Information Collected from Beluga Whale (*Delphinapterus leucas*) Hunts in Cumberland Sound, Baffin Island, Northwest Territories, 1982-1984

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January 1985

Canadian Data Report of Fisheries and Aquatic Sciences No. 490

Government of Canada Fisheries and Oceans
Gouvernement du Canada Pêches et Océans

Canadian Data Report of Fisheries and Aquatic Sciences

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Canadian Data Report of

Fisheries and Aquatic Sciences 490

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INFORMATION COLLECTED FROM BELUGA WHALE (Delphinapterus leucas) HUNTS IN CUMBERLAND SOUND, BAFFIN ISLAND, NORTHWEST TERRITORIES, 1982-1984

by

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This is the 72nd Data Report

from the Western Region, Winnipeg

Cat. no. Fs 97-13/490E ISSN 0706-6465

Correct citation for this publication is:

Orr, J. R., and P. R. Richard. 1985. Information collected from beluga whale (Delphinapterus leucas) hunts in Cumberland Sound, Baffin Island, Northwest Territories, 1982-1984. Can. Data Rep. Fish. Aquat. Sci. 490: iv + 32 p.

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Hunts of beluga whales were monitored in Clearwater Fiord during the summers of 1982, 1983 and 1984 and a spring floe edge hunt of beluga and narwhal in Cumberland Sound was monitored in May of 1983. Hunting techniques were recorded and biological samples and measurements were collected when possible. The report presents a summary of information collected during these hunts.

Key words: white whale; harvesting; hunting; biological sampling; marine mammals; catch statistics.

RESUME

Orr, J. R., and P. R. Richard. 1985. Information collected from Beluga whale (Delphinapterus leucas) hunts in Cumberland Sound, Baffin Island, Northwest Territories, 1982-1984. Can. Data Rep. Fish. Aquat. Sci. 490: iv + 32 p.

Au cours des étés 1982, 1983 et 1984, on a surveillé les chasses au béluga dans le fjord Clearwater; en mai 1983, on a étudié la chasse au béluga et au narval sur les glaces flottantes de la baie Cumberland. On a également noté les techniques de chasse utilisées, recueilli des échantillons biologiques et pris des mesures lorsque cela a été possible. Le présent rapport donne un résumé des renseignements recueillis lors de ces chasses.

Mots-clés: béluga; récolte; chasse; échantillonnage biologique; mammifères marins; statistiques de la récolte.

INTRODUCTION

A small population of beluga whales (Delphinapterus leucas), inhabit Cumberland Sound, Baffin Island in the summer months. In addition to native subsistence hunt, this population has been commercially hunted for a century between the years 1860 to 1960 (Kemper 1980; Mitchell and Reeves 1981).

The population was first studied in the nineteen-sixties (Brodie 1969, 1971; Sergeant 1962; Sergeant and Brodie 1969). Based on an aerial survey, Brodie (1971) estimated the summer concentration to number approximately 800 white whales, or 45% of the population which would have occupied the Sound prior to 1948.

Increased demands for intersettlement trade of beluga skin (muktuk) in the seventies prompted more research on the status of the population (Brodie et al. 1981). The results of these studies led, in 1980, to the setting of an annual quota of 40 beluga for the entire area of Cumberland Sound.

Field programs were subsequently designed to monitor the effect of continued native hunting on the population. This data report presents information gathered during hunt monitoring programs. Hunts observed in Clearwater Fiord during the 1982, 1983 and 1984 seasons are described in detail. Descriptions contain observations on hunting techniques as well as hunting effort and success. Beluga hunting in other areas of Cumberland Sound is briefly described based on hunter accounts and a single field trip to the spring floe edge in 1983. Samples acquired from hunter kills are listed and measurements are presented in tabular form.

MATERIALS AND METHODS

STUDY AREA

Clearwater Fiord is located at the northwest corner of Cumberland Sound, Baffin Island, N.W.T. (Fig. 1). Under normal weather and sea conditions it is a four hour boat trip from Pangnirtung. Mountains ranging as high as 450 meters (1 500 feet) above sea level surround Clearwater Fiord. Millut Bay, located at 66°35' N, 67°28' W is the area where the most whales are hunted in Clearwater Fiord. Millut Bay is substantially more turbid than other parts of Clearwater Fiord from the inflow of the silt-laden Ranger River. This, along with the slightly warmer waters discharged from the river creates a micro habitat within Clearwater Fiord that seems to be favoured by belugas, who return to the area annually (Brodie et al. 1981).

The whales arrive during mid July and remain in the general area of Millut Bay until about mid September. It is during this period that hunting occurs in Clearwater Fiord. The whales are also hunted in early spring at the floe edge as they migrate toward Clearwater Fiord and near the Drum Islands soon after the ice breaks up in Cumberland Sound.

HUNT MONITORING IN CLEARWATER FIORD

The Clearwater Fiord hunt is largely an unorganized hunt resulting in many hunting events occurring simultaneously within a short time period. This, in conjunction with limited verbal communication with most hunters, due to language differences, restricts the quality and quantity of information which may be collected from a hunt. Therefore the hunt was considered as a whole and less effort was put into trying to obtain in-depth information on individual hunter success (Appendix 1).

During the three years hunt observations were made from vessels directly or indirectly involved in hunting. In addition, observations were made from cliffs between Millut Bay and Shilmilik Bay and from the south shore (Fig. 2).

Hunt monitoring equipment included a means of transportation (freighter canoe and/or zodiac), binoculars, camera, pencils, waterproof paper and weather permitting, a tape recorder.

1982

During the first hunt two Department of Fisheries and Oceans (DFO) personnel accompanied two hunters in a 7.3 meter (24 foot) freighter canoe for approximately seven hours before sampling began. During that period information on the activities of that canoe and of other boats was documented. Once sampling began, at 1230 h, a zodiac boat was used by DFO to facilitate travel to areas where whales had been secured to the shore. Hunt monitoring continued but the majority of efforts were exerted on collecting biological information. Hunting activities of the second hunt were monitored from a vantage point near a base camp on the south side of the fiord (Fig. 2). Two of DFO's staff accompanied two hunters during the third hunt and recorded hunt information from them and on the other vessel hunting.

1983

With an increase of summer personnel, a more complete monitoring of the hunt was possible. Of the six observers present, two accompanied a hunter in his canoe, two travelled in a zodiac, one travelled with an Inuit not involved in hunting and another was posted on a cliff on the north side of the fiord. The two observers with the hunter were responsible for documenting both individual and overall hunting success as well as the biological sampling. The zodiac crew were primarily responsible for sample collection but also recorded general hunting methods and success. The person in the second canoe was responsible for documenting total shots and, when possible, number of shots fired per hunter per whale. The cliff observer recorded whale behaviour in relation to hunter movements.

A decision was made during a meeting of DFO and the hunters on August 14, that DFO would count the landed animals and that once the quota was reached would fire a signal flare to end the hunt.

1984

A significant change in hunter participation occurred during the 1984 Clearwater Fiord hunt. Rather than having the hunt open to any Pangnirtung resident the local Hunters and Trappers Association (HTA) selected eight hunters to kill the whales for the community. Although the hunting techniques were similar to those used in previous years there was a significant change in the amount of time it took to kill the 14 whales remaining from the quota of 40. Also, considering other studies had to be completed in the area within a short time period, all hunts could not be monitored as intensively as in previous years. Another point which affected hunter movements was that Arctic Management Research (AMR) set up an elaborate sampling station on the south side of the fiord across from Millut Bay. The hunters agreed to bring all killed whales to the sampling station and were reluctant to hunt too far away from the station because of the difficulty in hauling killed animals over any great distance. The first four hunts were monitored from a boat and cliffs. The last four hunts were monitored less intensively from cliffs on each side of Millut Bay.

HUNT MONITORING OUTSIDE CLEARWATER FIORD

In the spring of 1983, some observations were made of hunting techniques during a floe edge hunt monitoring trip from May 6 to May 10. Further details, particularly with respect to the Drum Islands hunting, were obtained through discussions with hunters.

SAMPLES AND MEASUREMENTS

1982

Sampling was performed as quickly as possible in order to minimize inconvenience to hunters. It usually took place when the tide had receded enough to leave the carcass above water level.

Equipment included a large butchering knife, a smaller knife, hatchet, 25 foot tape measure, data sheets and a camera. Samples were stored in individual plastic whirlpacks which were then put into a large plastic bag and marked accordingly. Samples were stored in ice-filled coolers, until they were taken to the community freezer in Pangnirtung.

External measurements were first taken (Appendix 2), being recorded to the nearest centimeter. The number of measurements obtained depended on the amount of time available. Dentition formula was also recorded. Skin color was documented and photographs were usually taken. The animal was then butchered by the hunters (Fig. 3).

Aside from muktuk, all samples were collected after the hunters had finished butchering. Approximately 500 grams of each of the following tissues: muktuk, blubber, kidney, liver and muscle were collected for DFO Arctic Management Research and the University of Guelph, and additional samples of lung and heart (which were frozen) and muktuk (which were preserved in 10% formalin) were collected for the University of Guelph. Stomachs were inspected for volume and contents. Half of the lower jaw (left side unless damaged) with teeth attached, as well as eyeball(s) were taken for age determination.

1983

Sampling and measuring procedures in 1983 were similar to 1982 (Appendix 3). In 1983 more animals were butchered in the water alongside hunting vessels than in 1982, as a rising tide made it difficult for hunters to butcher on the shoreline. The offshore butchering and the fact that the overall hunting time was less than in 1982, reduced the number of whales available for sampling and did not allow time for as many measurements as in 1982.

1984

During the 1984 hunt, AMR of DFO collected samples, measurements and other information from the killed whales. This information will be presented in separate reports.

RESULTS

BELUGA HUNTING IN CLEARWATER FIORD

Hunt summaries - 1982

Hunt No. 1: July 21, 1982 - 0400 to 1630 hours. Map Grid Reference: 66°35' N, 67°28' W.

The hunt began at 0400 h as the tide was beginning to rise in Clearwater Fiord. The weather was overcast with a slight north-easterly wind. The sea was of the Beaufort Sea Scale 1 (B.S.S.) (Fairbridge 1966) (Appendix 4). The hunt started with four canoes and nine hunters. As the day progressed more canoes joined the group resulting in a total of eight canoes and 17 hunters. Hunters ranged from 14 to 50 years of age. No women or children were present.

The vessels used by all hunters were 7.3 meter (24 foot) canvas covered freighter canoes powered by 50 to 100 HP (usually 70 HP) outboards. Each canoe had at least two hunters aboard, armed with rifles ranging from .22-.250 to .357 calibre. Soft and/or hard point shells were used. Each canoe carried at least one hand held harpoon with line and float attached.

Initially, canoes were spread throughout the fiord hunting individually (Fig. 4). The driver of a canoe would head full throttle towards the nearest pod. During this time, the other occupants would fire in the general area of the whales in an attempt to force them to dive before they were able to fully replenish their oxygen supply. According to hunters the intention was to exhaust the whales and eventually force them to spend more time at the surface, thereby enabling the canoe to get within adequate firing range. After the whale(s) sounded the canoe would slow down and travel in a circle, then slowly realign itself in the direction the whale(s) was expected to

resurface. Each time the whale(s) reappeared the same procedure was repeated until a fatal shot was made (Fig. 5). Shots were aimed at any visible part of the whale's body. Depending on the calibre and cartridge used, and the location of the strike, a whale could be hit several times before it was mortally wounded and subsequently harpooned.

Initially hunting was by individual canoe, but as more canoes joined in, the hunters began to hunt more as a group. The same basic technique was used as during individual hunting (Fig. 5). With more canoes concentrating on a specific group of whales, they became much more efficient, as a larger area was covered. Consequently, the chances of whales resurfacing closer to a canoe was substantially increased.

All the dead whales observed by DFO personnel, were buoyant and it is therefore unlikely that any were lost due to sinking. Once the harpoon was thrown and secured, the animal, if still able to dive, could easily be followed and if necessary a killing shot, usually at the apex of the skull, was made. It is likely that some whales were coincidentally shot by more than one hunter since hunters fired many shots, aiming at any whale within killing range. A whale could be therefore pursued and shot by hunters from a single canoe, escape from them and be shot and killed later by hunters from another canoe. This, however, cannot be confirmed because individual whales could not always be followed or differentiated. This did not lead to confusion among the hunters since they went by the rule that the man who harpooned the whale was the one credited for the kill.

Once an animal was dead the harpoon head was cut out, a line was strung through a cut made in the melon and the animal was towed to shore. The whale was taken to an area where, when secured close to the shore line, it would be beached with the recession of the tide. Once this procedure was completed hunters usually resumed hunting until the tide had receded enough to butcher the animal. Due to the importance of obtaining external measurements of whole animals, emphasis was focused on reaching carcasses before butchering began; as a result, some details of the hunt could not be completely documented once the tide started to drop (Fig. 6).

The first whale was taken at 0510 h, south of Millut Bay in the middle of the fiord and towed to the south shore. The second whale was killed at 0620 h about 0.5 km north-east of the first and taken to the north shore. The third, fourth, fifth and sixth whales were killed between 0800 h and 0830 h near the island on the west side of Millut Bay and towed to the island. The seventh and eighth whales were killed around 0945 h, just east of the west point of Millut Bay and towed to the same island as the previous four. Another whale was killed at 1100 h about 75 m offshore between Millut Bay and Shilmilik Bay and was butchered in the water. The exact location and timing of the other 10 whales taken is unknown. Hunting ended at 1630 h.

Hunt No. 2: July 22, 1982 - 0930 to 1130 hours.

The hunt began at 0930 h with a rising tide in Clearwater Fiord. The weather was overcast with drizzling rain and gusting northeasterly winds (B.S.S. 2). Seven hunters, in three 7.3 meter (24 foot) canoes all powered by 70 HP outboards, were involved in the hunt. All hunters were under 35 years of age. Hunters had the same equipment described in hunt number one. Hunting was generally done individually, primarily on the north side of the fiord between Millut Bay and Shilmilik Bay (Fig. 6). Hunting techniques were similar to those described for hunt number one: see, chase, shoot, circle, search, etc. Because of poor weather and low numbers of whales present in the area, hunting lasted only two hours. The number of whales struck was undetermined and no whales were landed.

Hunt No. 3: July 24, 1982 - 1030 to 1600 hours.

The hunt began at 1030 h when the tide was at its peak. The weather was clear and calm (B.S.S. 0). Three hunters using two vessels were involved in this hunt. Two hunters using a 7.3 meter (24 foot) freighter canoe powered by a 70 HP outboard and the other hunter using a 7.3 meter (24 foot) fiberglass Lake Winnipeg yawl powered by a 185 HP inboard. The hunter in the yawl was accompanied by his wife and two small children. The first two were armed with .22-.250, .303 and .30-30 calibre rifles, loaded with soft tip shells. The other hunter used a 12 guage shotgun (loaded with slugs), 7 mm, .303 and .30-30 calibre rifles and using both hard and soft point shells. Both vessels carried hand held harpoons with line and float attached.

During the first two hours the boats hunted both separately and together, but usually did not concentrate on any individual animal (Fig. 8). Shots were fired at any whale within shooting range until all but two whales had left the area.

When the two vessels hunted as a unit, concentrating on a specific animal, the same technique described in hunt number one was used: see, chase, shoot, circle, drive slow, see, shoot, etc. The boats usually chased an animal while driving parallel to each other, circled away from each other, then moved off at a 45° angle from their original course.

The two remaining whales had both been struck earlier while in a pod of eight. Soon after the two whales became separated from the other six in the pod one was killed (with a shot to the thorax) by the hunters in the canoe. The whale was harpooned and left floating while the hunters pursued the other whale.

It took three hours and 45-50 shots to kill the last whale. It was estimated that 50% of those shots actually hit the whale. Although hit several times, the whale still was able to swim far enough underwater so that it resurfaced

too far from the hunters for a fatal shot to be made. Eventually the whale was approached close enough to be harpooned. But even then it had enough strength to tow the yawl for about three minutes before it was shot in the head at point blank range (Fig. 8). Both whales were then hauled to shore and butchered.

This was the last official hunt for belugas in Cumberland Sound for 1982. The quota was deemed to have been reached and the last hunters left the fiord.

Hunt summaries - 1983

Hunt No 1: August 15, 1983 - 0310 to 0845 hours. Grid Reference: 66° 35' N, 67° 28' W.

Hunting began in Clearwater Fiord at first light. The weather was overcast, rain and low fog. A light breeze was blowing from the west (B.S.S. 1). The tide was at its low ebb, just beginning to rise. Shortly after the first vessel left the base camp on the south side of the fiord the rest of the hunters followed.

Two types of vessels were used for hunting, freighter canoes with plywood caps powered by 70 HP outboards and Lake Winnipeg yawls. Two of the freighter canoes were less than 7.3 meters (24 foot) in length and were not used for hunting. There were three Lake Winnipeg yawls, powered by a 90 HP outboard, a 50 and a 70 HP, and dual 70 HP outboards. Two peterhead boats were also brought to Clearwater Fiord but were not used as hunting vessels. They were used to accommodate some of the hunters and to carry back meat and muktuk to Pangnirtung.

Approximately 25 vessels, carrying 52 hunters were involved in the hunt. At least two hunters occupied each vessel. Hunters used an assortment of weaponry ranging from .22-250 to .375 magnums. Some hunters using .303 calibre rifles had hard point military shells, all others used soft point shells. Hunters carried at least one harpoon with float and line attached, various types of knives for butchering, and seal hooks to gaff dead whales.

Observations of hunting activities were made from a vantage point on the north shore (Fig. 2) and also by people occupying three boats. Although fog caused some visibility problems, coverage of the hunting area was adequate. The number of hunters and the unorganized methods of hunting did not always allow collection of details such as hunter names and individual hunting success, hunter age, number of shots fired by each hunter and the calibre of rifles used on specific animals.

The first vessel set out to hunt at 0315 h. By 0350 h most hunters were participating. Very little hunting occurred west of Millut Bay. Most hunting occurred east of the west point of Millut Bay and east into Shilmilick Bay (Fig. 9). Hunting patterns were similar to that described as individual hunting patterns in 1982: search, see, shoot-chase at high speed, slow down-shoot, retrieve or circle and repeat.

The restriction imposed on hunting by the quota seems to have created an attitude of: get a whale before the other hunter does. Bullets being fired in all directions made travel in the hunting area quite dangerous. Hunters felt it necessary to affix orange tarps or other bright material to their vessels to reduce the possibility of being mistaken for a whale.

Coordinated hunting appeared minimal, most hunter grouping seemed incidental to whale movements. This is not to say that hunters did not shoot simultaneously into the same pod, as this was observed several times, but there appeared to be no combined effort to take or shoot the same whale.

During the 5 1/2 hours of hunting a minimum of 430 bullets were fired, the majority from distances $\geq$50 meters. As described earlier, long range shooting is a common hunting technique and effective if the same target is pursued long enough. However, a justified effort to continue following a specific whale was not always observed, hunters seemed to pursue the whale that presented the best target. Often the whale originally selected would be abandoned if another whale surfaced in closer proximity to the hunting party. Consequently, a specific whale was not always pursued until it was killed.

The first whale was taken at approximately 0335 h in the middle of Clearwater Fiord south of Millut Bay (Fig. 9). Another whale was shot at 0400 h near the west point of Millut Bay. From that point on exact times of kills were not documented because the hunters were spread out over a 5 km area and fog hampered visibility of the observer on the north cliff. Also sampling of killed whales was of higher priority than hunt monitoring. By 0600 h at least seven whales had been taken. By 0700 h at least 15 whales had been taken. By 0800 h approximately 20 whales were thought to have been taken (Fig. 8). At 0825 h the first hand held flare was lit in the middle of the fiord between Millut and Shilmilik Bay. The second flare followed minutes after, near the west point of Millut Bay and before it went out another flare was lit from the north cliff. Following the three hand flares, an aerial flare was launched from the zodiac in the middle of the fiord. Hunting stopped within minutes after the last flare had been fired. Sampling continued until 16:30 h (Fig. 10).

Hunt summaries - 1984

Hunt No. 1: August 16, 1984. Grid Reference: 66° 35' N, 67° 28' W.

Eight hunters set out from the south shore camp at 0845 h. The wind was calm (B.S.S. 0), the sky overcast with some precipitation in the form of sleet. The hunters travelled in four freighter canoes powered by 70 hp outboard motors. All the hunters headed directly into

Millut Bay and hunted there until 1230 h. Hunters carried .303, 3.08 and .357 calibre rifles and each canoe had at least one harpoon aboard. After a short meeting amongst themselves in the middle of Millut Bay the hunters headed east, in an attempt to find more whales at the mouth of the fiord and herd them into the area of Millut Bay. They were not seen again until 1600 h. When they returned, the hunters confined their movements within Millut Bay and hunted there until 2130 h.

The techniques used were similar to those of the 1982-83 hunts, with most hunting done on an individual basis. There was a minimum of 180 shots fired between 0845 h and 2130 h. From these shots the hunters killed seven and successfully landed six belugas (Fig. 11). One whale had sunk before it could be harpooned, just south of Shilmilik Bay. The exact number of wounding was unknown but after conversing with the hunters, was thought to be 10 to 12 whales. The times at which whales were killed was not available.

Hunt No. 2: August 17, 1984.

With strong winds (B.S.S. 2-3) and rain continually falling, hunting conditions were quite unfavourable. Nevertheless, 10 men using five canoes began hunting at 1745 h and continued until 2100 h. Hunting was generally done on an individual basis between Millut Bay and Shilmilik Bay (Fig. 12). No whales were taken during this hunt though a minimum of 140 shots were fired. The number of wounded for this hunt was unknown.

Hunt No. 3: August 18, 1984.

Eleven hunters using six canoes began hunting at 1145 h. Visibility was poor as rain fell throughout the day but with no wind the sea remained calm (B.S.S. 1). Hunting was done only in the area of Millut Bay continuing through until 2130 h (Fig. 13). The hunters appeared to make an effort to hunt as a group for about an hour during this hunt but reverted back to hunting individually after no success with the group method. Although an estimated 210 shots were fired during the hunt only one whale was killed and successfully landed. The whale was killed on the south side of the fiord directly across from the Ranger River estuary at 1600 h. No killed whales were said to have been lost and the number of wounded was thought to be nine whales. This was the last large scale hunt because eight of the 11 hunters left Clearwater Fiord for Pangnirtung.

Hunt No. 4: August 20, 1984.

Rain, fog and wind (B.S.S. 2-3) made hunting conditions poor. Three hunters in two canoes hunted from 0945 h to 1245 h in Millut Bay and along the south side of the fiord (Fig. 14). Only four shots were fired as the inclement weather made it difficult to locate the whales. Number of wounded during this hunt was unknown.

Hunt No. 5: August 21, 1984.

One canoe hunted within the area of Millut Bay and Shilmilik Bay from 1600 h to 2010 h (Fig. 15). No whales were killed from the 37 shots fired. Three whales were reported to have been hit.

Hunt No. 6: August 23, 1984.

The hunt began at 1000 h and the two men involved continued hunting until 1750 h. Hunting was done in the area of Millut Bay only (Fig. 16). The only whale taken was killed at 1630 h in the middle of the fiord directly south of the Ranger River. A total of 38 shots were fired by the two hunters. No whales were said to have been wounded during this hunt.

Hunt No. 7: August 24, 1984.

Two hunters began the hunt at 0900 h and another joined in at 1130 h. Hunting was done in the area of Millut Bay and Shilmilik Bay (Fig. 17). A total of 53 shots were fired. One whale was killed but the time of death as well as the number of hits of other whales was unknown. Hunting ended at 1800 h.

Hunt No. 8: August 25, 1984.

A mostly sunny sky and very little wind (B.S.S. 0-1) made hunting conditions ideal. Hunting started at 0830 h and was confined to the area of Millut Bay and south into the main channel of the fiord (Fig. 18). The three men that participated in the hunt fired approximately 24 shots. Two whales were killed, one at 0910 h and the other at 1330 h (Fig. 18).

Although there was one whale to kill before the quota of 40 was reached, the hunters elected to stop hunting in Clearwater Fiord and possibly take the last whale in Cumberland Sound later in the fall. Two whales were said to have been struck during this hunt, but were not mortally wounded.

BELUGA HUNTING OUTSIDE CLEARWATER FIORD

The floe edge and the area around Drum Islands are also popular locations for Pangnirtung hunters to pursue beluga whales in the spring, Markham (1981) (Fig. 19). The whales move through these areas as they travel to Clearwater Fiord.

Floe edge hunting usually occurs in May and June, narwhals (Monodon monoseros) and ringed seals (Phoca hispida) are also hunted at this time. The floe edge is usually 60-100 km east of Pangnirtung, depending on the yearly fast ice formation. The hunters travel by snowmobile usually in groups of three or more. Boats are commonly hauled out on wooden sleighs (qamatiks) to be used in the open water at the floe edge. Some hunters haul out 7.3 meter (24 foot) freighter canoes and 70 HP outboards, others only take small row boats.

There are two basic strategies at the floe edge. One is go to the whales by boat, the other is to wait for the whales to pass by the ice edge. The latter strategy demands a high level of patience, as several hours may pass by before whales swim within adequate shooting

range. The former employs the same techniques as described in the Clearwater Fiord hunt, look, see, chase etc. If or when a whale is successfully killed and harpooned it is then towed to the floe edge and pulled up on the ice to be butchered. Whales are also put onto a qamatik in the water then pulled up by strong arming and snowmobile. Normally few beluga are successfully taken at the floe edge.

Once the ice begins to break up and the belugas move west along the southern coast of Cumberland Sound, hunting occurs near the Drum Islands (Fig. 19). Camps are established on the islands and hunters, usually accompanied by their families, watch for and hunt the beluga as they pass by. Little information is available from these hunts, which take place around late June and early July, as DFO staff have not been on site. However, according to hunter descriptions, the technique appears to be similar to other open water hunts mentioned earlier. Some hunters feel more whales are struck but not killed during these hunts since more open area and foating ice pans allow whales to elude the hunters more effectively than in Clearwater Fiord.

Since the HTA divided the quota into two areas in 1981, hunters landed 17 beluga in 1982, 16 beluga in 1983 and 27 in 1984, outside of Clearwater Fiord.

Samples and measurements

Measurements obtained from hunter kills are listed in Tables 1 and 2 for 1982 and Table 3 for 1983. A list of tissue samples from those same whales are listed in Table 4. Arctic Management Research collected samples and obtained measurements during the 1984 hunts and will present their information in another report.

ACKNOWLEDGMENTS

The authors are grateful to all the beluga whale hunters of Pangnirtung for their help and cooperation, in particular the Hunters and Trappers Association. Special thanks to our guides for both summers, especially Michael Kishak. Thanks are also extended to the Northwest Territories Wildlife Service, specifically the local officers Ben Kovic and Winston Filatre for arranging accommodations and logistic support. L. Dahlke and L. Laroque, DFO Field Services, Frobisher Bay and summer staff of B. Renooy, T. Forrest, S. Waters, S. Milne, K. Ballard and T. Oakes provided invaluable assistance during the hunts. R. W. Moshenko, T. Strong and D.V. Gillman provided critical review of the report.

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Table 1. Measurements taken from harvested beluga sampled in Clearwater Fiord during 1982.

			Measurements (cm)														
				Girth					Flipper Length				Fluke Notch		Blubber Thickness		
Sample# PDL82	Date July/82	Sex	Total Length	Maximum	At Eye	At Armpit	At Anus	Fluke Notch	Anterior	Avilla	Flipper Width	Fluke Width Tip to Tip	To Leading Edge	Depth	Mid Back	Mid Side	Mid Belly
1	21	M	444.7	294.0	136.0	246.6	133.0	55.0	41.8	44.5	32.2	103.0	58.4	14.0	7.5	10.4	10.0
2	21	M	460.2	308.0	145.5	294.0	147.0	64.3	48.8	46.6	34.5	117.4	33.5	13.5	14.0	11.0	10.0
3	21	M	326.4	206.0	114.0	192.0	118.0	52.5	38.2	35.0	23.4	78.5	24.5	8.5	-	5.3	6.7
4	21	M	308.2	-	-	-	-	-	42.0	33.2	24.6	80.5	22.0	10.7	-	5.2	-
5	21	M	194.0	-	-	-	35.5	-	25.3	21.2	13.8	43.0	18.0	3.2	-	-	-
6	21	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	21	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	21	?	283.0	-	-	-	45.0	-	32.5	24.7	21.0	64.5	25.3	6.5	-	-	-
9	22	M	-	-	62.5	-	-	-	42.8	40.5	27.6	-	-	-	6.0	6.8	13.2
10	24	M	≈435.0	336.0	150.5	318.0	159.0	65.0	49.5	48.5	34.0	116.5	32.5	15.5	8.7	9.2	10.5
11	24	M	453.2	-	132.4	306.2	173.0	58.1	56.5	52.0	38.2	109.2	36.9	14.8	7.3	7.2	13.5

Table 2. Additional measurements taken from harvested beluga sampled in Clearwater Fiord during 1982.

	Snout to								Eye to				Dentition		
Sample# PDL82	Eye	Center of Blowhole	Anterior Origin of Blowhole	Angle of Mouth	Midpoint of Navel	Midpoint of Genital Slit	Ear	Center of Anus	Ear	Angle of Mouth	Center of Blowhole	Projection of Upper Beyond Lower Jaw	Left	Right	Color
1	34.3	45.0	78.8	23.8	229.2	317.5	34.3	345.0	15.3	11.5	37.8	2.8	8/8	8/7	White
2	41.4	47.7	115.7	30.3	241.3	314.0	59.2	365.5	20.1	12.6	36.0	2.4	9/9	9/9	White
3	29.4	31.9	73.0	20.8	171.2	212.5	42.0	249.2	14.2	9.0	32.2	2.0	8/7	6/7	Grey
4	Tide stops sampling.														Black
5	Butchered before measurements could be taken.														Grey
6															Grey
7															Grey
8															Grey
9	35.8	42.9	86.2	26.5		288.2	52.0	327.5	16.2	9.8	33.5	1.9	9/8	8/7	Grey
10	39.5	47.5	97.0	28.5	237.0	304.0	57.0	346.0	19.1	11.5	43.7	2.5	9/8	9/8	White
11	42.0	43.0	88.0	31.0	232.0	293.0	58.5	347.0	15.0	12.3	37.0	-	9/8	9/8	White

Table 3. Measurements taken from harvested beluga sampled in Clearwater Fiord during 1983.

			Measurements (cm)										
			Girth		Flipper Length			Fluke		Blubber Thickness			
Sample #	Sex	Total Length	Armpit	Navel	Anterior	Avilla	Flipper Width	Width Fluke	Notch Depth	Mid Side	Mid Back	Mid Belly	Color
PGDL8301	M	425.8	249.0	267.0	48.3	45.7	33.0	106.7	17.0	8.3	-	-	White
PGDL8302	F	292.0	-	-	36.2	30.5	22.2	72.4	-	-	-	-	Grey
PGDL8303	?	216.0	200.7	205.2	40.6	35.6	25.4	75.0	-	-	5.7	-	Grey
PGDL8304	?	322.6	-	-	32.4	33.0	24.1	78.1	-	8.3	-	-	Grey
PGDL8305	?	358.2	229.0	-	35.5	33.0	23.5	76.8	-	9.5	-	-	White
PGDL8306	F	383.5	234.8	228.0	42.0	38.1	26.0	78.7	14.6	-	7.0	-	White
PGDL8307	F	365.7	218.4	-	38.7	-	26.0	82.6	10.7	7.0	-	-	White
PGDL8308	M	434.3	269.2	279.4	47.0	45.7	35.6	122.0	13.3	9.6	8.4	11.2	White
PGDL8309	M	442.0	330.0	-	48.3	45.7	33.0	109.2	13.8	10.3	12.8	9.0	White
PGDL8310	M	414.0	271.8	243.8	48.3	43.2	31.8	101.0	13.0	8.7	8.1	8.4	White
PGDL8311	F	360.7	177.8	214.6	39.4	38.1	26.7	83.8	-	-	-	-	White
PGDL8312	F	363.2	-	-	43.2	42.0	26.7	-	-	10.2	-	-	White

Table 4. Beluga samples collected in Clearwater Fiord during 1982 and 1983.

Sample Number	Liver	Kidney	Blubber	Skin	Muscle	Heart	Lung	Stomach	Eyeball	Jaw
PDL82-M 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Empty	Yes	Yes
PDL82-M 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Empty	Yes	Yes
PDL82-M 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Empty	Yes	Yes
PDL82-M 4	No	No	No	Yes	No	No	No	Empty	No	Yes
PDL82-M 5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	?	Yes	Yes
PDL82-M 6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Empty	Yes	Yes
PDL82-F 7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Empty	Yes	Yes
PDL82-X 8	No	No	No	Yes	No	No	No	?	No	Yes
PDL82-M 9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Empty	Yes	Yes
PDL82-M10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Empty	Yes	Yes
PDL82-M11	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Empty	Yes	Yes
PDL8301	No	No	Yes	Yes	No	No	No	-	No	No
PDL8302	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes
PDL8303	No	No	Yes	Yes	No	No	No	-	Yes	Yes
PDL8304	No	No	Yes	Yes	No	No	No	-	No	Yes
PDL8405	No	No	No	No	No	No	No	-	No	Yes
PDL8306	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes
PDL8307	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes
PDL8308	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes
PDL8309	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes
PDL8310	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes
PDL8311	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes
PDL8312	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes

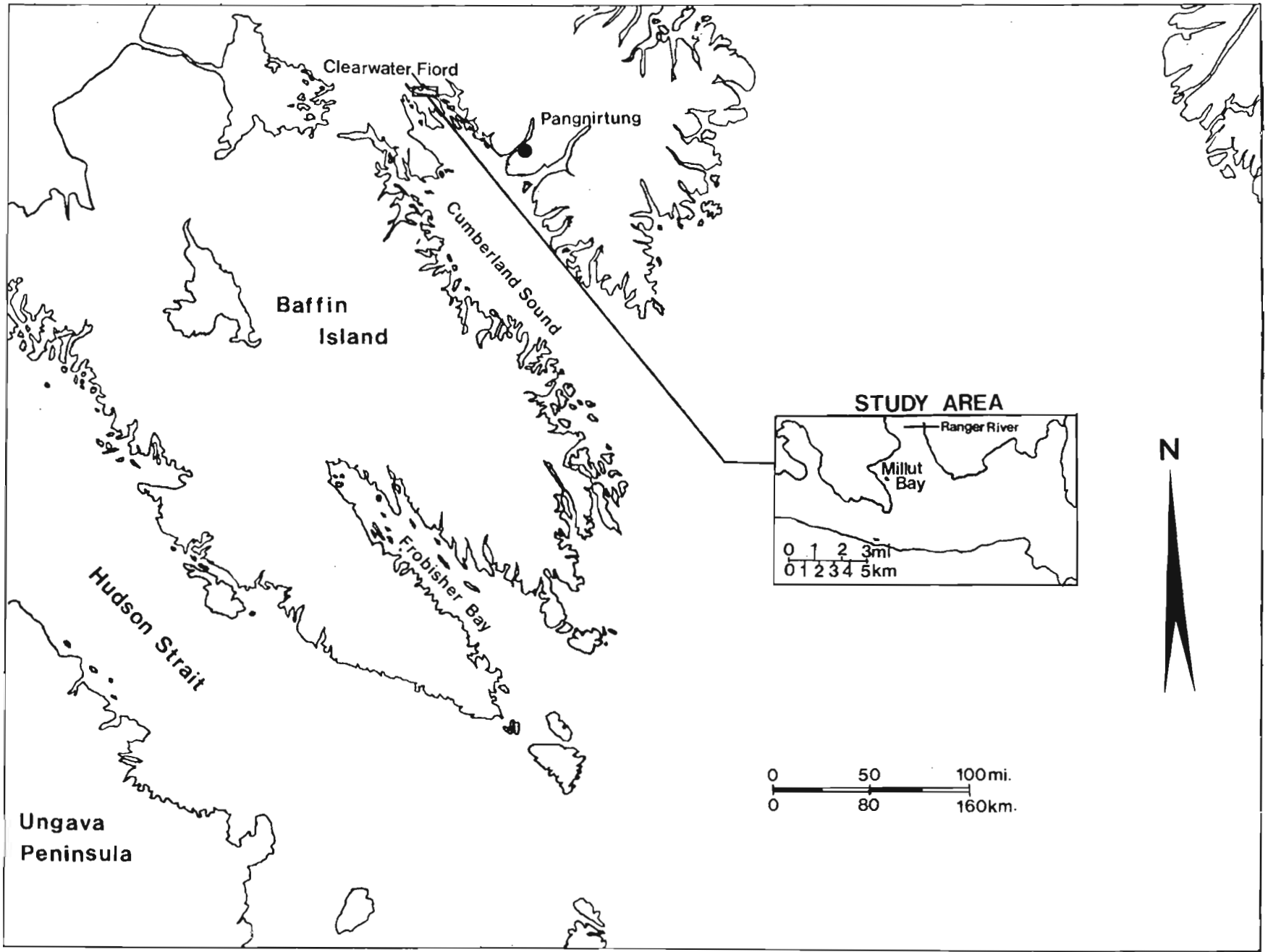


Fig. 1. Map of Southeast Baffin Island showing Clearwater Fiord and study area.

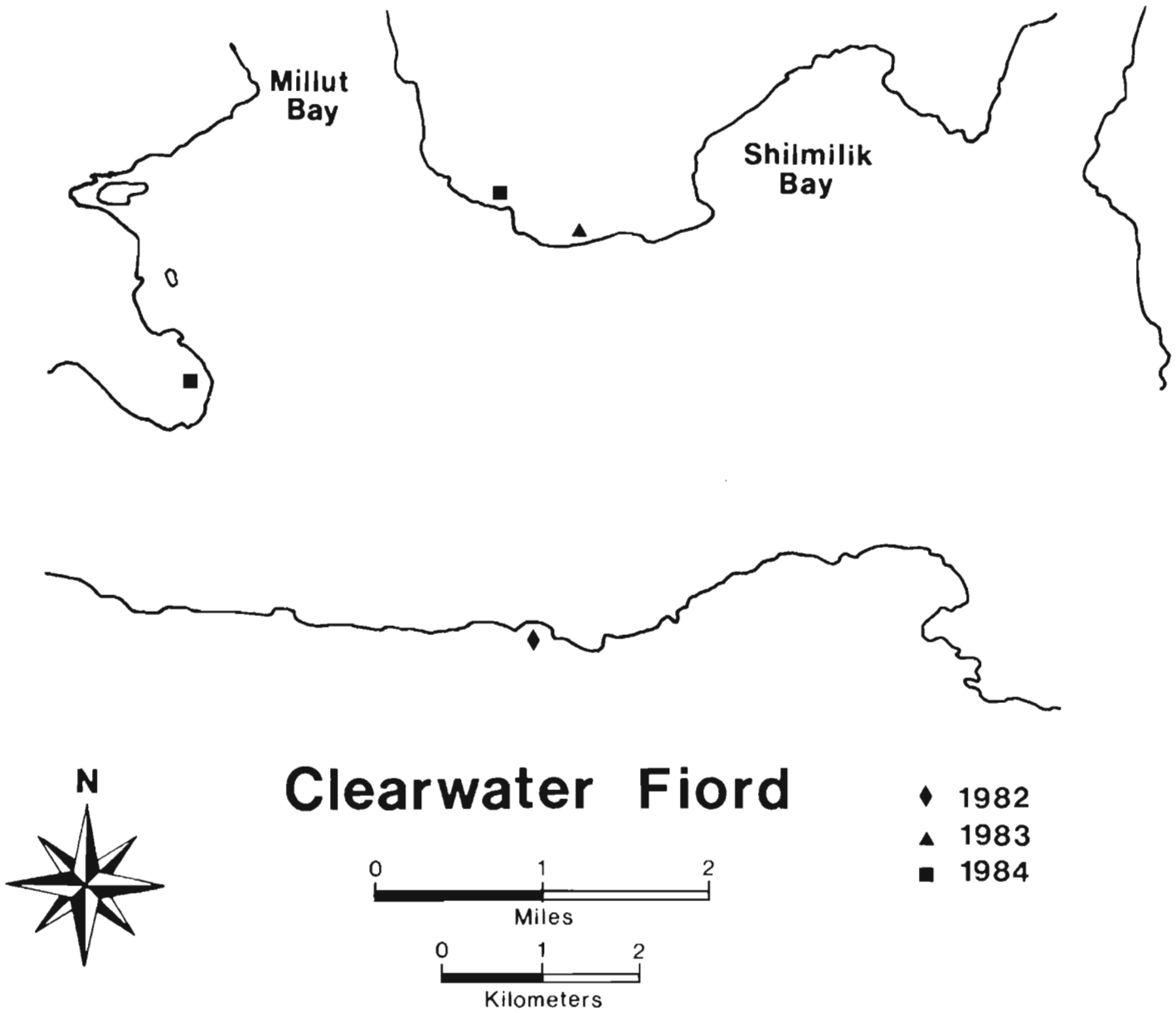
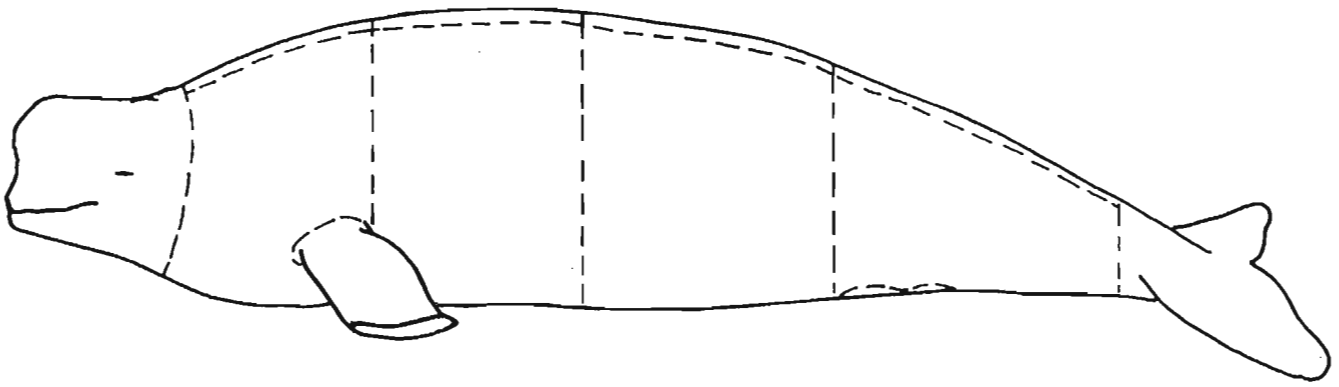
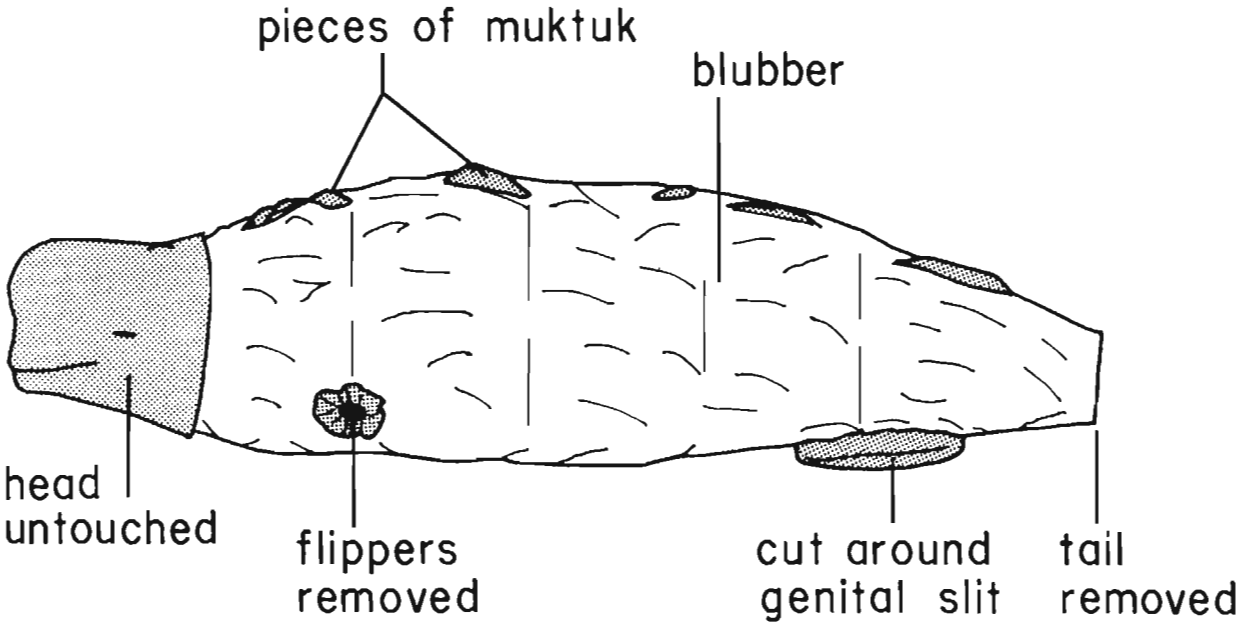


Fig. 2. Locations of observation sites.



Dotted line indicates general sectioning technique.



Carcass after removal of muktuk

Fig. 3. Typical flensing method used by Pangnirtung hunters when butchering whales.

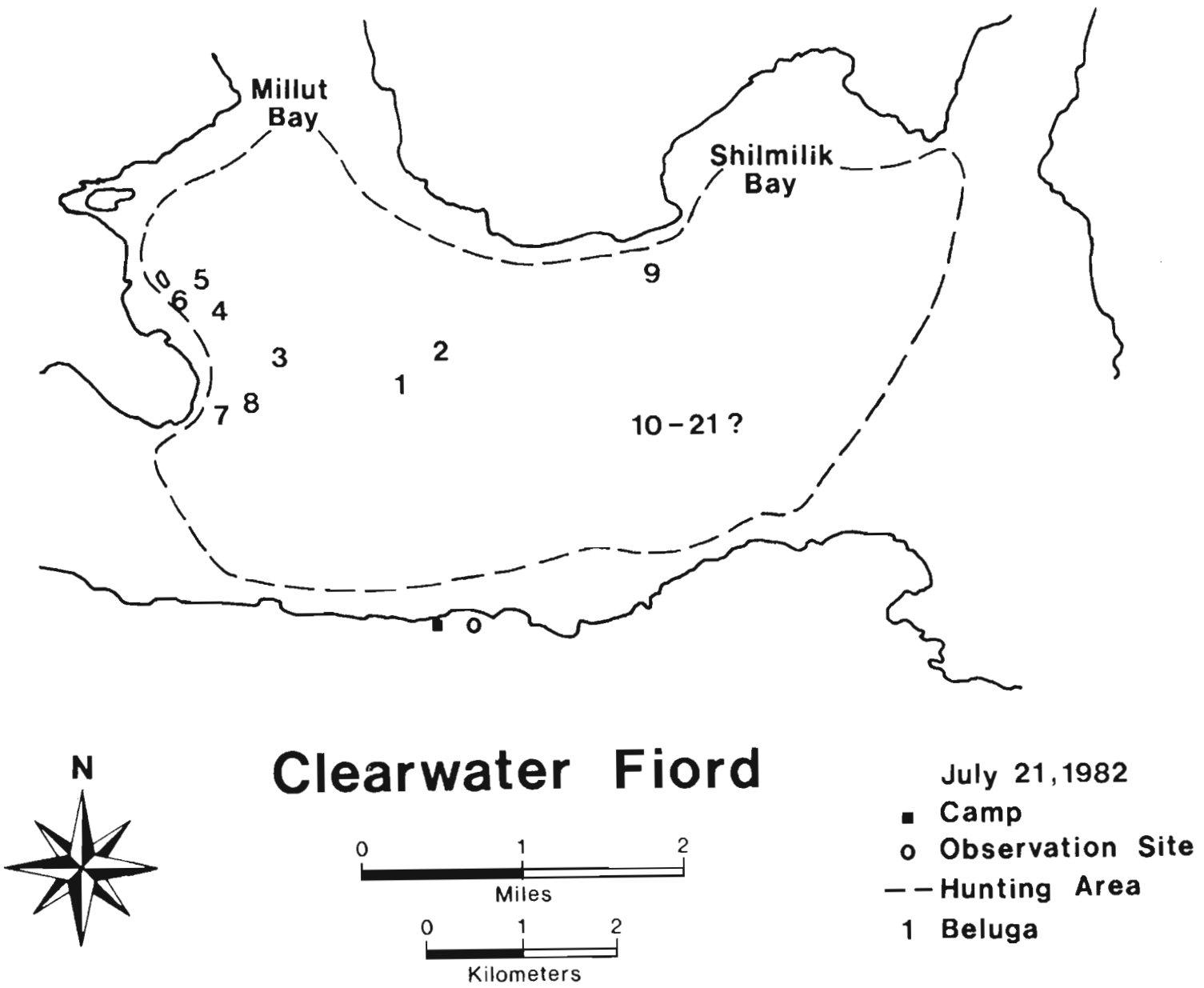
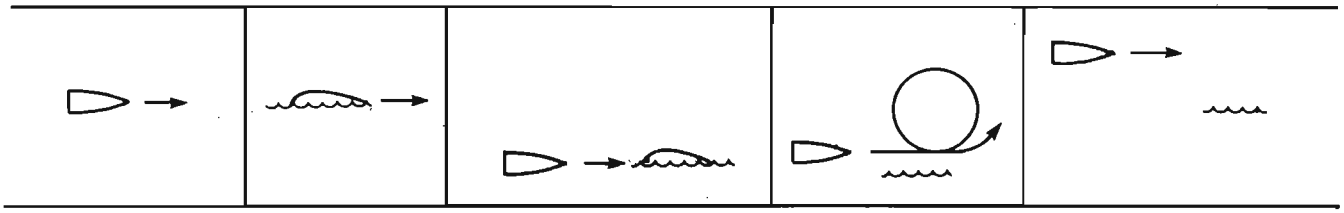


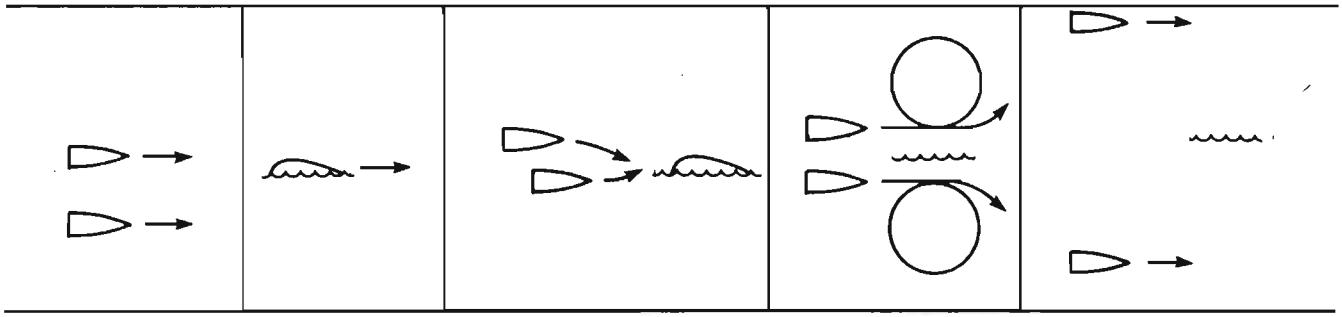
Fig. 4. General area hunted and numbers of whales taken on July 21, 1982.

5A. Individual hunting.



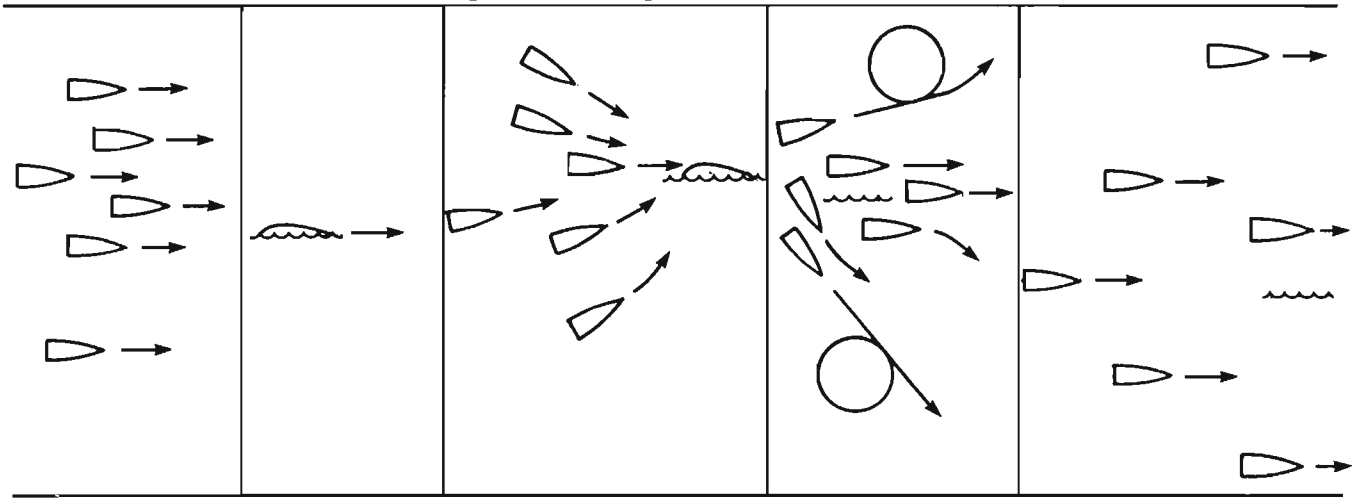
Look See Chase and Shoot Circle and Realign Driving Slowly Look

5B. Two groups hunting together.



Look See Chase and Shoot Circle and Realign Driving Slowly Look

5C. More than two groups together.



Canoe
Whale(s) on Surface
Whale(s) Submerged
Direction

Fig. 5. General procedure when hunting beluga in Clearwater Fiord.

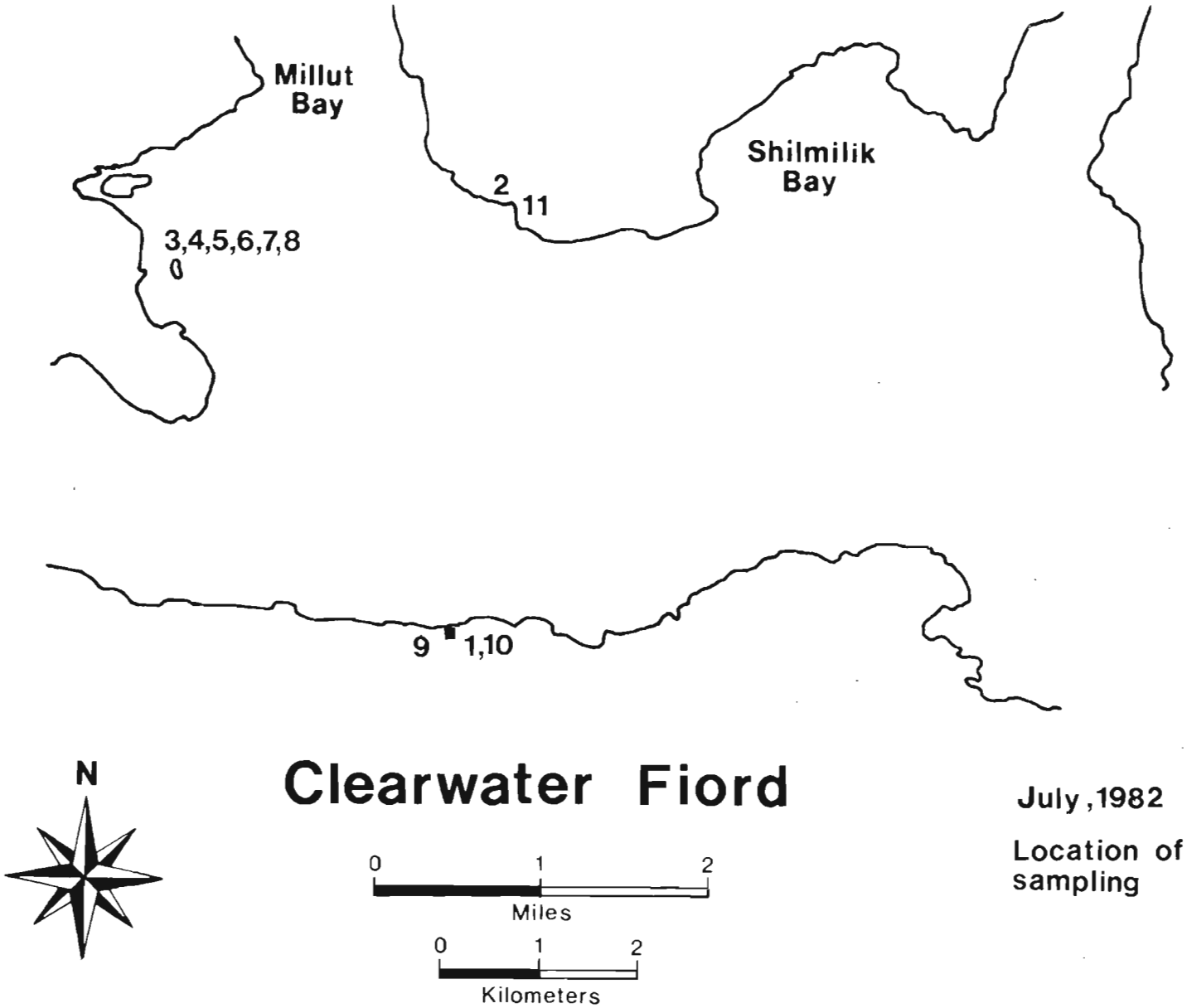


Fig. 6. Areas where whales were sampled, by sample number, in 1982.

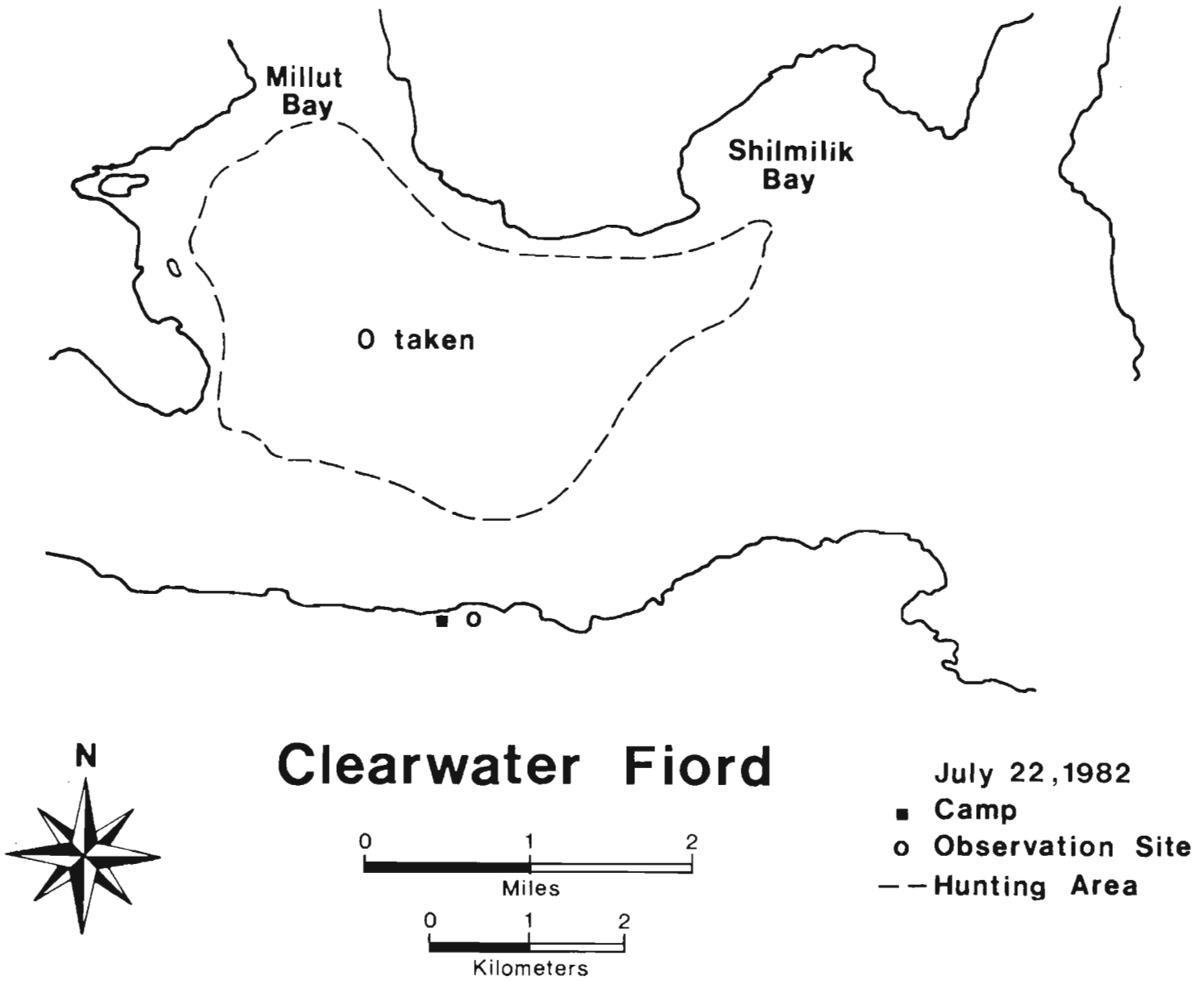


Fig. 7. General area hunted and numbers of whales taken on July 22, 1982.

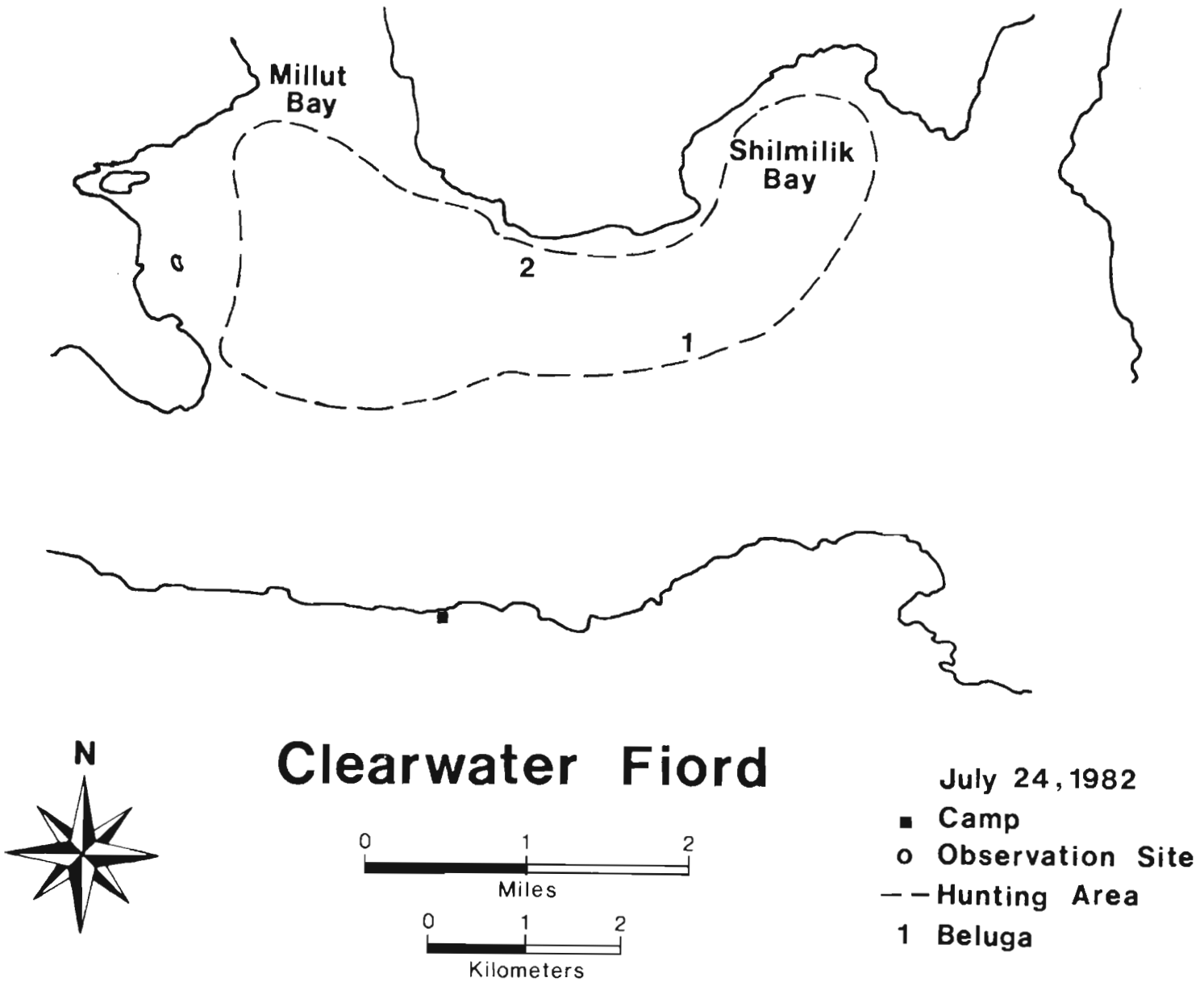


Fig. 8. General area hunted and number of whales taken on July 24, 1982.

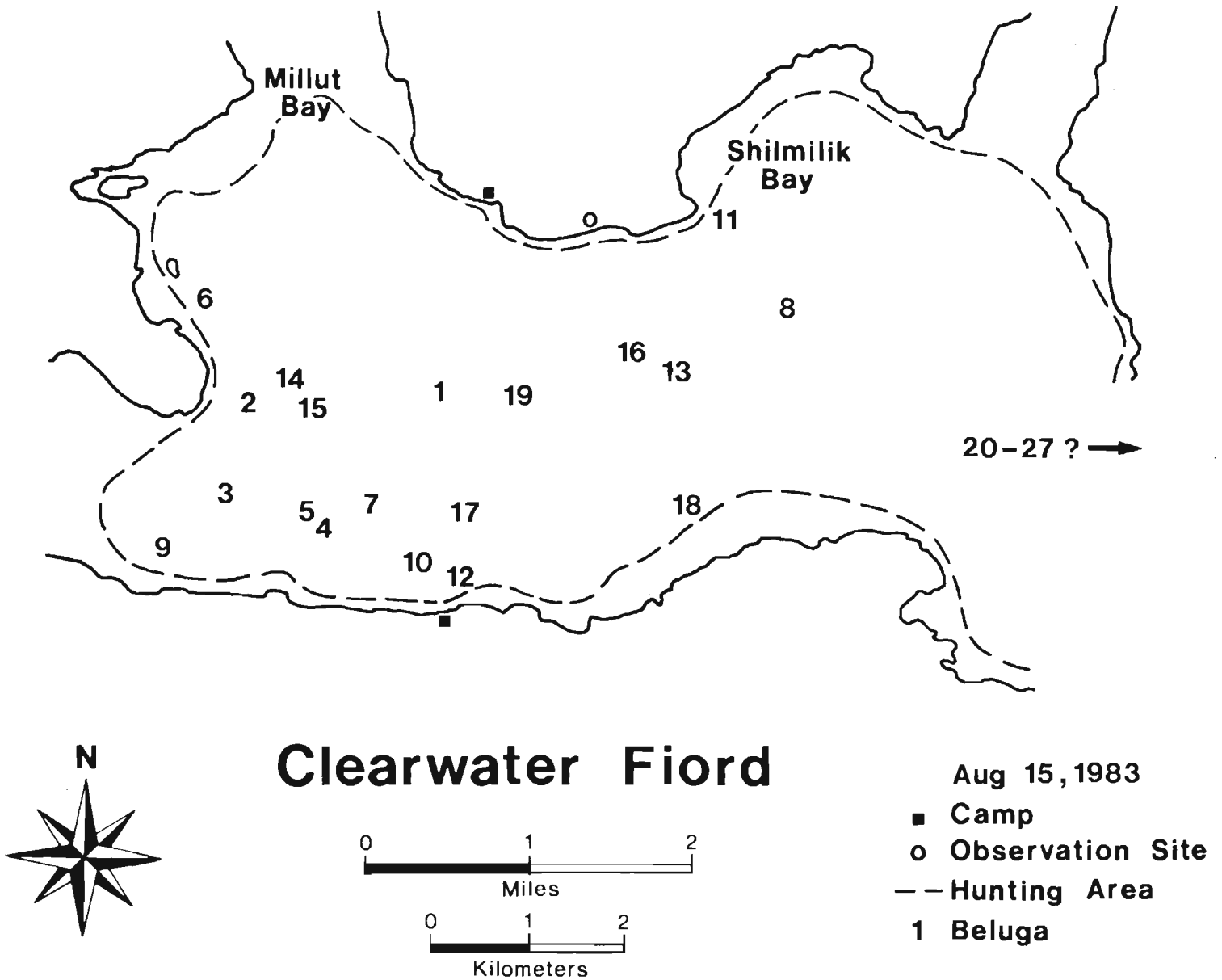


Fig. 9. General area hunted and number of whales taken on August 15, 1983.

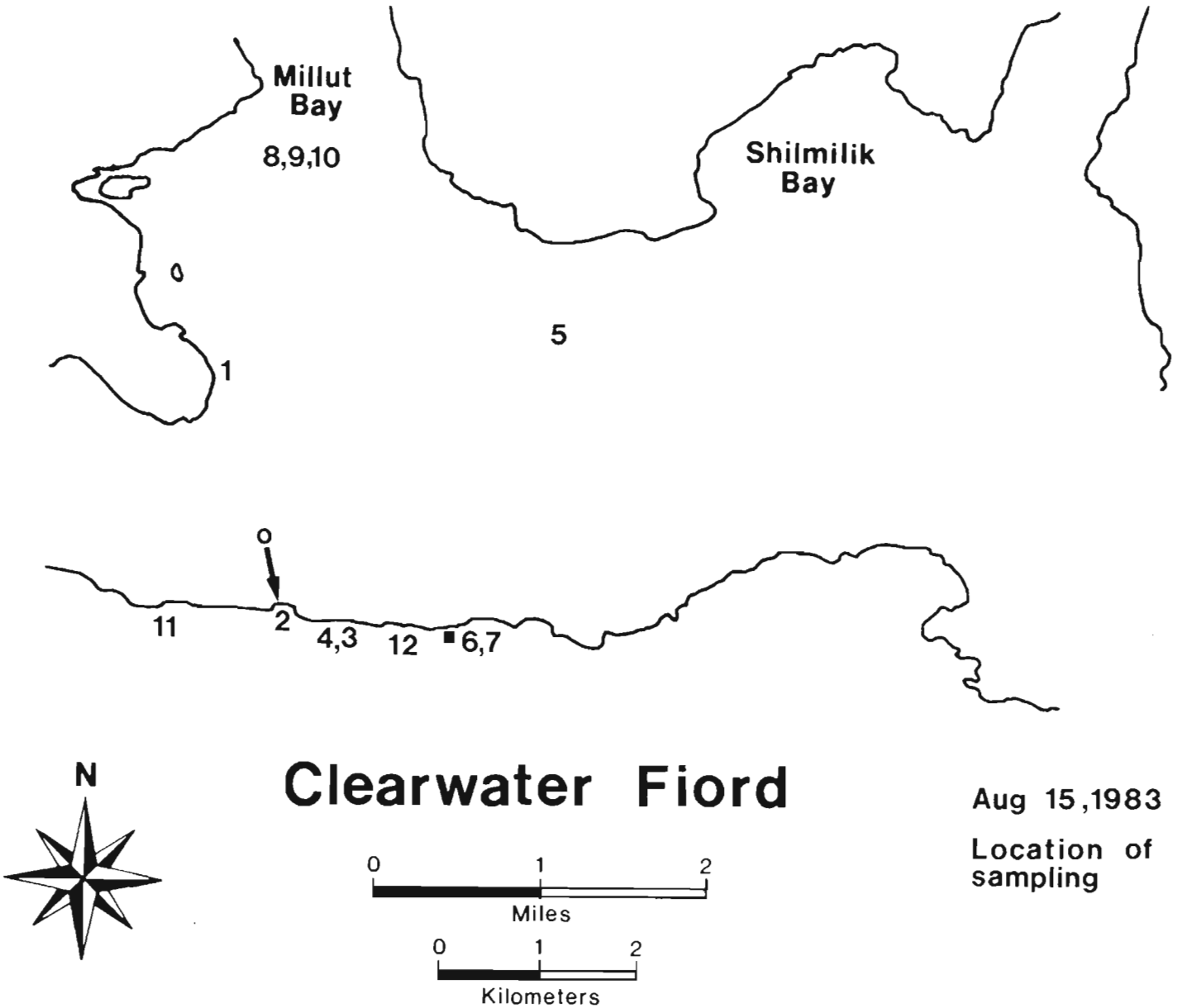


Fig. 10. Areas where whales were sampled, by sample number, in 1983.

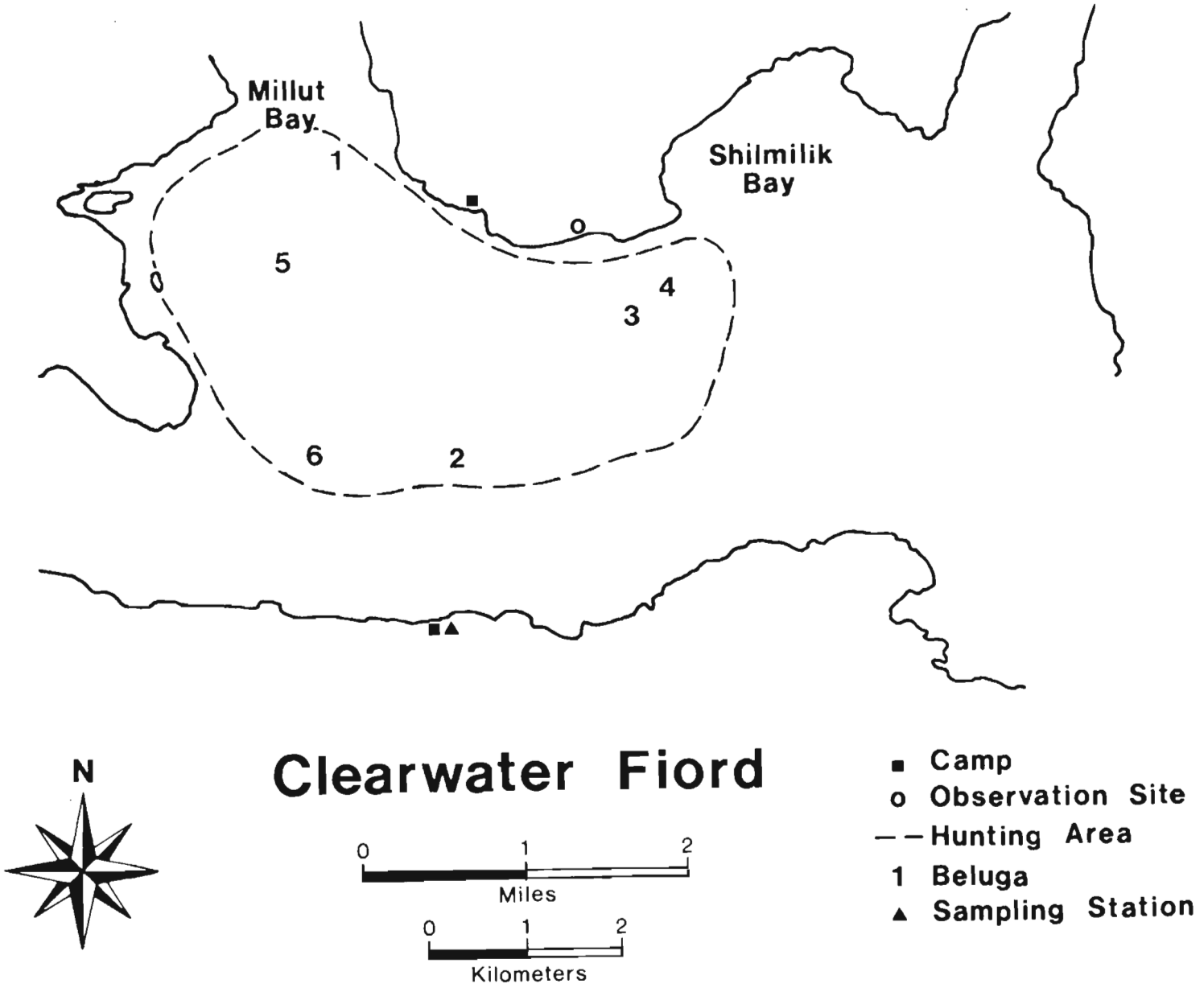


Fig. 11. General area hunted and number of whales taken on August 16, 1984.

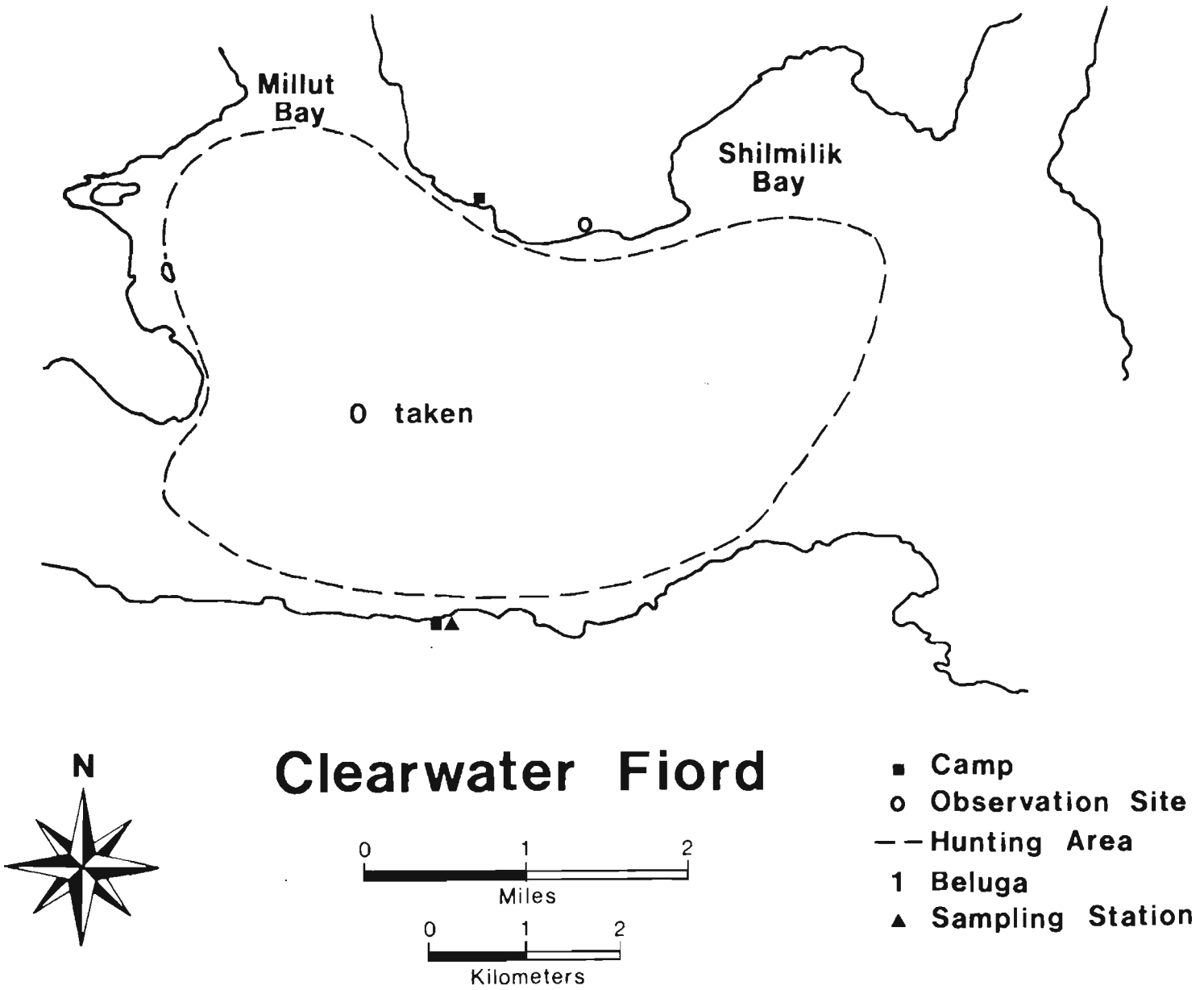


Fig. 12. General area hunted and number of whales taken on August 17, 1984.

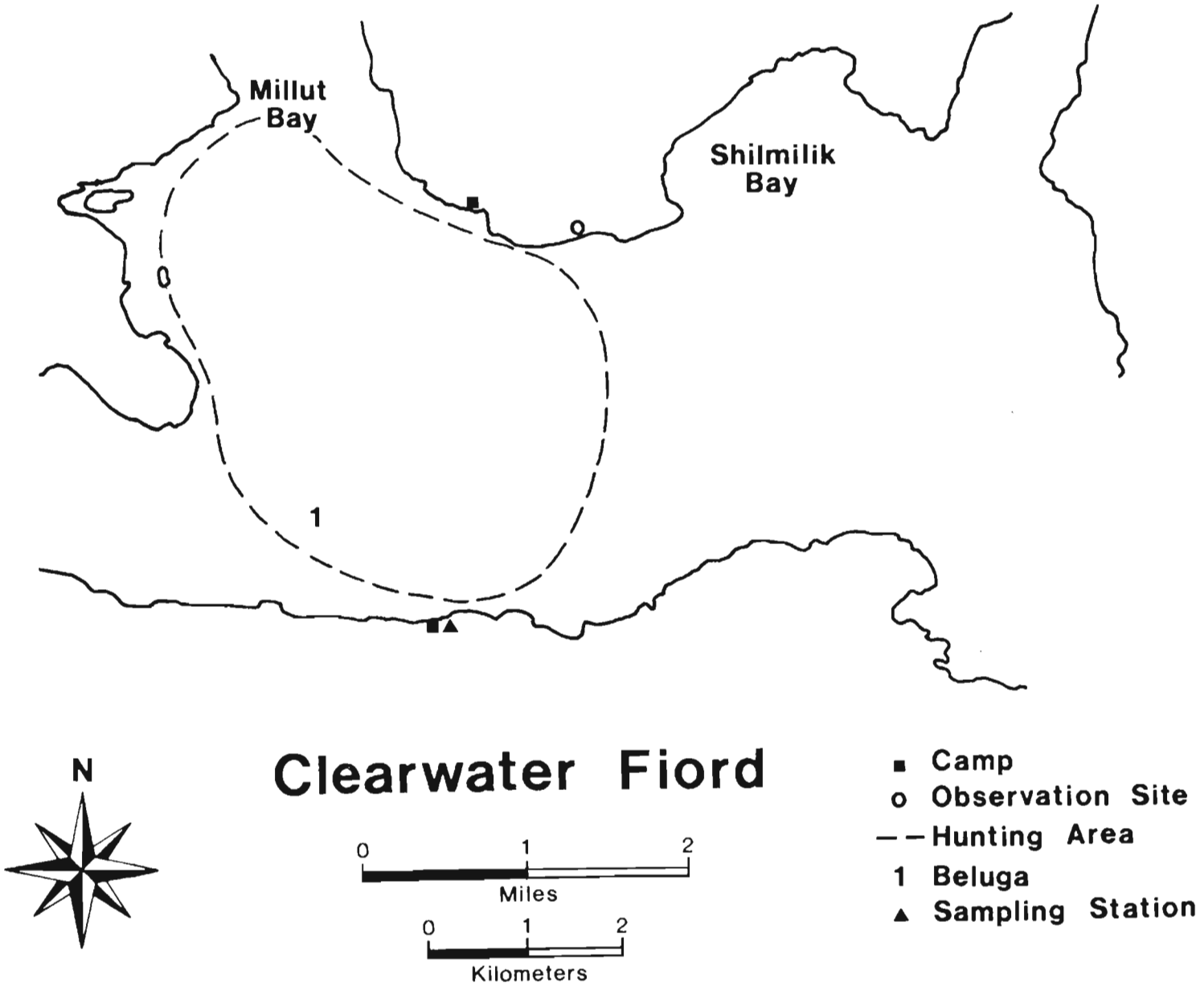


Fig. 13. General area hunted and number of whales taken on August 18, 1984.

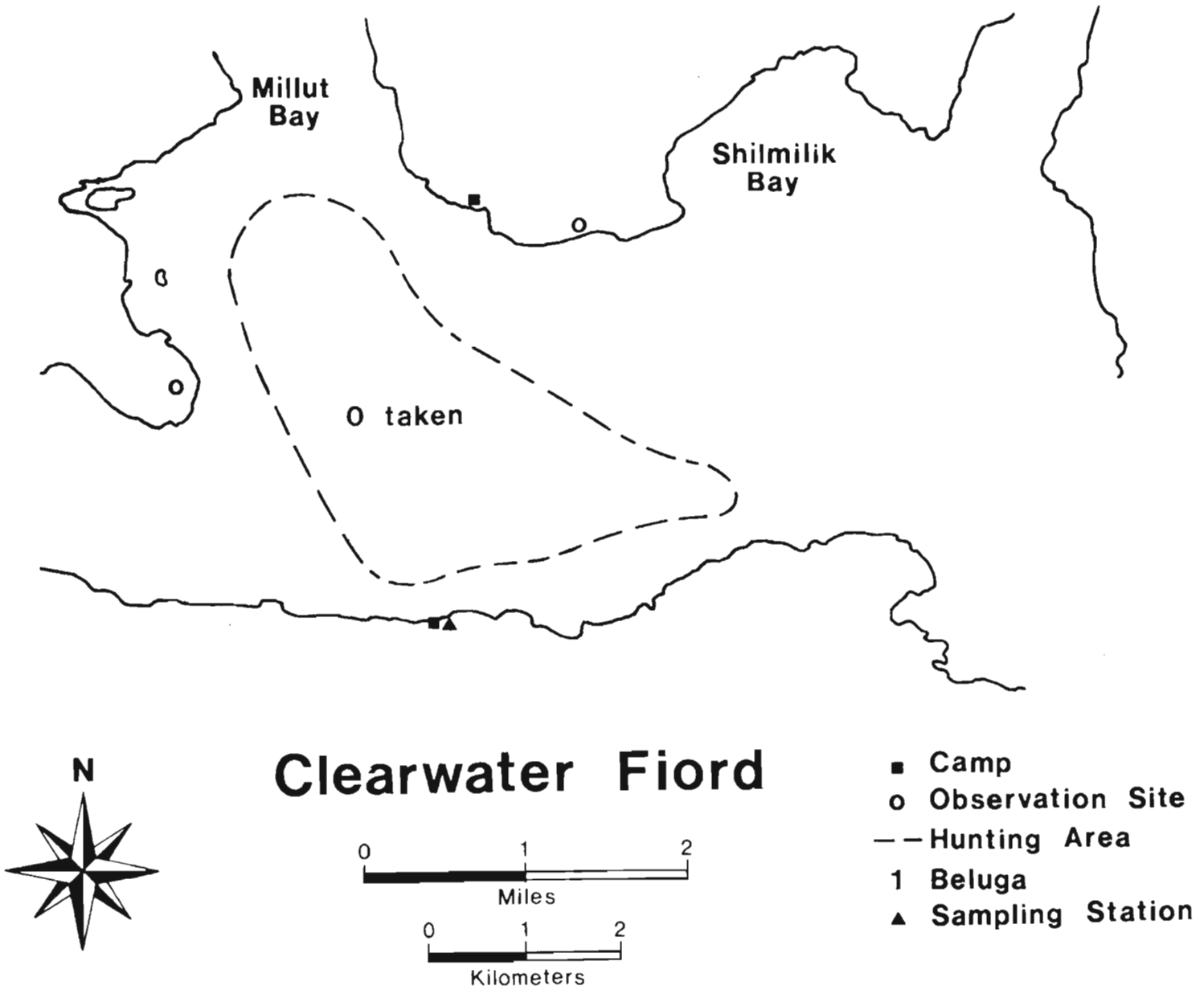


Fig. 14. General area hunted and number of whales taken on August 20, 1984.

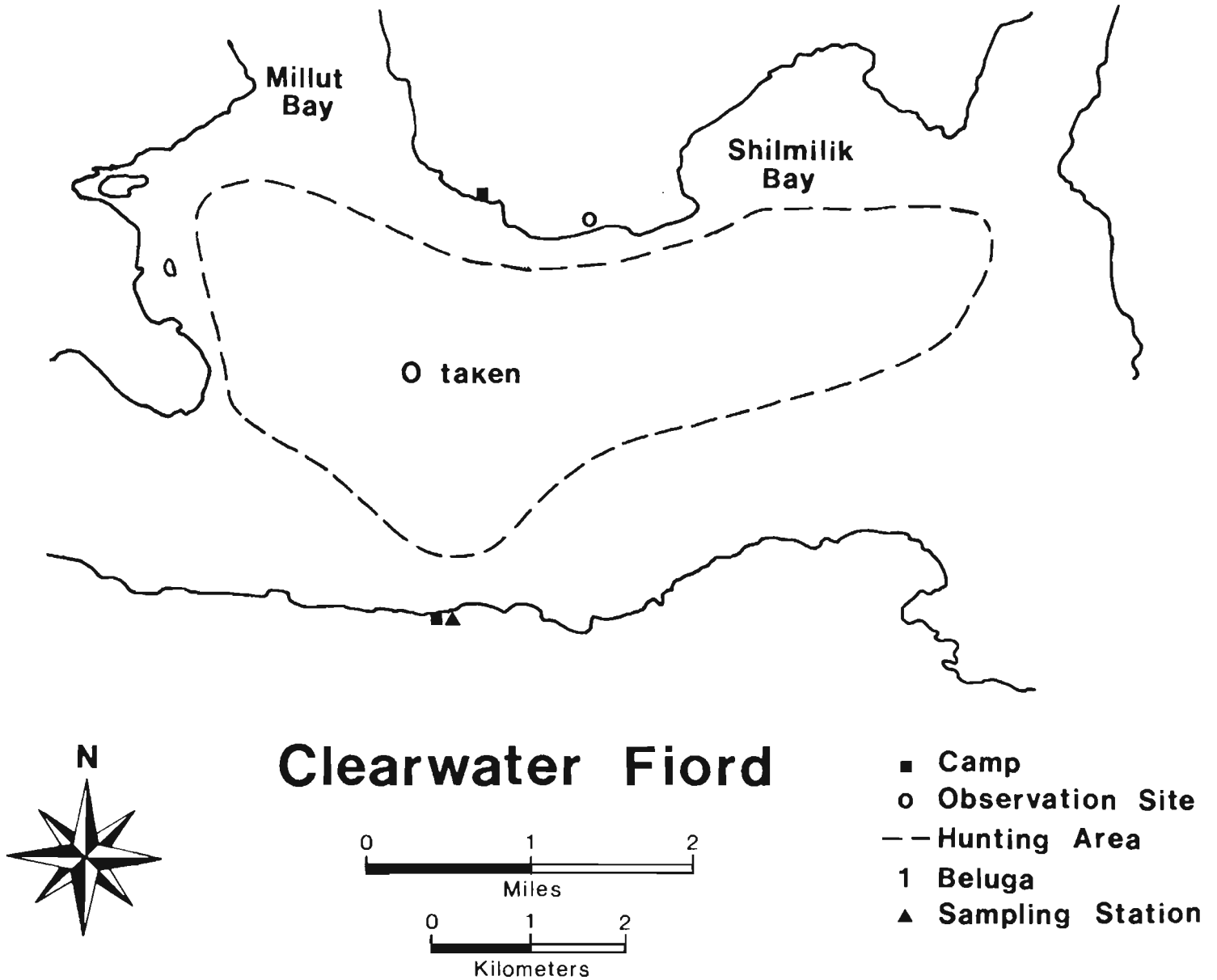


Fig. 15. General area hunted and number of whales taken on August 21, 1984.

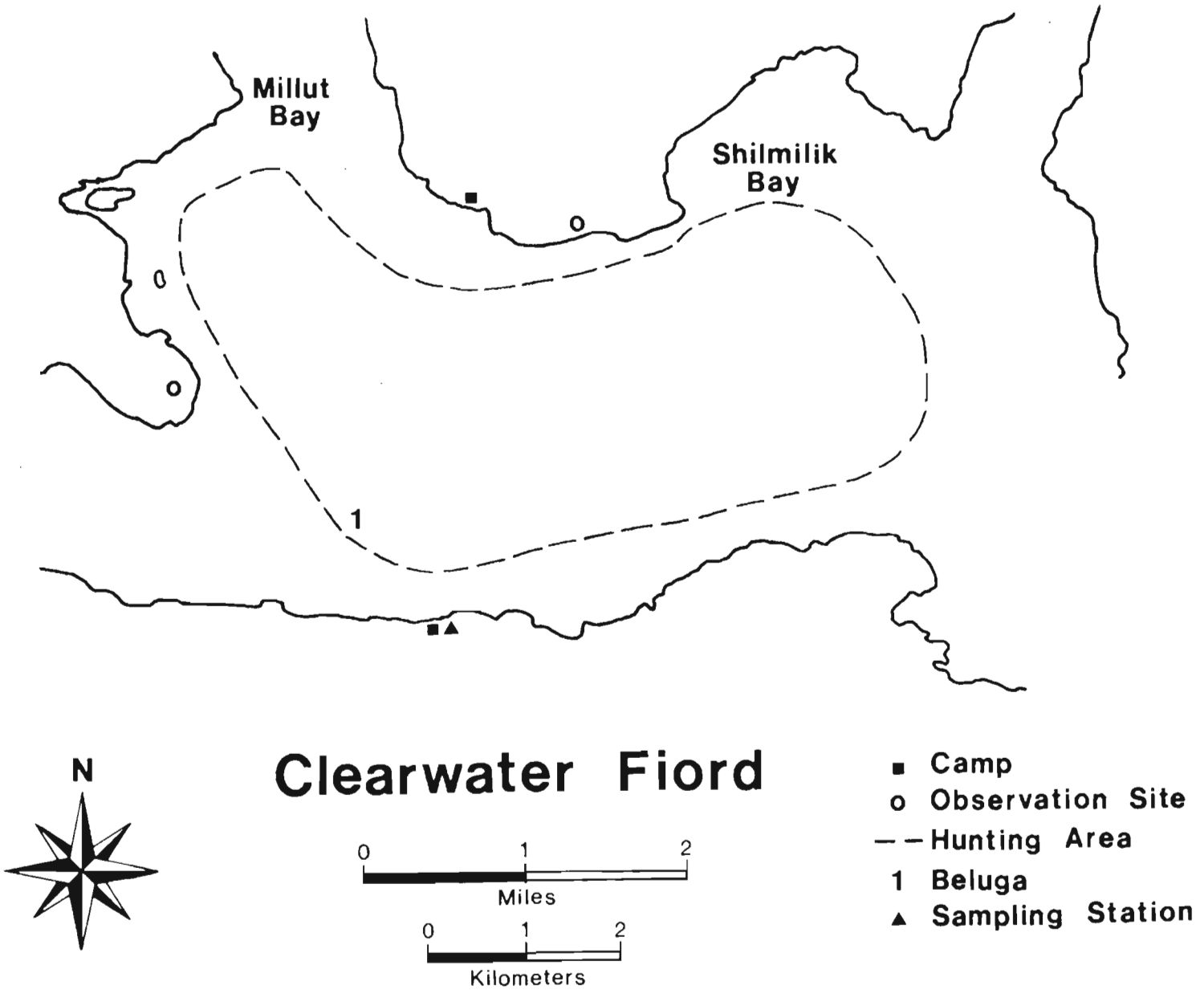


Fig. 16. General area hunted and number of whales taken on August 23, 1984.

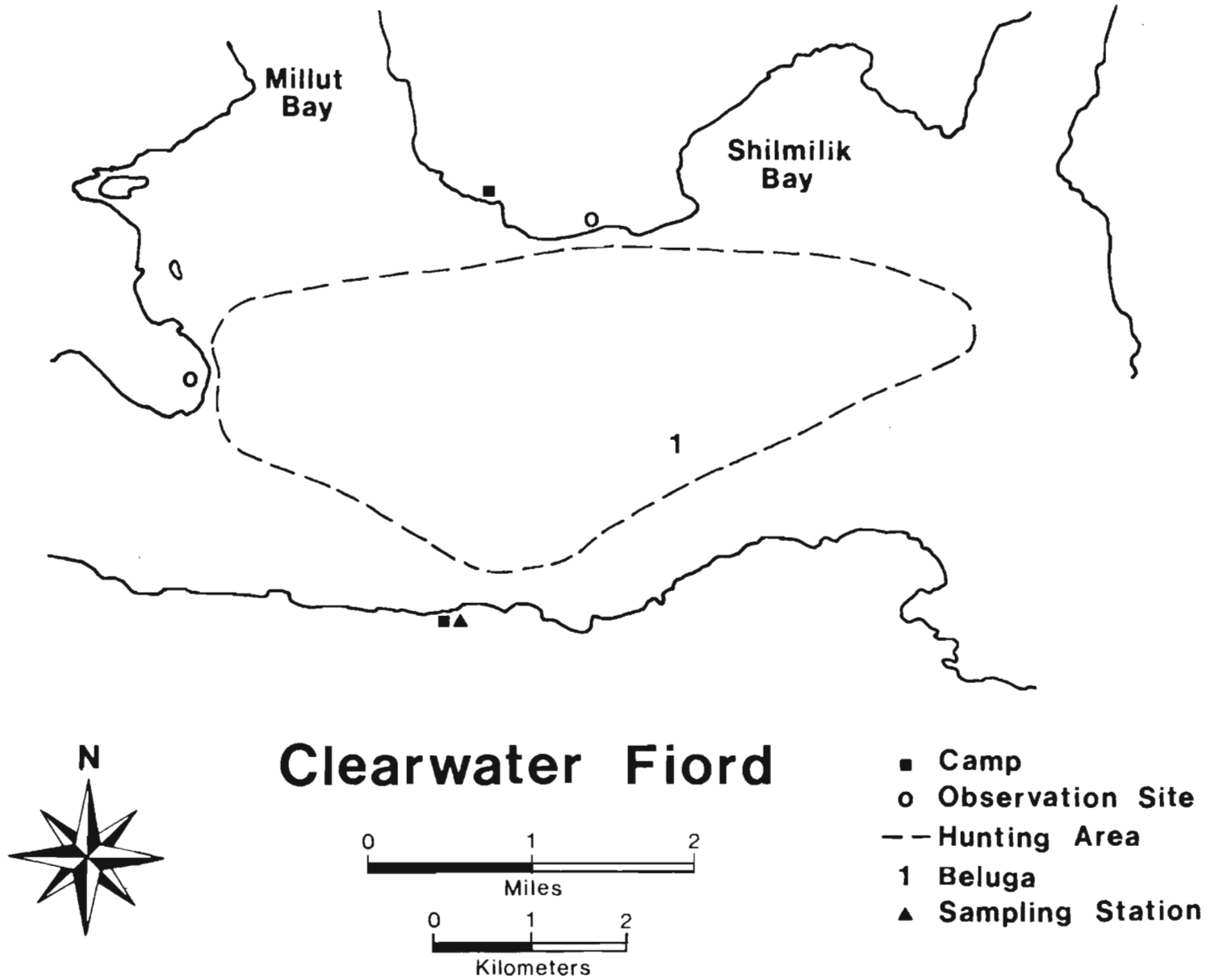


Fig. 17. General area hunted and number of whales taken on August 24, 1984.

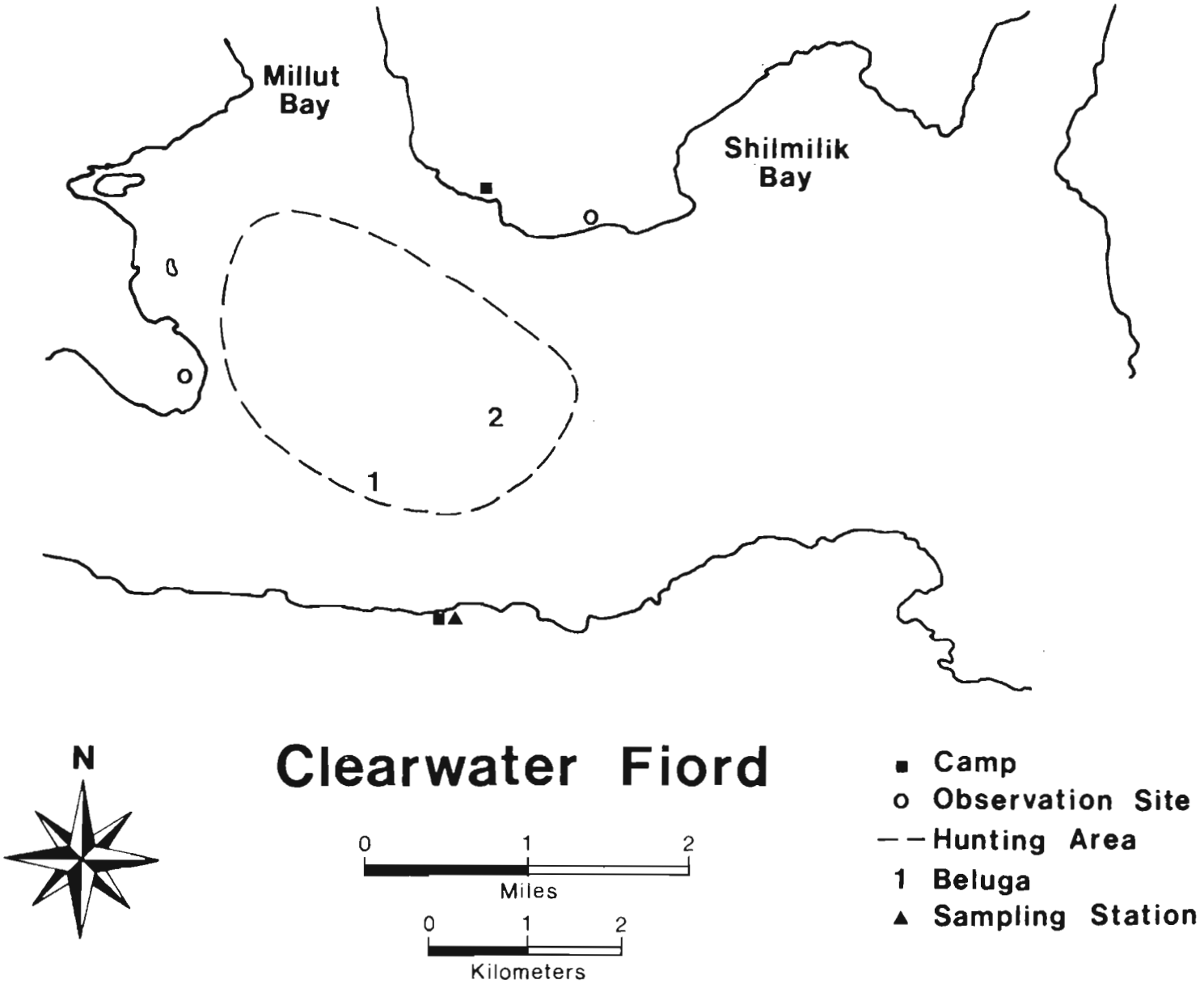


Fig. 18. General area hunted and number of whales taken on August 25, 1984.

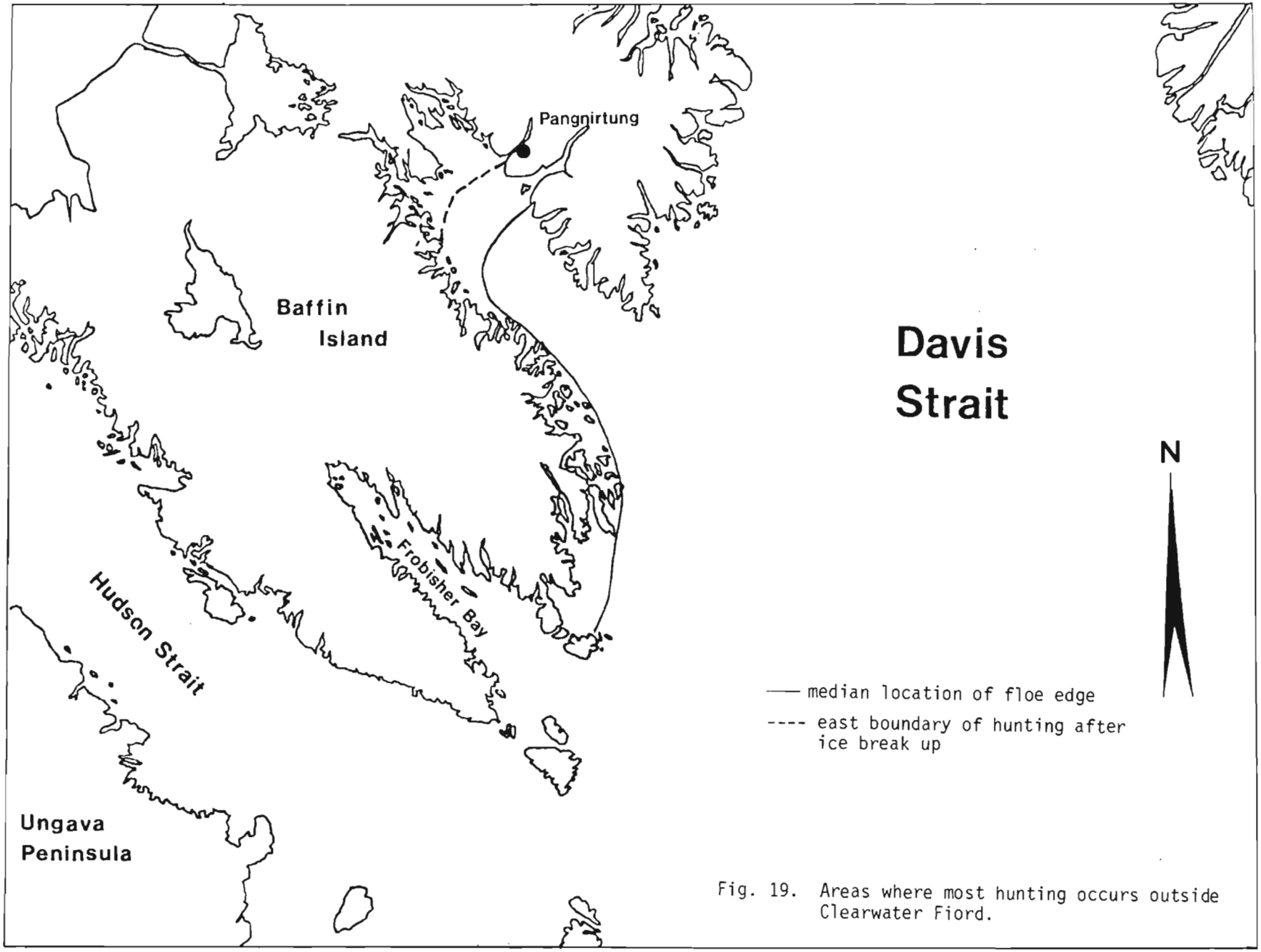


Fig. 19. Areas where most hunting occurs outside Clearwater Fiord.

Appendix 1

GUIDELINES FOR HUNT DOCUMENTATION

1. WHO?

   a) name(s) and/or number of hunter(s) per canoe and other occupants (children, DFO employees, etc.).

   b) total number of canoes and hunters.

   c) name(s) and/or number of hunters involved in a strike (lost or retrieved) per canoe.

   d) community or staging area of origin.

2. WHAT?

   a) object of hunt - target species, age and sex group of strike(s) (lost or retrieved).

   b) other species or age/sex group of observed but not hunted (reasons for).

   c) condition(s) of hunt - weather, ice, sea state, tide level, abundance and distribution of target species and conditions conducive to hunting results.

3. WHERE?

   Map coordinates (lat., long.) and/or location relative to known land forms (i.e. Rowley Is., Millet Bay, etc.).

4. WHEN?

   Date, departure time, time travelled, time spent hunting, time butchering, return time and other pertinent activities (itemize in sequence).

5. WHY?

   Utilization of catch (meat, ivory, muktuk) quality and quantity (estimate Kg of each part), if parts rejected give reasons why.

6. HOW?

   a) equipment used: rifles, calibres, number of shots fired, type of transportation (make, size, powered by), fuel consumed, harpoon type and condition.

   b) hunting technique: when and where shots fired, use of harpoon (before or after shot).

Appendix 2. Cetacean data sheet, 1982.

CETACEAN SPECIMEN NO._____ Page 1 of 2

SPECIES _____ LENGTH: _____ feet _____ metres SEX _____

LOCALITY _____ Lat. _____ Long. _____

DATE _____ VESSEL _____ PHOTOGRAPHS _____

PIGMENTATION: PHYSICAL CONDITION:

Normal _____ Abnormal _____ Thin _____ Normal _____ Fat _____

TEETH or BALEEN PLATES:

Number: Left upper _____ Right upper _____

Left lower _____ Right lower _____

Diameter largest tooth _____

Position of plates or teeth collected _____

STOMACH: Contents

Quantity _____ Species _____

VERTEBRAL EPIPHYSES: (Mid-thoracic)

Open _____ mm Closed _____ Fused visible _____ Fused invisible _____

EAR PLUGS: Right _____ Left _____

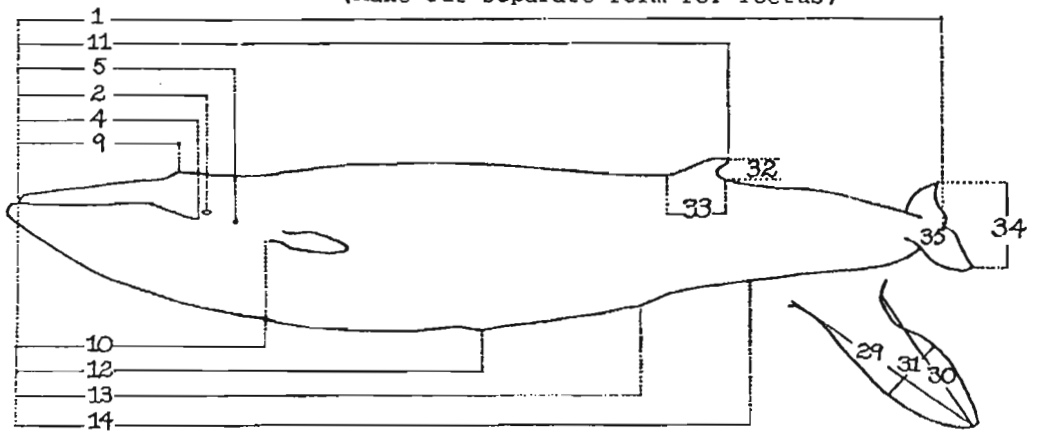
FEMALE: OVARIES			MALE: TESTES		
	Left	Right		Left	Right
Weight	_____ kg	_____ kg	Weight	_____ kg	_____ kg
Corp. Lut.	_____ mm	_____ mm	Length	_____ cm	_____ cm
	Uterine cornua		Width	_____ cm	_____ cm
Diameter	_____ cm	_____ cm	Depth	_____ cm	_____ cm
(Flat, external)			Sperm in epididymis	_____	

MAMMARY GLANDS: Milk quantity: None ____ Small ____ Med ____ Large _____

Length _____ cm Width _____ cm Thickness _____ cm

PREGNANT: _____ Foetus sex _____ Total length _____ cm

(Make out separate form for foetus)



EXTERNAL:	NOT EXAMINED ↓	0	EXAM., PRESENT
Body: Panella			
Cyamids			
Conchoderma auritum			
Conchoderma virgatum			
Coronula diadema			
Coronula reginae			
Xenobalanus globicipitis			
Lamprey scars			
Other			
Teeth:			
Baleen:			
Eye slit:			
Genital slit:			
Anal slit:			
INTERNAL:			
Eyeball			
Blubber			
Trunk musculature			
Oral cavity			
Oesophagus			
Forestomach			
Main stomach			
"Pyloric" stomach			
Intestine, proximal			
Intestine, distal			
Rectum			
Bile duct			
Liver			
Kidney			
Main kidney duct			
Urinary bladder			
Dorsal aorta			
Heart chambers			
Heart muscle			
Trachea			
Bronchi & Bronchioles			
Lungs			
Mammary glands			
Placenta			
Uterus			
Testes			

CETACEAN SPECIMEN NO.

✓✓ Length of tusk(s) L _____ R _____ cm
Basal diameter of tusks L _____ R _____ cm

✓(1) Total length _____ cm
(11) Length, snout to tip of dorsal fin _____ cm
(5) Length, snout to ear _____ cm
(2) Length, snout to eye _____ cm
(4) Length, snout to angle of mouth _____ cm
(9) Length, snout to center of blowhole(s) _____ cm
(3) Length, snout to apex of melon _____ cm

(10) Length, snout to anterior origin of flipper _____ cm
(20) Throat grooves, length: maximum ____ cm minimum ____ number _____ cm
(16) Length, snout to back end of ventral grooves _____ cm
(12) Length, snout to midpoint of navel _____ cm
(13) Length, snout to midpoint of genital slit _____ cm
(14) Length, snout to center of anus _____ cm
Length, midpoints of genital slit to centre of anus _____
✓(22) Girth, maximum _____ cm *
(21a) Girth, at eye _____ cm *
(21b) Girth at armpit _____ cm *
(23) Girth at anus _____ cm *
(23a) Girth _____ cm before fluke notch _____ cm *

(25) Length of mammary slits: right _____ cm left _____ cm
(26) Length of genital slit _____ cm anal slit _____ cm

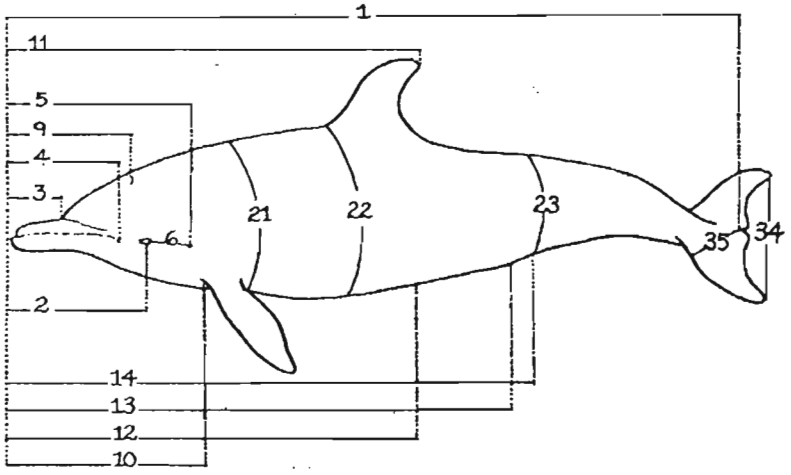
✓(34) Width, flukes (tip to tip) _____ cm
(35) Fluke notch to nearest point on leading edge _____ cm
(36) Depth of notch between flukes _____ cm

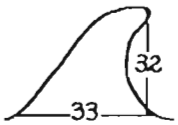
(6) Center of eye to center of ear (direct) _____ cm
(7) Center of eye to angle of mouth (direct) _____ cm
(8) Center of eye to center of blowhole(s) (direct) _____ cm
(24) Dimension of eye opening: height _____ cm length _____ cm
(28) Diameter of ear opening: right ____ mm left ____ mm absent _____
(27) Dimension(s) of blowhole(s): Width(s) _____ cm length(s) _____ cm
(15) Projection of lower jaw beyond upper (if reverse, so state) _____ cm

(32) Height, dorsal fin (fin tip to base) _____ cm
(33) Length, dorsal fin base _____ cm

✓(29) Length, flipper (anterior origin to tip) _____ cm
✓(30) Length, flipper (axilla to tip) _____ cm
(31) Width, flipper (maximum) _____ cm

✓(17) Blubber thickness, mid-back, midlength _____ cm
✓(18) Blubber thickness, mid-side, midlength _____ cm
✓(19) Blubber thickness, mid-belly, midlength _____ cm
Length, skull (tip of rostrum to condyles) _____ cm





Appendix 3. Cetacean data sheet, 1983.

Fisheries and Oceans / Pêches et Océans

MARINE MAMMAL MANAGEMENT
501 UNIVERSITY CRES.
WINNIPEG, MAN. R3T 2N6

Cetacean Data Sheet

SAMPLE NO. _____ (loc. sp. yr. no.) SEX_____ DATE _____ (yr. mo. day) SAMPLERS _____

SPECIES _____ Location _____ lat._____ (deg. min. sec.) long._____ (deg. min.)

Hunter(s) _____ Community _____ TIME AFTER DEATH _____ hrs.

Weather: wind _____ sky _____ water/ice _____

PIGMENTATION:

CAUSE OF DEATH
bullet entry and path

SCARS

TOTAL LENGTH 1 _____ cm
FLUKE WIDTH 2 _____ cm
GIRTH AT ARMPIT 3 _____ cm
GIRTH AT NAVEL 4 _____ cm
FLIPPER LENGTH
- anterior origin to tip 5 _____ cm
- axilla to tip 6 _____ cm
- maximum width 7 _____ cm

TUSK
- exposed length 8 _____ cm
- total length 9 _____ cm
- basal circ. 10 _____ cm
- condition _____

MILK amt: none/little/lots
(tick boxes)

lt. green	☐	thick	☐
dk. green	☐	thin	☐
yellow	☐	oily	☐
cream	☐	sticky	☐
white	☐	watery	☐
clear	☐	other	☐
opaque	☐		

STOMACH CONTENTS: description

AMOUNT

SAMPLES

BLUBBER THICKNESS

	at armpit MUKTUK	BLUBBER
back	_____ . _____	_____ . _____ cm
side	_____ . _____	_____ . _____ cm
belly	_____ . _____	_____ . _____ cm
at navel		
back	_____ . _____	_____ . _____ cm
side	_____ . _____	_____ . _____ cm
belly	_____ . _____	_____ . _____ cm

FOETUS
if FULL TERM — sampled? yes/no
sample no. _____
if NON TERM
- which horn? left/right
- sex ♂ ♀
- length _____ . _____ cm
- weight _____ . _____ kg
- placental wt. _____ . _____ kg

snout or Tail
- to anus 11 _____ cm
- to mid-point of genital slit 12 _____ cm
- to navel 13 _____ cm
- to anterior origin of flipper 14 _____ cm
- to ear 15 _____ cm
- to eye 16 _____ cm
- to blowhole 17 _____ cm
- to angle of mouth 18 _____ cm

depth of tail notch 19 _____ cm
girth at anus 20 _____ cm
girth at eye 21 _____ cm
eye to ear (surface) 22 _____ cm
eye to blowhole (surface) 23 _____ cm
eye to angle of mouth (surface) 24 _____ cm
blowhole width 25 _____ . _____ cm

TESTIS left/right
- weight _____ . _____ kg
- length _____ . _____ cm
- width _____ . _____ cm
- height _____ . _____ cm
- sperm? no/little/lots

MAMMARY GLAND left right
- thickness _____ . _____ _____ . _____ cm

UTERINE CORNUA
- diameter _____ . _____ _____ . _____ cm

CORPORA LUTEA
- present? _____ _____

COMMENTS–

Appendix 4. Beaufort Sea Scale Guide.

Beaufort No.	Wind Speed (knots)	Wind Speed (km/hr)	Effects Observed at Sea	Term and Height of Waves (ft)
0	Under 1	Under 1	Sea like mirror	Calm, 0
1	1-3	1-5	Ripples with appearance of scales; no foam crests	Smooth, less than 1
2	4-6	6-11	Small wavelets; crests of glassy appearance, not breaking	Slight, 1-3
3	7-10	12-19	Large wavelets; crests begin to break; scattered whitecaps	Moderate, 3-5
4	11-16	20-28	Small waves, becoming longer; numerous whitecaps	
5	17-21	29-38	Moderate waves, taking longer form; many whitecaps; some spray	Rough, 5-8
6	22-27	39-49	Larger waves forming; whitecaps everywhere; more spray	
7	28-33	50-61	Sea heaps up; white foam from breaking waves begins to be blown in streaks	
8	34-40	62-74	Moderately high waves of greater length; edges of crests being to break into spindrift; foam is blown in well-marked streaks	Very rough, 8-12
9	41-47	75-88	High waves; sea begins to roll; dense streaks of foam; spray may reduce visibility	High, 12-20