat	" "

*Karl W. Kenyon, Bureau of Sport Fish and Wildlife, U. S. Fish and Wildlife Service

Table 1 (continued)

Date	Skin Collection Number	KWK* Collection Number	Sex	Age	Tail Length in cm.	Body Length in cm.	Body Weight in lbs.	Raw Skin Weight	General Body Condition	Location of Collection
Jan.										
29	060	62-64	F	Ad	300	1255	46	7	very fat	East Cape
29	061	62-65	F	Juv	305	1170	38	6	very fat	" "
31	062	62-68	F	Ad	335	1265	48.5	-	fat	Constantine Pt.
Feb.										
1	063	62-72	M	Ad	310	1390	67	9	fat	St. Makarius Pt. E.
1	064	62-73	M	Juv	275	1050	26	4	fat	" " " "
1	065	62-74	M	Juv	315	1170	38	5.5	fat	" " " "
1	066	62-75	M	Ad	355	1375	58	10	fat	" " " "
1	067	62-76	M	Ad	320	1395	50	8	fat	" " " "
1	068	62-77	M	Ad	315	1355	67	11	fat	" " " "
1	069	62-78	F	Ad	300	1155	38	5.5	fat	Constantine Pt.
2	070	62-79	M	Ad	395	1355	61	10	fat	St. Makarius Pt. E.
2	071	62-80	M	Ad	350	1345	57	9.5	fat	" " " "
2	072	62-81	M	Ad	370	1355	56	10	fat	" " " "
2	073	62-82	M	Ad	310	1340	73	10.5	very fat	" " " "
2	074	62-83	F	Juv	290	1000	25	5	-	" " " "
2	075	62-84	M	Ad	365	1370	72	11	very fat	" " " "
3	076	62-86	F	Juv	260	975	22	4.75	fat	St. Makarius Bay
3	077	62-87	F	Ad	355	1300	49	7	lactating	" " "
3	078	62-88	F	Ad	340	1255	38	5.5	fat	" " "
3	079	62-89	F	Ad	345	1250	42	6	fat	" " "
3	080	62-90	F	Ad	330	1250	49	7	fat	" " "
3	081	62-91	M	Ad	310	1365	61	10	very fat	St. Makarius Pt. E.
3	082**	62-92	M	Ad	335	1325	55	9	fat	" " " "
3	083	62-93	M	Ad	310	1220	50	8	pelt torn	" " " "
3	084	62-94	M	Ad	290	1225	68	11	fat	" " " "
4	085	62-95	M	Ad	320	1195	44	6.5	fat	" " " "
4	086	62-96	M	Ad	320	1200	45	7.5	very fat	" " " "
4	087	62-97	M	Ad	325	1300	51	8	fat	" " " "
5	088	62-105	F	Ad	325	1275	52	9	fat	St. Makarius Pt. W.

*KWK Karl W. Kenyon, U.S. Fish and Wildlife Service, Bureau of Sport Fish and Wildlife
** Skin speciman - U. S. Fish and Wildlife Service, Bureau of Sport Fish and Wildlife

Table 1 (continued)

Date	Skin Collection Number	KWK Collection Number	Sex	Age	Tail Length in cm.	Body Length in cm.	Body Weight in lbs.	Raw Skin Weight	General Body Condition	Location of Collection
Feb.										
5	089	62-106	F	Ad	295	1230	45	7	fat	St. Makarius Pt. W.
5	090	62-107	F	Ad	320	1280	48	8	fat	" " " "
5	091	62-108	F	Ad	280	1215	47	7	Lactating	" " " "
5	092	62-109	F	Ad	315	1290	50	8	fat	" " " "
5	093	62-110	F	Ad	325	1225	48	7	fat	" " " "
5	094	62-111	F	Ad	315	1260	39	6	--	" " " "
5	095	62-112	F	Ad	330	1235	40	6.5	fat	" " " "
5	096	62-113	F	Ad	325	1290	41	7	fat	" " " "
5	097	62-114	F	Ad	320	1255	46	7	lactating	" " " "
5	098	62-115	M	Juv	255	1005	27	4	fat	" " " "
5	099	62-116	F	Kit	245	900	19	3.5	--	" " " "
5	100	62-117	F	Ad	340	1260	40	6	fat	" " " "
6	101	62-118	F	Ad	310	1225	40	6	fat	Constantine Harbor
6	102	62-119	M	Juv	270	1000	29	4	--	" "
6	103	62-120	M	Juv	280	1000	25	4	--	St. Makarius Pt. W.
6	104	62-121	F	Ad	355	1295	47	7	little fat	" " "
6	105	62-122	M	Ad	340	1370	63	10.5	" "	" " "
6	106	62-123	M	Ad	305	1255	57	9	Mod. fat	" " "
6	107	62-124	F	Ad	315	1185	39	8.5	" "	" " "
8	108	62-128	M	Kit	245	900	17	3.5	" "	Rifle Range Point
9	109	62-129	F	Kit	205	695	8	3	" "	Ivakin Point
9	110	62-130	F	Ad	325	1175	36	6	" "	" "
9	111	62-131	F	Ad	345	1250	45	7.5	" "	" "
9	112	62-132	F	Ad	315	1180	40	7	" "	" "
9	113	62-133	F	Ad	330	1245	36	6	Thin	" "
9	114	62-134	F	Ad	330	1290	43	7	Mod. fat	" "
9	115	62-135	F	Ad	335	1275	42	7	" "	" "
9	116	62-136	F	Ad	305	1310	51	8.5	" "	" "
9	117	62-137	F	Ad	300	1260	41	6.5	" "	Constantine Point
9	118	62-138	M	Ad	295	1375	65	10	fat	Kirilof Point
10	119	62-139	M	Ad	335	1350	67	10	fat	St. Makarius Pt.E.

Table 1 (continued)

Date	Skin collection Number	KWK Collection Number	Sex	Age	Tail Length in cm.	Body Length in cm.	Body Weight in lbs.	Raw Skin Weight	General Body Condition	Location of Collection
Feb.										
10	120	62-140	F	Ad	310	1270	44	-	Mod. Fat	St. Makarius Pt. E.
10	121	62-141	F	Ad	325	1285	54	-	" "	" " " "
10	122	62-142	M	Kit	205	800	11	-	" "	St. Makarius Bay
10	123**	62-143	F	Ad	315	1315	49.5	-	" "	" " "
10	124	62-144	F	Ad	315	1260	49	8	fat	" " "
10	125	62-145	F	Ad	335	1320	53	9	fat	" " "
10	126	62-146	F	Ad	330	1255	39	7	-	" " "
10	127	62-147	F	Ad	320	1320	54	9.5	-	" " "
10	128	62-148	M	Pup	260	970	22	4	-	" " "
10	129	62-149	F	Ad	320	1305	54	8.5	Pregnant	" " "
10	130	62-150	F	Ad	320	1260	53	7	Pregnant	" " "
10	131	62-151	F	Ad	345	1285	42	7.5	Mod. fat	" " "
10	132	62-152	F	Ad	345	1270	43.5	7	" "	" " " "
10	133	62-153	M	Juv	260	975	20	4	" "	" " " "
13	134*	62-154	F	Ad	320	1245	41	8	" "	Kirilof Bay
13	135	62-155	F	Ad	330	1205	40	7	" "	" "
13	136	62-156	F	Ad	315	1230	41	7	-	" "
13	137	62-157	F	S.Ad	275	1005	26	5	Mod. fat	" "
13	138	62-158	M	S.Ad	305	1075	30	4	thin	" "
13	139	62-159	F	Ad	325	1275	43	8	Mod. fat	" "
13	140	62-160	F	Ad	315	1170	39	7	thin	" ""
13	141	62-161	M	Pup	260	915	18	4	-	" "
13	142	62-162	M	S.Ad	315	1100	34	6	Mod. fat	" "
13	143	62-163	F	Ad	330	1285	50	9	fat	" "
13	144	62-164	F	Ad	320	1245	51	10	fat	" "
13	145	62-165	F	S.Ad	305	1100	33	6	-	" "
13	146	62-166	F	S.Ad	310	1080	30	6	Mod.fat	" "
13	147	62-167	M	Ad	340	1320	55	9	" "	" "
13	148	62-168	F	Ad	290	1195	35	6.5	Pregnant	St. Makarius Pt. W.
13	149	62-169	F	Ad	290	1290	48	8	fat	" " " "
13	150	62-170	F	Ad	310	1285	45	8	fat	" " " "

* Tagged - Number EL 12941
** Tagged - Number 12993

immersed in a saturated salt (NaCl) solution and allowed to cure from seven to ten days. They were agitated by stirring twice daily to insure that all portions of the pelt were evenly cured. Wood barrels were utilized for this brining process. It was found to be necessary to add additional water and salt after each group of pelts was removed. Eleven hundred pounds of salt were used in the process of curing the 150 pelts.

Upon removal from the brine the pelts were drip dried and liberal amounts of powdered borax were vigorously rubbed into each pelt. An average of three-quarters of a pound of borax was used per pelt.

Following the boraxing process the pelts were rolled, fur side in, and placed in heavy plastic sacks, four pelts being placed in each sack. The plastic sacks were then placed in fiber polyethylene lined sacks and securely tied and labeled for transport.

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