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Progress Report, 1981

Walrus Harvest, Health/Welfare Study

Little Diomede, Alaska.

by
Libby Halpin

Information presented as the authors interpretation of the walrus harvest during a particular time for a specific village. Primary use of this report is to provide insight to resource managers on the current walrus harvest. The document is restricted to internal U.S.F.W.S. use.

Key Words: Pacific Walrus
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ABSTRACT

There were 808 walrus taken during the spring harvest on Diomede, Alaska between May 12 and June 15, 1981. Composition of the harvest consisted of 57% adult males, 38% adult females, and 4% calves. This exceeds last year's harvest of 708 walrus.

Loss rate of wounded animals was estimated to be 10-20% for animals taken on the ice, and 100% for animals taken in the water. Using these figures, the number of walrus killed during the harvest ranged from 920 to 998 animals. Two hundred and ten walrus were sampled for age, tusk length, and in most cases blubber and skin thickness. Blubber thicknesses for both males and females were consistently higher in comparison to last year's measurements.

Seven boat crews hunted consistently throughout the season, including as many as 50 hunters. Three of the crews used 18-foot aluminum boats, while four used traditional skin boats. In twenty hunting days, a total of 4935 man-hours were expended hunting walrus. Success rate averaged one walrus per 6.1 manhours. Success rates between hunters using aluminum and skin boats did not vary markedly. If evenly distributed, this year's harvest of 773 tusked adult walruses would allow each of the 32 households 24 walrus, or 5.5 walrus for each of the 141 individuals on the island this spring.

Although villagers of Diomede seem to depend to a large extent on marine mammal meat, salvage rate of walrus meat was estimated to equal only 10% of the total harvest. The apparent increasing dependence on a cash economy resulting in an increased reliance on ivory as a cash product was noted.

Cooperation with Fish and Wildlife Service in the walrus study this spring was generally good, although as funding for sample payments ran out, attitudes of some hunters made data collection more difficult. Payments made by FWS for walrus samples, lodging, hiring of an assistant, and store services resulted in a total income of \$4110.00 to Diomede.

INTRODUCTION

This year, the Marine Mammal Division of the Fish and Wildlife Service (FWS) conducted their second study of the walrus during the spring hunting season in the village of Diomed. Again, as in last year, the FWS imposed no limits on the number of walrus that could be taken by the natives. The objectives of this springs' study were:

- 1) to document the total number and sex of walruses harvested
- 2) to sample the age and tusk length of animals harvested
- 3) to sample several animals for contaminant levels
- 4) to document any additional information pertinent to the life history of the walrus, and subsistence requirements of the natives.

METHODS

The walrus data collection program was accomplished during a two month field season in the village (April 22 - June 22). Transportation to Diomed from Nome was via a small charter aircraft which was able to land on the ice airstrip next to the village. Transportation off the island was via skin boat owned by a native, to the village of Wales, and a small charter aircraft from Wales to Nome. The last plane able to land on the ice airstrip occurred on May 19. During the two weeks following ice conditions did not permit air or boat traffic. Villagers began making boat trips to Wales and other villages on June 2.

During the two months on the island, lodging was provided at the school, in a guest room with running water, private kitchen, toilet, and shower facilities at a cost of \$20/night.

A two month supply of groceries was purchased in advance in Anchorage.

Communication out of Diomed was made relatively easy due to presence of a satellite public telephone in the village. This phone remained in good operating condition during the two months. Contact was made several times with FWS personnel in Nome and in Anchorage. There was mail service to the village for all but two weeks during the ice breakup.

Shortly after arrival in the village a meeting was held for boat owners to outline details of the walrus program this year. Funding allowed for purchase of 200 pairs of lower canine teeth when accompanied by a label of sex of the animal, measurements of blubber and skin thickness, and the longest of the two tusks for measurement by the biologist. Collection and labelling materials were distributed to the hunters. Samples were purchased from the boat captains at \$10.00 each, on a first come, first served basis. In addition, several samples of liver, kidney and blubber tissue were collected for contaminant analysis. Boat owners were given receipts for the samples purchased, and turned them in to the native store for credit. At the end of the season, after all receipts had been turned in, the store was reimbursed by FWS at a profit of \$2.00 for each sample. An assistant from the village was hired to help the biologist with the sampling.

Table 1. Summary of Walrus Harvest, Spring 1981

No. Walruses harvested: 808

Sex Composition - Adult males: 458 (57%) Adult Females: 304 (38%)
Calves: 36 (4%) Adult, sex unknown: 10 (1%)

No. samples collected: 210

Average blubber thickness - Female: 61 mm. Male: 50 mm.

Average skin thickness - Female: 19 mm. Male: 18 mm.

No. hunting crews: 7-9*

Average crew size - Aluminum boat: 8 Skin boat: 5

Maximum crew size - Aluminum boat: 9 Skin boat: 12

No. hunters (approximately): 50

No. hunting days: 20

Manhours expended: 4935.2

No. walrus harvested/manhours - Aluminum boat: 361/2239.4
Skin boat: 447/2695.8

Success rate (# manhours/walrus) - Aluminum boat: 6.2 Skin boat: 6.0
Overall: 6.1

Average No. Walrus/hunter: 16

*Although at one time there were nine crews, only seven hunted together consistently throughout the spring.

After hunting began, a daily log was maintained noting such things as weather and ice conditions, hunters names and crew size, time spent hunting, locattion of hunting, number and sex of walrus harvested, walrus meat parts retrieved and other marine mammals harvested. This information was noted following direct observation by the biologist. Teeth samples were cleaned and prepared for subsequent age determination in Anchorage.

RESULTS and DISCUSSION

Weather and Ice Conditions

Weather and ice conditions proved to be the limiting factor on the number of hunting days, and hunting success during those days. During the first several weeks after I arrived, ice conditions were more important than weather conditions in influencing hunting, as there were very few ice-free areas. Hunters were commuting by snowmobile to an area of open water, two and one half miles north of the village. They kept several aluminum and one skin boat near the ice-edge. Because open water was encircled by ice, the water was calm and hunters went out in nearly all types of weather. However, fog sometimes impaired visibility resulting in decreased hunting success. Hunters continued using this area through May 12, with the exception of several days when the ice temporarily closed in. This was the only area of open water accessible to hunters. Seals and birds were harvested, but no walrus were taken. Although much open water existed east of the island it was not accessible. On May 12 the open area north expanded to form a lead to the east permitting access to the large area of open water. On this day, the first walrus were retrieved. The lead existed only one day, and no lead formed again until May 19, which again permitted access east. The amount of drift ice in the open water varied - on several days hunters reported no ice. On these days walrus were taken in the water. When ice was present, the number of walrus harvested was much greater. On the 24th of May, hunters moved their boats to the south end of the island where they gained safer access to the water. Several hunters successful in hunting on foot along this south ice-edge. By that time the only area of solid ice remaining was between the two Diomedes islands. On the 26th of May, a lead formed in front of the village allowing boat crews to land on the village beach. Three days later, 90% of the ice between the islands had drifted away. For several days there was no ice nearby and hunters were forced to travel considerable distances - 25 to 30 miles in search of game. On June 13, a large amount of moving ice from the south moved past the island, filling the water in front of the village and extending several miles south. Hunting success increased tremendously on this day, but all of the ice had drifted north beyond sight by the next day. Hunters once again had to travel appreciable distances to overtake ice. During the last week, June 15-21, hunters reported that there was no ice. On June 22, when I left for Wales, no ice was visible.

Following the formation of leads which permitted accessibility to open water, weather conditions became a critical factor, limiting number of hunting days and distances traveled while hunting. Weather often changed quickly usually caused by a sudden shift in wind direction. On one occasion all crews departed from the island taking advantage

of mild, calm weather. Ten minutes later they were forced to return, when the wind shifted suddenly from slight southerly to strong northerly winds creating dangerous boating conditions.

Wind speed and direction also strongly influenced the current which determined the movement of ice and it's accessibility to the hunters.

Fog was another factor limiting hunting activity. Though seas may have been calm, fog was often present, preventing hunting. On other occasions, hunters were out on clear days when rapid formation of fog forced them to come home, sometimes interrupting very successful hunting.

As a general rule, hunters were out everyday when seas were calm and visibility was good, regardless of whether ice was present nearby. On days of moderate wind or fog, crews were more hesitant to leave, considering such factors as proximity to ice, and type of boat. The skin boats could generally withstand rougher seas and were advantageous in relatively poor weather conditions. During days of high winds (20-25 mph) or thick fog, all hunters remained in the village, or if they had been caught out at sea beached on the nearest land until the weather cleared. Several crews were "weathered-in" on Fairway Rock. Weather sometimes kept hunters stormbound for several days. On only one occasion did I notice crews launching their boats in what seemed to be very poor weather. On this occasion, fog was thick and visibility was very limited. However, someone had reported ice close to the island and several crews set out. One boat crew got lost and the school sirens were sounded in an attempt to give the boat the proper direction home. The crew found their way back several hours later. This was rare however, as hunters normally exercised extreme caution regarding weather conditions.

During the two month period on the island, there were 36 days of possible walrus hunting - when accessibility to open water was permitted by leads, or following ice break-up. Weather conditions further limited walrus hunting activity to 20 days. Of these 20 days, 65% of the hunting occurred in clear, calm weather, 30% in moderate weather (winds 15-25 mph) and/or low overcast or moderate fog cover causing relatively poor visibility) and only 5% in very poor weather (winds greater than 25 mph and/or thick fog).

Walrus Movements

Walrus were first observed in proximity to the village on April 30, when two were shot in the water north of the island, but neither was retrieved. No more were observed until May 12, when the first walrus were shot and retrieved east of the island. As indicated by the harvest, groups of females with calves led the spring migration north past the island (Figure 1). From May 12 through May 23, females dominated the harvest, representing 82% of walruses retrieved. During the following week however, males began to move through rapidly, constituting 715 of the harvest. For the remainder of the season, the harvest continued to be dominated by males, and constituted 91% of the harvest. During the week of May 21 to May 26, more than half of the walrus harvest was taken, probably corresponding to the height of migrational movement through the area.

The Harvest

There were 808 walruses harvested this spring on Diomedé (Table 1). The harvest consisted of 458 adult males (57%), 304 adult females (38%) and 36 calves (4%). Ten adult of unknown sex were also harvested (1%).

This year's harvest is an increase of 100 animals from last years harvest of 708 walrus (Smith, 1980).

The actual number of walrus killed during the harvest is larger, including those animals wounded and lost. For those animals shot by hunters, I was able to calculate a loss rate based on comments from different crews indicating the number of animals that sunk, and they were unable to harpoon. Loss rate in the water equalled approximately one walrus for each walrus retrieved, or 100% of those retrieved. The number of walrus taken directly from the water totalled 35. Therefore it is expected that approximately 35 additional walruses were lost in the water. I was not able to calculate a loss rate for walrus taken on the ice. However, Tim Smith, the FWS biologist in Diomedes last spring estimated the loss rate of animals struck on the ice to be between 10 and 20%, depending on factors such as hunter skill, and number of walrus on the ice (Smith, 1980). Applying these numbers to the 773 walrus taken on ice floes this year, the number of walrus lost on the ice would range from 77 to 155. An estimate of the total number of walrus killed ranges from 920 to 998.

Samples of lower canines, tusk length measurements, skin and blubber thickness were collected for 210 animals. For all but 13 of the sampled specimens, I measured and recorded tusk length while hunters measured skin and blubber thicknesses. Tusk length of the 13 others were measured by one of the hunters, and are believed to be accurate. Blubber and skin thicknesses were all measured by the hunters, and are not thought to be as reliable. The room for error when many different people take measurements is great, even if measured consistently at the sternum. Caution should be exercised in interpretation of this data. Skin and blubber measurements appearing especially questionable were marked as such on data forms and were not included in calculations of average thicknesses. The average of blubber thickness for females was 61 mm, and skin thickness 19 mm (Table 2). This compares to last year's averages of 39 mm and 19 mm respectively. Male blubber thickness averaged 50 mm, and skin thickness 18 mm, comparing with last years averages of 27 mm and 20 mm respectively. The increase in blubber thickness from last year, consistent in both male and female walruses, may be one indication of a healthier population of animals this year.

Other Marine Mammals: Other marine mammal species were taken during the spring walrus harvest. I directly observed harvesting of the following:

Bearded Seal (Ugruk)

adults: 16 # calves: 2 Dates taken: throughout season

Ringed Seal

adults: 21 # calves: 2 Dates taken: throughout season

Spotted Seal

adults: 6 Dates taken: One, May 20; others, June 10-15

Ribbon Seal

adults: 6 # calves: 1 Dates taken: June 10-15

Beluga Whale

retrieved: 1 struck & lost: 2 Dates taken: April 20

Bearded and ringed seals were taken in significant numbers, prior to and concurrent with walrus hunting. A relatively large number were taken on foot before the ice broke up, along leads north and south of the village. The number of ringed seals recorded is under-representative of the actual number taken, as I missed quite a few taken during the first two weeks in the village. The number of bearded seals is accurate as these seals are left on the beach for several days after they are hauled back to the village, and were therefore easy to count.

Both spotted and ribbon seals were harvested later in the spring, in June. There was no report of ribbon seals harvested last spring.

Only one beluga was retrieved, while two others were struck and sunk. Last year, 9-10 belugas were taken on Diomedes (Smith, 1980). One crew returned from walrus hunting with several large skin portions of gray whale which they had removed from an animal they found floating dead, several miles from the village. They reported that it had been killed by another whale.

Hunting crews pursued gray whales on two occasions that I know of, but were unsuccessful in striking them both times.

The Hunters

This year there were seven boat crews hunting consistently throughout the season. This included as many as fifty hunters, ranging from ten year old boys to men in their seventies. Three crews used eighteen-foot aluminum boats while four used traditional skin boats. Three other men owned aluminum boats which they occasionally used to hunt walrus. This represents an increase in the number of crews, and aluminum boats used last year. Two crews using aluminum boats for the first time commented on how they believed they could get more walrus because of higher speeds possible in the smaller boats, although acknowledging that they couldn't support near the weight of the larger skin boats. Acquisition of aluminum boats also gave individual families the opportunity to hunt by themselves, and provided the family with transportation to the mainland during the summer.

Once hunters gained access to the open water via a lead north of the village, they hunted everyday weather permitted. There were twenty days of walrus hunting, beginning on May 12, when the first walrus were taken. There were only eight days when all of the crews were out. Hunters departed from the village at all times of the day or night, whenever weather was favorable. A total of 4935.2 manhours were spent walrus hunting. The overall success rate was one walrus retrieved for every 6.1 manhours expended. This compares to 57.3 manhours per walrus reported last year (Smith, 1980). The significant change in rate of success could be partially attributed to methods used to calculate manhours. I thought that the larger number of crews using aluminum boats may partially explain the increased success rate, however there was no marked difference in success rates between skin and aluminum boats (Table 1). Estimating the maximum number of hunters to be fifty, there were approximately 16 walrus per hunter.

Subsistence Use of the Resources

A wide variety of animals and plants are exploited by the natives of Diomede. Native foods continue to fill most of the nutritional requirements, despite the increasing popularity of "white-man" foods sold in the village store. Walrus is probably the single most important food resource. Walrus liver, heart, kidneys, intestines, tongue, and portions of rib meat are eaten fresh during the spring harvest. Large quantities of walrus meat - rib meat, flippers, flanks are stored underground for use in the fall and winter. Walrus stomachs are always brought back if they contain clams, which they extract and boil to eat. Despite this seemingly heavy reliance on walrus meat, it appeared that a relatively small percent of meat was retrieved this spring. Though more meat was retrieved early in the season, estimates for percent of meat salvaged were low. This could be partly attributed to the inconvenience of hauling meat several miles by sled from the ice edge to the village. The amount of meat brought back by the different crews was inconsistent - some brought all, others none at all. The majority brought back a small percentage; often including several flippers, hearts, livers, tongues, and occasionally rib meat. Smaller amounts of meats were taken as the season progressed. The amount of meat salvaged was found to be, in most cases, inversely proportional to the number of walrus killed in a day. When crews returned after a very successful day (i.e. 20-50 walrus), the boats would be filled with tusks and oosiks, with very little or no meat. In contrast, on slower days when fewer walrus had been killed, more meat was salvaged along with the tusks. I hypothesized that during days when walrus were abundant in the area, hunters were less likely to take the time required to butcher the animals when presented with the opportunity to gather large amounts of ivory. Thus, the time involved in butchering walrus, as well as weight capacity of the boat, and water conditions were probably all factors influencing the amount of meat salvaged on a particular trip.

As crews returned from hunting, I noted whether or not meat had been salvaged. Walrus calves were always brought back in their entirety. For adult walruses, hunters were often selective in which parts they brought back. Livers, tongues and flippers were taken in larger numbers than other meat parts. When possible, I counted each of the parts retrieved. If not, I gave an estimate of the number of walrus represented by the meat. This was often difficult as the meat was taken from several animals but usually represented only a small percentage of each. I estimated that this spring, meat equivalent to approximately 80 walrus was salvaged, or 10% of all adult walruses harvested.

Walrus meat is supplemented with bearded seal (Ugruk) - perhaps the second most important source of meat. These seals were always brought back in their entirety. Meat was often cut into strips and dried. Large amounts were also stored in the meat pits. The blubber was rendered to oil, which is used extensively in cooking. Ugruk skins were often saved to be used for shoe soles and other skin garments.

Hunting and preparation of the walrus and seals dominated spring time activity. In late spring, when auklets were present by the thousands on the island, people used traps, nets, and slingshots to retrieve them. Of the two auklets, the crested was preferred over the least auklet, because of its larger size. Women spent long hours plucking and preparing these birds to be eaten.

Other birds taken opportunistically and infrequently included king eiders, cormorants, murres, pigeon guillemots, horned and tufted puffins. During the spring, crabbing and fishing was a popular activity among the women as well as some of the hunters. On a good day, one person could easily get 20 crabs within several hours. Crabs were boiled and fried fresh, or stored for several days outdoors if temperatures were cold enough to keep them frozen. Fish taken were bullheads and blue cod. These were eaten fresh, sun-dried and stored, or used as bait for crabbing.

Early in the summer, women (and some men) began collecting edible plants, or "greens", on the island. I was able to collect and identify some of them:

Oxyria digyna (Mountain Sorrel) - one of the "sour greens". Leaves eaten fresh in seal oil as salad, or stored in barrels with seal oil for later use. Another green similar to this one was collected extensively but I was unable to identify it.

Anemone narcissiflora - one of the more bitter greens. Stored in barrels with seal oil for use in fall and winter.

Claytonia tuberosa - the bulbous core of this plant, up to 3" round, is known as an "eskimo potato" and is boiled or roasted.

Rubus chamaemorus (Cloudberry) - berries of this plant were collected extensively in late summer, early fall. Eaten fresh or frozen.

The natives also collect a plant they call "eskimo cabbage." I did not identify this one.

During the summer, Diomeders also collect eggs from all the birds on the island and on Fairway Rock, south of Little Diomede, as they become available.

Ivory: In past years, Diomede's increasing dependence on a cash economy has led to an increasing reliance on ivory - both carved and raw ivory - as a cash product. Within the village, ivory is used to exchange for groceries, clothing, oil and gas, as well as to pay for movies and bingo games. This year the Diomede Native Store paid \$14/lb. for raw ivory. Prices were higher and varied for carved items. The store served as an agent to the villagers, providing them with raw ivory when they ran out. It also sold their carved items to gift shops. Some villagers sold surplus ivory directly to natives in other villages at higher prices than those paid by the native store.

For some, carving is a full-time job, working 7 days a week and 8 or more hours a day. One man commented to me that he could easily make \$2000 each month by marketing ivory pickle forks. Others work more leisurely on carving, as time permits. Adult men and women, as well as older children, carve ivory.

This year's harvest of 773 adult walrus with ivory, if evenly distributed, would allow each of the 32 households 24 walrus, or 5.5 walrus for each of the 141 individuals on the island this spring. Although the distribution of ivory did not yield equal amounts per household, the division of the harvest was relatively even among them by the end of the season.

USFWS In Diomede

Cooperation with the villagers of Diomede during this year's walrus study was generally good. Collection of walrus teeth and measurements from hunters, as well as payments to them, ran smoothly. When funding ran out for the collection of samples, documenting the number of walrus retrieved, and gathering additional pertinent information, became more difficult. I was then always required to meet all boats upon their return, at all times of the day and night. Some, but not all, of the hunters became more reluctant to give information when I was no longer able to buy samples from them. They commented that the FWS should provide more funding next year.

Sentiment regarding scientific studies of walrus varied among the hunters. Some seemed concerned and interested in population studies, while others were only concerned with restrictions or regulations that might be imposed by State and Federal wildlife agencies.

Income to Diomede from FWS during this spring study totalled \$4110.00 (Table 3). This included lodging expenses, collection of walrus samples, payment to the local assistant, and payment to the store for handling sample payments to the hunters.

CONCLUSION

Diomede is an extremely marine mammal-oriented village. The dependence on these animals, especially the walrus, to provide food, boat skins, and ivory, is very evident. Caught in a transition between eskimo and "white-man" lifestyles, an increasing shift toward a cash economy was noted. I believe this has driven the natives of Diomede in recent years to rely more heavily upon their greatest marketable item - ivory. A recent trend of taking more walrus in less time, while salvaging less meat, in order to obtain large amounts of ivory may persist, as Diomeders adapt to meet rising cash demands.

Research of walrus should be closely tied with subsistence studies, as the nature of native subsistence requirements may continue to change. Reinstatement of a quota system in the case of a declining walrus population may be extremely difficult in light of the native's increasing dependence on ivory as a cash product and absence of quotas during past years.

Should quotas become a necessary part of walrus management in the future on Diomede, restrictions of the number of females taken may be the most easily accepted means by which to boost reproduction potential and population numbers. Per animal, females provide much less ivory than the males. By curbing the number of females taken, an increased reproduction could be achieved while a decrease in the bulk amount of ivory obtained by natives could be minimized.

ACKNOWLEDGEMENT

I would like to thank the people of
Diomede for their cooperation and warm
friendliness during my stay on their island.

Table 3. Income to Diomedes from Fish and Wildlife Service, Spring, 1981

<u>To</u>	<u>Purpose</u>	<u>Amt. Paid</u>
Boat Captains	Walrus teeth samples	\$1935.00
Diomedes Native Store	Handling of payments	396.00
Hired Assistant, Gene Ozenna	To Assist biologist in collecting materials	360.00
Diomedes Student Council	Lodging at school	1220.00
Glen Iyahuk	Boat trip to Wales	200.00
Total:		<u>\$4111.00</u>

Table 2. Walrus Skin and Blubber Thickness Measurements, Spring 1981

Female

Code No.	Date Taken	Skin Thickness	Blubber Thickness
DW-19-81	5/19	-----	6 cm.
DW-20-81	5/19	-----	6 cm.
DW-21-81	5/19	-----	6 cm.
DW-22-81	5/19	-----	7.7 cm.
DW-23-81	5/19	-----	6.4 cm.
DW-24-81	5/19	-----	7.5 cm.
DW-25-81	5/19	-----	6 cm.
DW-26-81	5/19	3 cm.	4.8 cm.
DW-27-81	5/19	3 cm.	5.4 cm.
DW-28-81	5/19	2.3 cm.	6.6 cm.
DW-31-81	5/19	1.7 cm.	6.1 cm.
DW-34-81	5/19	-----	6.4 cm.
DW-41-81	5/20	2.5 cm.	7.2 cm.
DW-42-81	5/20	2.4 cm.	5.4 cm.
DW-66-81	5/23	1.0 cm.	6.2 cm.
DW-68-81	5/23	1.6 cm.	8.4 cm.
DW-70-81	5/23	1.0 cm.	6.5 cm.
DW-71-81	5/23	1.2 cm.	6.6 cm.
DW-72-81	5/23	1.5 cm.	5.8 cm.
DW-73-81	5/23	1.4 cm.	7.8 cm.
DW-74-81	5/23	1.5 cm.	8.3 cm.
DW-75-81	5/23	2.0 cm.	6.3 cm.
DW-78-81	5/23	1.2 cm.	8.7 cm.

Code No.	Date Taken	Skin Thickness	Blubber Thickness
DW-79-81	5/23	1.2 cm.	6.3 cm.
DW-80-81	5/23	2.1 cm.	6.9 cm.
DW-81-81	5/23	2.5 cm.	7.3 cm.
DW-83-81	5/23	1.2 cm.	6.3 cm.
DW-84-81	5/23	2.8 cm.	6.2 cm.
DW-85-81	5/23	1.8 cm.	4.0 cm.
DW-86-81	5/23	1.4 cm.	4.0 cm.
DW-87-81	5/23	1.3 cm.	3.7 cm.
DW-88-81	5/23	1.1 cm.	3.1 cm.
DW-89-81	5/23	2.1 cm.	5.8 cm.
DW-90-81	5/23	1.6 cm.	3.4 cm.
Dw-91-81	5/23	2.0 cm.	4.4 cm.
DW-92-81	5/23	1.9 cm.	4.2 cm.
DW-93-81	5/23	2.5 cm.	4.6 cm.
DW-95-81	5/23	2.1 cm.	5.6 cm.
Dw-96-81	5/23	1.5 cm.	4.1 cm.
DW-97-81	5/23	1.5 cm.	4.5 cm.
DW-99-81	5/23	2.2 cm.	6.5 cm.
DW-100-81	5/23	2.4 cm.	5.7 cm.
DW-103-81	5/23	2.4 cm.	6.0 cm.
DW-104-81	5/23	2.0 cm.	7.3 cm.
DW-105-81	5/23	2.5 cm.	7.3 cm.
DW-106-81	5/23	2.4 cm.	6.6 cm.
DW-107-81	5/23	1.7 cm.	3.1 cm.
DW-109-81	5/23	2.5 cm.	8.3 cm.
DW-110-81	5/23	1.7 cm.	6.8 cm.
DW-111-81	5/23	1.4 cm.	3.0 cm.

Con't Female

DW-112-81	5/23	1.7 cm.	9.2 cm.
DW-113-81	5/23	1.9 cm.	6.5 cm.
DW-114-81	5/23	2.2 cm.	5.5 cm.
DW-115-81	5/23	2.4 cm.	6.9 cm.
DW-116-81	5/23	1.9 cm.	8.9 cm.
DW-117-81	5/23	2.0 cm.	5.7 cm.
DW-118-81	5/23	1.7 cm.	7.3 cm.
DW-119-81	5/23	2.0 cm.	8.6 cm.
DW-121-81	5/23	2.1 cm.	9.3 cm.
DW-122-81	5/23	1.6 cm.	4.2 cm.
DW-123-81	5/23	1.4 cm.	8.9 cm.
DW-124-81	5/23	1.9 cm.	3.6 cm.
DW-125-81	5/23	2.1 cm.	4.3 cm.
DW-127-81	5/23	1.7 cm.	4.4 cm.
DW-128-81	5/23	1.8 cm.	4.0 cm.
DW-130-81	5/23	1.9 cm.	4.8 cm.
DW-132-81	5/23	1.7 cm.	7.7 cm.
DW-133-81	5/23	1.7 cm.	8.2 cm.
DW-134-81	5/23	1.9 cm.	5.5 cm.
DW-136-81	5/23	2.0 cm.	7.7 cm.
DW-147-81	5/24	2.0 cm.	6.3 cm.
DW-150-81	5/24	1.9 cm.	2.8 cm.
DW-200-81	5/25	5.7 cm.	2.0 cm.
DW-202-81	5/25	7.0 cm.	2.2 cm.
DW-204-81	5/25	5.9 cm.	2.5 cm.
DW-209-81	5/25	7.0 cm.	2.4 cm.
DW-210-81	5/25	6.4 cm.	2.6 cm.

Male

DW-39-81	5/19	1.5 cm.	6.1 cm.
DW-30-81	5/19	1.5 cm.	6.7 cm.
DW-32-81	5/19	1.5 cm.	7.4 cm.
DW-33-81	5/19	1.6 cm.	6.0 cm.
DW-85-81	5/19	1.1 cm.	6.7 cm.
DW-36-81	5/19	1.5 cm.	6.5 cm.
DW-37-81	5/19	1.0 cm.	6.7 cm.
DW-67-81	5/23	2.1 cm.	6.2 cm.
DW-69-81	5/23	1.1 cm.	8.6 cm.
DW-76-81	5/23	1.6 cm.	7.3 cm.
DW-77-81	5/23	1.6 cm.	8.4 cm.
DW-94-81	5/23	1.9 cm.	3.6 cm.
DW-101-81	5/23	2.1 cm.	6.5 cm.
DW-120-81	5/23	1.7 cm.	5.5 cm.
DW-131-81	5/23	2.3 cm.	5.5 cm.
DW-137-81	5/23	2.2 cm.	4.2 cm.
DW-140-81	5/23 5/24	1.8 cm.	3.9 cm.
DW-141-81	5/23 5/24	1.7 cm.	3.8 cm.
DW-142-81	5/23 5/24	1.9 cm.	4.1 cm.
DW-143-81	5/23 5/24	2.1 cm.	3.5 cm.
DW-144-81	5/23 5/24	1.3 cm.	3.5 cm.
DW-146-81	5/23 5/24	1.6 cm.	5.3 cm.
DW-148-81	5/23 5/24	1.7 cm.	3.2 cm.
DW-149-81	5/23 5/24	2.9 cm.	2.9 cm.
DW-190-81	5/25	1.5 cm.	2.8 cm.
DW-191-81	5/25	1.7 cm.	2.7 cm.
DW-192-81	5/25	3.0 cm.	3.4 cm.

Con't Male

DW-193-81	5/25	1.5 cm.	3.3 cm.
DW-194-81	5/25	1.8 cm.	3.7 cm.
DW-195-81	5/25	2.0 cm.	4.8 cm.
DW-196-81	5/25	1.3 cm.	2.2 cm.
DW-197-81	6/6	3.5 cm.	4.5 cm.
DW-198-81	6/6	2.5 cm.	4.5. cm.

Appendix 1.

Bird Observations on Diomedes (Spring 1981).

<u>Species</u>	<u>Date</u>	<u>Comments</u>
King Eiders	Prior to April 22	In water, lead N. of village.
Snow Buntings	Prior to April 22	In village, on rocks.
Ravens	April 26	In flight, near garbage dump.
Glaucous Gulls	April 28	In flight, near garbage dump.
Murres	April 30	In water, lead N. of village.
Pelagic Cormorants	April 30	In water, lead N. of village.
Sandhill Cranes	May 5, 7	In flight, heading west. At least 700 birds.
Snow Geese, Swans & Brant	May 17	Reported by hunters, in flight north of village.
Crested Auklets	May 19	In flight, N. of village.
Kittiwakes	May 20	In flight, near village.
Murres, Kittiwakes, Pelagic Cormorants	May 26	Landing on cliffs, N. and S. of village.
McKay's Buntings	May 27	May have arrived earlier.
Tree Swallows	May 27	In flight, near village. Species identification uncertain.
Pigeon Guillemots	May 30	Feeding in water near village.
Least Auklets	June 1	Thousands landing in boulder fields.
Horned Puffins	June 9	S. of island on rock out- crops.
Northern Phalaropes	June 14	Two in water in front of village.
Lapland Longspurs	June 15	Plateaus on top of the island.
Horned and Tufted Puffins	June 15	Rock outcrops, sea level to top of the island.

Appendix 2. List of Boat Captains on Diomedes (Spring 1931).

<u>Captains</u>	<u>Type of Boat</u>
Orville Ahkinga	Skin
Philip Ahkinga	Aluminum
Peter Ahkvaluk	Aluminum
Albert Iyahuk	Skin
Andrew Kunayak	Aluminum
Tommy Menedalook	Skin
Moses Milligrock	Aluminum
Sam Mogg	Aluminum *
Louis Ozenna	Skin

* Although Sam Mogg owned an aluminum boat, he was the captain of Albert Iyahuk's skin boat during most of the hunting season.

