INUVIALUIT WILDLIFE STUDIES

WESTERN ARCTIC WOLF RESEARCH PROJECT

PROGRESS REPORT

1988-1989

Peter Clarkson
Wolf/Grizzly Biologist

Ilme Liepins
Wolf/Grizzly Technician

Dept. of Renewable Resources
Inuvik Region, G.N.W.T.

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ABSTRACT

During the second year of research 27 new wolves were captured. Twelve of the wolves were radio-collared and the remaining 15 were only tattooed and ear-tagged. A total of 66 wolves have been captured in the study area, however, 29 wolves marked wolves (collared or ear-tagged) have died (hunter-trapper and natural mortalities) since the beginning of the study in February 1987.

The wolves in the study area continued to display two movement strategies. Those packs which travelled greater distances in 1987-88 continued to travel extensively in 1988-89. Packs using smaller areas continued to do so for the second year. Packs or individual wolves were monitored in 1988-89. Wolf pack structure continued to be dynamic with some packs producing and raising pups, splitting into separate packs and joining other wolves to form new packs.

The wolves again selected den sites throughout the caribou range with more dens in the treeline-tundra transition zone. Dens selected were often in the same area as dens in 1987, however, few packs used the same den. Each pack appears to have several dens in close proximity that can be used.

Two predation rate studies were conducted. Over a 26 day period in April-May the study found that six packs consumed an average of 2.67 kg prey/wolf/day. Over a 24 day period the October-November study concluded that six packs consumed an average of 3.26 kg prey/wolf/day. The difference being that wolves preyed mainly on adult females and calves in the spring and on adult male caribou in the fall.

Analysis for diseases and parasites revealed that the wolves were generally healthy with a few cases of tapeworm, roundworm and canine distemper. Brucellosis was found in 45 percent (n=21) of the samples analyzed. Fighting and starvation appeared to be the major causes of natural mortality.

Age analysis of captured wolves and hunter/trapper harvested wolves showed that 65-72% of the wolves in the population are in the pup and yearling age classes. Genetic analysis of wolf tissue samples has shown that wolves throughout the study area are genetically similar.

Hunters and trappers throughout the study area continued to cooperate with the study and submitted 36 carcasses and 59 skulls for measurement and analysis

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

Wolves (Canis lupus) in the Inuvialuit Settlement Region (ISR) are important to the natural ecosystem and to the Inuvialuit. With the approval and signing of the Inuvialuit Final Agreement in 1984, wildlife research was identified as a priority to ensure that wildlife populations were properly managed. The Wildlife Management Advisory Council (WMAC) and the Inuvialuit Game Council (IGC) approved a wolf-prey research program because wolves in the area prey predominately on caribou (Rangifer tarandus), which is an important food species for the Inuvialuit. Wolves are also an important fur resource for the communities. The Inuvialuit are interested in maintaining a wolf population that is a part of the natural environment and can meet their needs, yet not jeopardize their opportunity to harvest caribou.

The wolf and caribou populations appear to be healthy and increasing in the ISR. Determining wolf-prey relationships at this time provides the Department and the Inuvialuit with information necessary for responsible management. A wolf research commitment is particularly important in light of current widespread controversy over wolf population control and the fur harvest. The goals, objectives and hypotheses for the project are outlined in the first progress report (Clarkson and Liepins 1989a). This paper presents and discusses interim results of the second year (1988-89) of the research program.

As the second year of wolf research is completed we can begin to see relationships between wolves and their prey. Some wolf packs have now been monitored for two years and we have recorded their movements, predation, pup survival and pack dynamics. Information on prey species their abundance and availability is also being recorded. For a more detailed background of prey species available refer to Clarkson and Liepins (1989a). The last

two years of research should reveal more conclusive information on the variability and patterns inherent among wolves in the Western Arctic.

2.0 STUDY AREA

The Western Arctic Wolf study area is a 140,000 sq. km tract of land stretching 600 km from east to west (Figure 1). The communities of Inuvik, Tuktoyaktuk, Paulatuk and Colville Lake border on the area. Classified as a polar continental climate region, the study area is characterized by long periods of extreme cold in winter, short cool summers and light precipitation. The study area can be subdivided into two basic physiographic regions; Arctic Coastal Plain and Interior Plateaus and Plains (Mackay 1963). The predominant vegetation type in the area is perennial and may be subdivided into four general vegetation communities; sedge tundra, shrub tundra, forest-tundra transition and open forest. The study area is inhabited by a variety of wildlife species which form the basis of the hunting and trapping economies. For a more detailed description of the study area refer to Clarkson and Liepins (1989a).

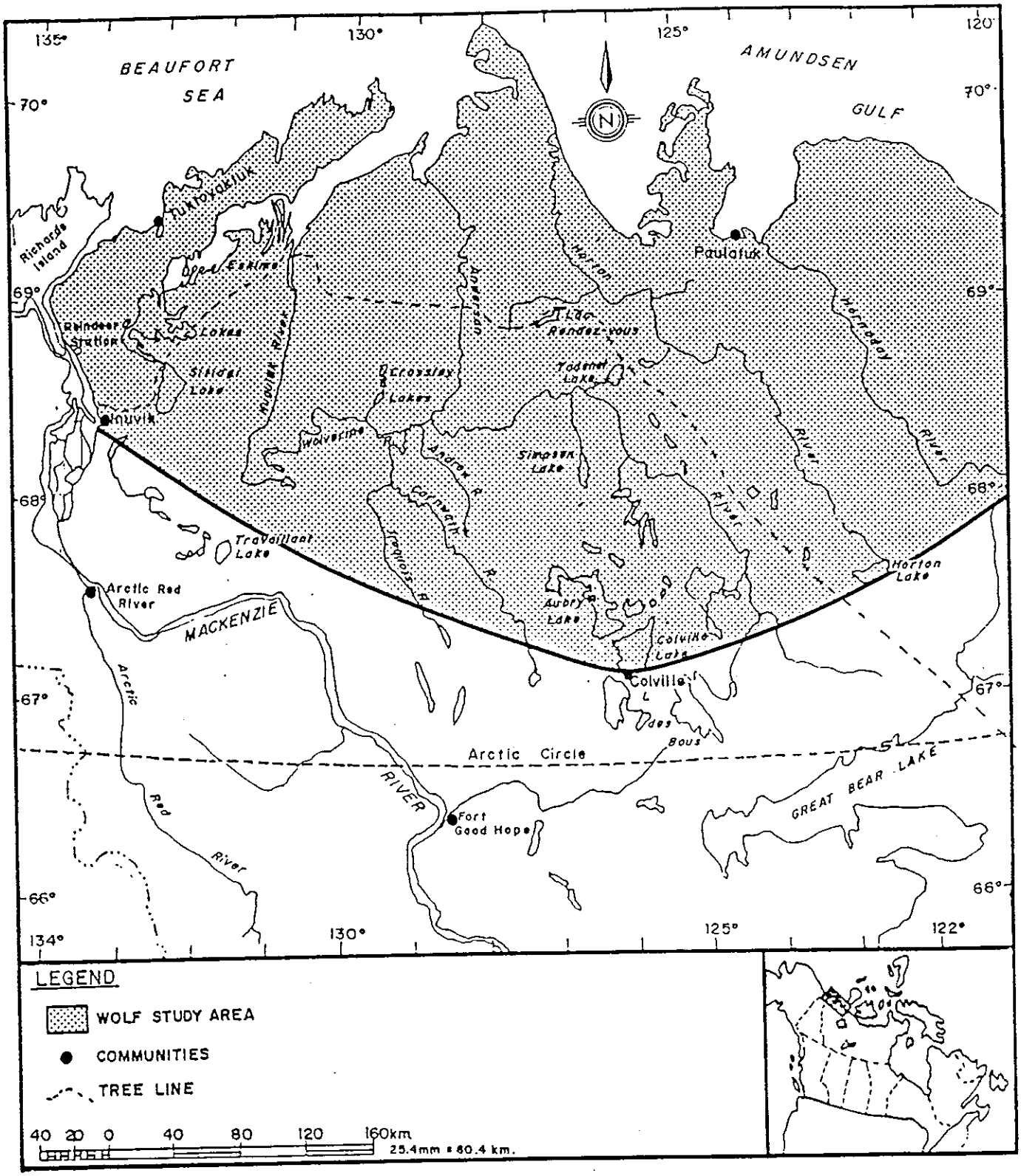


Figure 1. Western Arctic Wolf Research Study Area, 1987-89.

3.0 METHODS

Most of the wolf research methods used in 1988-89 were similar to 1987-88 and are described in Clarkson and Liepins (1989a). The following section only discusses new and improved methods and analysis techniques not used in 1987-88.

Wolves were located in April 1988 by tracking radio-collared wolves and then capturing pack members not previously captured. This was done to increase the number of active collars to at least two collars per pack. In some cases an entire pack was captured to get sex and age composition data. Ages given for wolves are as of March 1989, unless otherwise stipulated.

The collared wolves were monitored approximately once per month. This year a Supercub was used for monitoring from March to November 1988. During the cold and dark season a Cessna 185 and Cessna 310 were used for monitoring. The Cessna 310 monitoring was usually done at 3,000 m above ground level and was conducted to get general wolf locations during December and January when there was not enough daylight for single engine flights.

During the 1988 wolf capture and predation rate work a 2000 L portable fuel bladder (Fuel Easy, SEI, Vancouver) was used at the field camp to fuel fixed-wing and helicopter aircraft. By using the fuel bladder we were able to cache more fuel per Twin Otter charter and save on fuel and fuel caching expenses.

3.1 Predation Rate

During 1988 two field studies were conducted to determine wolf predation rate. The spring predation rate study was completed from 6 April to 1 May (26 days) and the fall study was from 26 October to 18 November (24 days). Both studies were conducted from the

field camp at Rendezvous Lake. In each study 5-6 packs were located daily to determine how far they had travelled and if they had made a kill. A Supercub on skis was used for both studies. Predation rate was calculated using kg prey/wolf/day. The methods of Dauphine (1976) were used to determine caribou weights. Consumption of kills by wolves was estimated to be 80% of their total weight.

3.2 Parasite and Disease Analysis

When immobilized for tagging and collaring all wolves were examined for signs of external parasites (ticks, fleas, lice). A fecal sample was also taken for parasite (tapeworm, roundworm, heartworm) analysis. A 20 cc blood sample was taken from the foreleg above the elbow joint. The blood was spun in a centrifuge in serum separating tubes. The serum was then poured into 5 cc plastic tubes and frozen for later analysis.

The frozen serum samples were sent to Dr. F.A. Lieghton at the Western College of Veterinary Medicine, Saskatoon, Saskatchewan. Dr. Leighton sent the serum samples to Dr. L. Forbes, Agriculture Canada Lab, Saskatoon for Brucellosis testing and to Dr. T. O. Bunn, National Animal Disease Lab, Ames, Iowa, for canine distemper, canine parvovirus, canine hepatitis and rabies testing. Serum neutralization tests against 100 TCID 50 of virus were used to detect antibodies of canine distemper, canine parvovirus and canine hepatitis (Bunn pers. comm. 1989). The rapid fluorescent focus inhibition test was used to detect rabies antibodies (Bunn pers. comm. 1989).

4.0 RESULTS AND DISCUSSION

The results from the second year of research are preliminary. As the project continues more will be learned about wolves and their relationship with caribou in the western arctic. Some of the data collected during the second year are presently being analyzed and are not available for this report. As results are tentative and analysis is not complete this report does not include a detailed discussion comparing results with other research.

4.1 Wolves Captured

During April 1988, 27 new wolves were captured, 12 males, 14 females and 1 unsexed. Of the 27 wolves 12 were pups, 7 - yearlings, 4 - two year olds, 1 - three year old, 2 - five year olds and 1 - ten year old. This gives a combined 1987 and 1988 capture total of 67 wolves (30 males, 36 females, 1 unknown) (Table 1). All of the wolves captured in April 1988 were from the Tadenet Lake-Anderson River area (Figure 2).

Two wolves from 1987 were recaptured. W14 was captured and her nonfunctioning collar was replaced and W32 was darted by mistake. The ages of the captured wolves are shown in Figure 3. The pup and yearling age classes make up 65% (n=44) of the captured wolves. Few wolves live longer than 3 years. The average life expectancy of a wolf based on the capture ages is 1.46 years (Figure 3). There was one wolf mortality during capture work in 1988, however, the death was not caused by the capture. Details of the mortality are given in section 4.8.

Table 1. Wolves Captured Radio-Collared and Ear Tagged, Western Arctic Wolf Research, 1987-89.

Wolf	Coordinates		Wolf Pack (January, 1989)	Age	Sex	Tag/ Tattoo	Weight (kg)
+8701	68.48	133.01	Husky Lakes	(1)	F	W1/8701	34**
+8702	68.45	133.14	Husky Lakes	1	M	W2/8702	41**
8703	68.43	132.50	Williams Lake	(1)	F	W3/8703	40
8704	68.45	132.53	Sitidgi Lake	1	M	W4/8704	48
8705	68.46	133.28	Whale Point	(6)	F	W5/8705	36
+8706	68.53	132.18	500 Lake	1	F	W6/8706	30
+8707	68.53	132.14	500 Lake	1	M	W7/8707	26
+8708	68.50	132.26	Dennis Lake	1	M	W8/8708	43
+8709	68.59	132.13	Old Man Lake	0	F	W9/8709	25**
+8710	69.02	132.10	Old Man Lake	(1)	M	W10/9710	29
+8711	68.47	132.28	Dennis Lake	3	F	W11/8711	32
+8712	68.45	131.42	Miner River	4	F	W12/8712	25
+8713	68.39	131.42	Wolverine River	8	M	W13/8713	35
8714	68.39	131.42	Wolverine River	3	F	W14/8714	25
8715	68.39	131.42	Wolverine River	0	F	W15/8715	26
8716	68.39	131.42	Unknown	0	M	W16/8716	31
+8717	68.34	126.45	Anderson River	1	M	W17/8717	28
8718	68.32	126.54	Anderson River	(2)	F	W18/8718	28
8719	68.36	126.50	Anderson River	(3)	M	W19/8719	35
+8720	68.37	127.34	Horton River	(0)	M	W20/8720	27
+8721	68.37	127.30	Horton River	(0)	F	W21/8721	29
+8722	68.33	127.28	Granet Lake	(1)	F	W22/8722	30
+8723	68.34	127.28	Smoke River	1	M	W23/8723	32
+8724	68.34	127.28	Tedji Lake	7	F	W24/8724	34
8725	68.22	127.58	Tadenet Lake	(0)	F	W25/8725	21
+8726	68.33	127.54	Ridge	3	F	W26/8726	20
8727	68.33	127.34	Ridge	(0)	F	W27/8727	22
8728	68.34	127.35	Ridge	0	F	W28/8728	28
8729	68.48	127.09	Rendezvous Lake	2	F	W29/8729	31
8730	68.48	127.09	Rendezvous Lake	1	M	W1/8730	32
8731	68.37	127.06	Horton River	1	F	W2/8731	24
8732	68.37	127.06	Ridge	2	M	W3/8732	31
+8733	68.35	126.37	Ewariege	1	M	W4/8733	40
+8734	68.33	126.45	Andrew River	1	F	W5/8734	22
+8735	68.33	126.45	Anderson River	1	M	W6/8735	27
+8736	68.33	127.00	Horton River	1	M	W7/8736	26
+8737	68.42	127.05	Lone Wolf	2	M	W37/8737	39
8738	68.30	126.52	Has Travellers	1	F	W38/8738	26
+8739b	68.35	126.58	Horton River	1	F	W39/8739	20
8739w	69.38	126.42	Melville Hills	-	M	W39/8739	21

Table 1. (continued)

Wolf	Coordinates	Wolf Pack (January, 1989)	Age	Sex	Tag/ Tattoo	Weight (kg)
8940	68.50 126.32	Wolverine	2	M	W40/8740	46
+8841*	68.49 126.25	Lucifer	3	F	W41/8741	36
+8842	68.50 126.27	Lucifer	5	F	W42/8742	41
8843	68.38 126.45	Tadenet	0	F	W43/8743	31
8844	68.35 127.00	Sundog	0	M	W44/8744	41
8845	68.41 126.31	Has	2	M	W45/8745	47
8846	68.23 125.58	Melville	(0)	M	W46/8746	36
+8847	68.26 127.37	Erly	1	M	W47/8747	39
+8848	68.31 125.43	Unknown	5	F	W48/8748	36
8849	68.33 127.07	And.River	1	F	W49/8749	32
8850	68.28 127.04	Ridge	0	M	W50/8750	34
8851*	68.27 127.12	Ridge	1	M	W51/8751	39
8852	68.32 127.20	Iroquois	2	M	W52/8752	39
8853*	68.33 127.10	Wolverine	(0)	M	W53/8753	38
+8854*	68.37 126.22	Unknown	0	F	W54/8754	30
8855*	68.37 126.22	Unknown	1	F	W55/8755	32
+8856	68.33 126.05	Erly	2	M	W56/8756	35
8857*	68.32 126.05	Erly	2	M	W57/8757	42
8858*	68.33 126.05	Erly	1	F	W58/8758	35
8859*	68.37 126.25	Horton River	0	M	W59/8759	33
8860*	68.37 126.25	Horton River	10	F	W60/8760	36
8861*	68.37 126.25	Horton River	0	-	W61/8761	36
+8862*	68.37 126.25	Horton River	0	F	W62/8762	38
8863*	68.37 126.25	Horton River	0	M	W63/8763	34
8864*	68.37 126.25	Horton River	1	F	W64/8764	30
8865*	68.33 126.32	Anderson River	1	F	W65/8765	33
8866*	68.33 126.32	Anderson River	1	F	W66/8766	36

* only tagged not radio-collared, present pack and location status unknown.
- wolves 8701-8739b were captured in February-March 1987.
- wolves 8840-8866 were captured in April 1988.
- age refers to age at capture, wolves caught in 1987 would be 2 yrs. older, wolves caught in 1988 would be 1 yr. older.
- ( ) age estimate by tooth eruption and wear when captured
- * estimate weight
- 0 age is a pup of the year
- + indicates a dead wolf

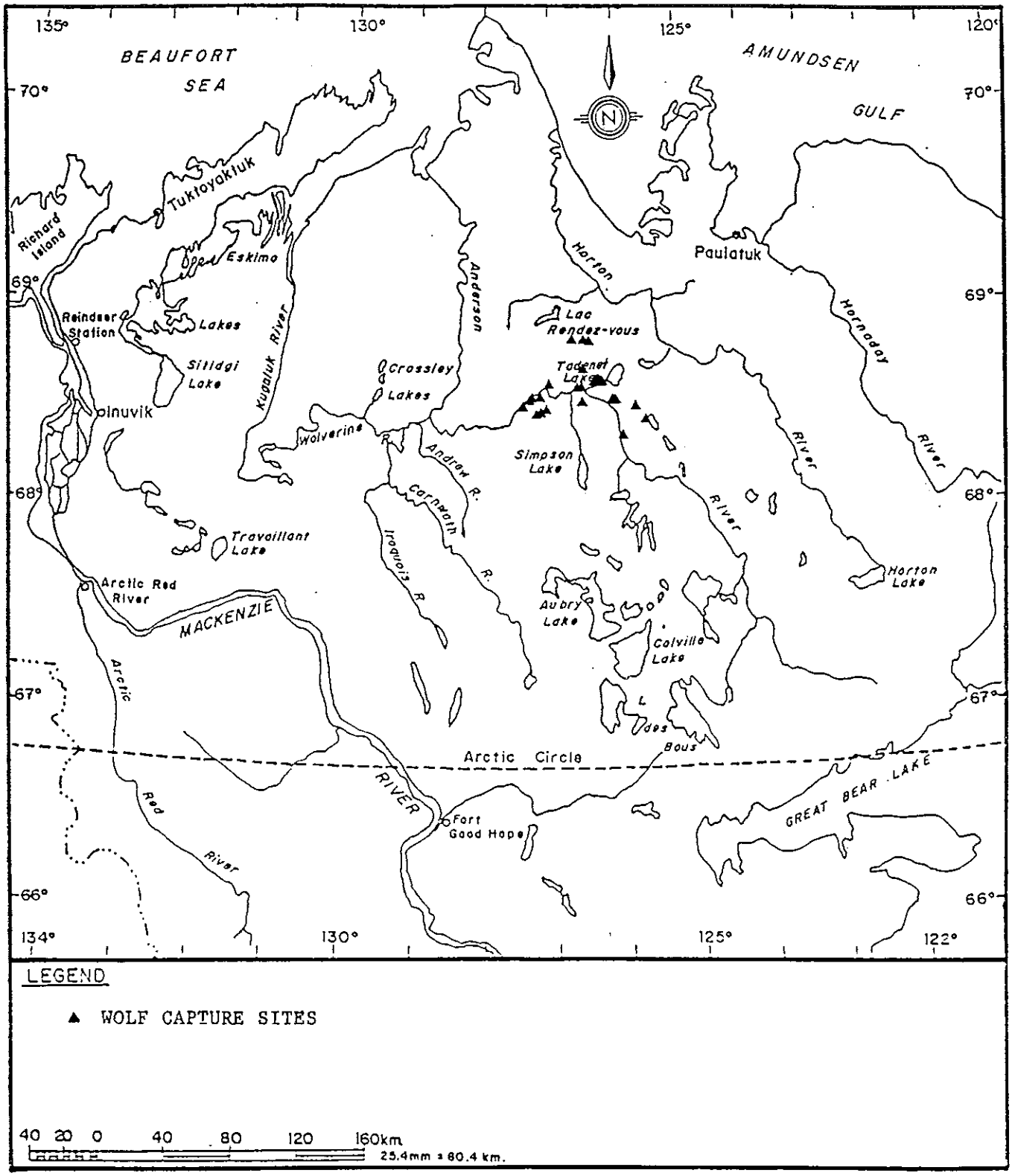


Figure 2. Wolf capture locations, Western Arctic Wolf Research, 1988-89.

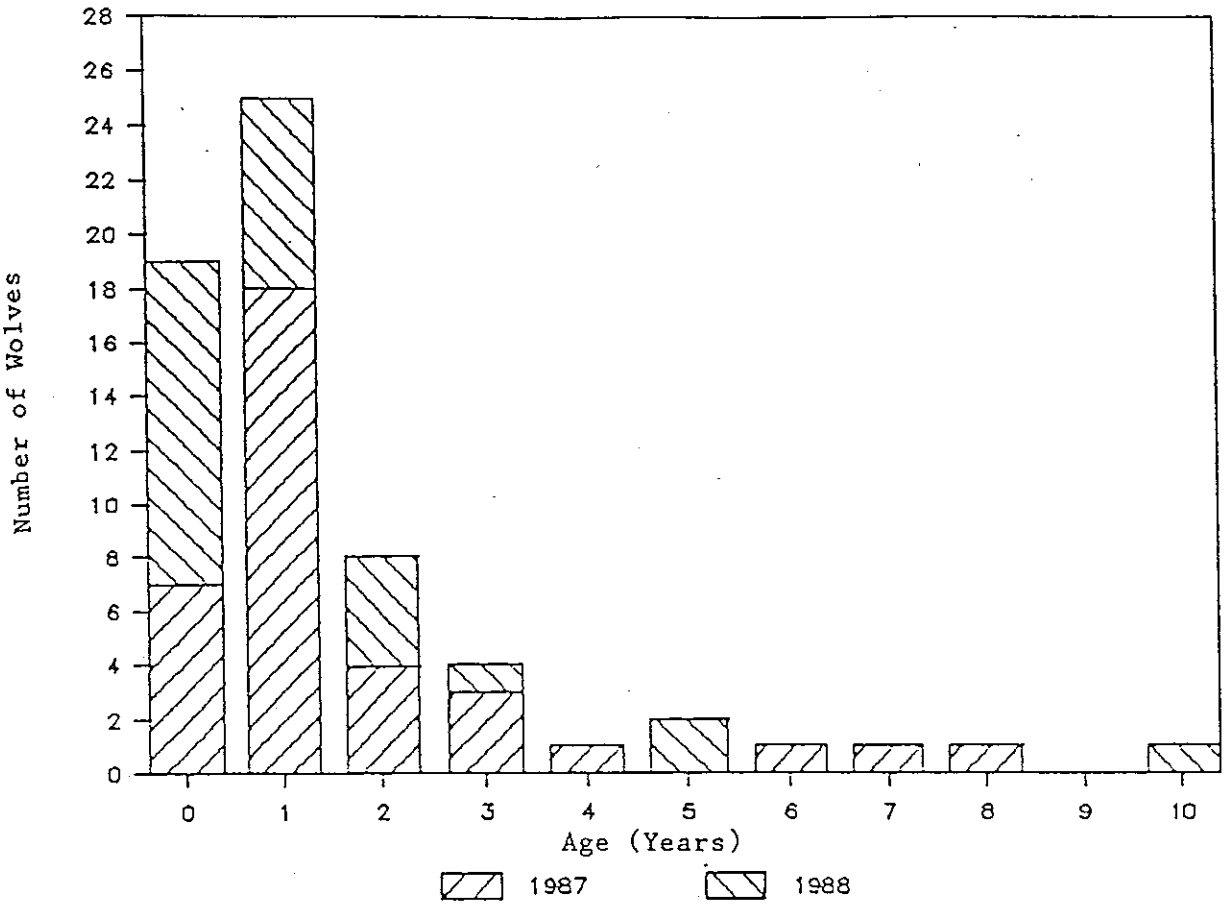


Figure 3. Age of wolves captured in 1987 and 1988.

4.2 Collared Wolves And Pack Status

Monitoring the radio-collared wolves and their associated pack members has provided good data on wolf pack dynamics. Throughout the year wolf packs increase in size with new pups, experience natural and man caused mortality and may split into separate packs. By monitoring approximately 15 packs we have been able to determine the movement strategies different packs used to gain access to their prey. Pack sex and age structure are also important aspects of the overall wolf ecology in an area. During capture work in April 1988 we were able to capture some entire packs to determine the pack sex and age composition. In general a pack captured in April consisted of a reproductive pair (2-5 years old) one to two yearlings, one to two pups, and sometimes an older adult female.

For a more detailed review each wolf pack or collared wolf is discussed separately. Collared wolves are identified, by " W1 - W66". Female wolves are identified by "*" (eg. W3*). Wolf packs are given a name based on some geographical location that describes the packs den location, capture location or center of activity. Capture locations and movement information for the following packs are discussed in other parts of this report.

Williams Lake Pack

W3* was estimated to be a yearling when captured and would be 3 years old this year and is the dominant female of the pack. She did not have pups as a two year old, but did have pups as a three year old (1988). In 1988, W3* was seen with one other adult and 5 pups (19 September 1988). In February 1987, W3* was observed with 3 other wolves. Over the past year the Williams Lake pack has centered its activity around the Miner River. This pack relies on caribou and moose for larger prey species.

Sitidgi Lake Pack

W4 was aged (cementum) as a yearling and is now 3 years old (1988) and is likely the dominant male of the pack. In September 1988, W4 was seen with 2 other adults and 3 pups. In February 1989 the Sitidgi Lake Pack had 5 wolves. Throughout the year this pack uses the area north of Sitidgi Lake and southeast of Husky Lakes. This pack would have access to both caribou and moose. In March 1989, W4 was taken by a Tuktoyaktuk hunter.

Wolverine Pack

W14* was initially collared as a 3 year old (1987) and is now 5 years old (1989) and is likely the dominant female of the pack. W15* was collared as a pup (1987) and is now 2 years old (1988). W14* and W15* have remained together over the past year and have been in a pack of 3 - 5 wolves. W16 a 2 year old (1988) has dispersed from the pack and has not been located with the pack since March 1988. W40 a 3 year old (1988) was initially collared with W17 (2 year old), W41* (3 year old) and W42* (5 year old), however, the Lucifer pack (5 wolves) was killed on Tadenet Lake on 16 April 1988. W40 had separated from the pack 2 days before the pack was killed. The Wolverine pack was in the same area at the time and W40 was later found with the Wolverine pack (24 May 1988).

This pack produced pups in 1987, but has not been seen with pups in 1988. In September 1988, the Wolverine pack had 5 wolves and this was reduced to 4 by February 1989. W14*'s collar was located east of Crossley Lake, but there was no sign of any wolves in this area. Until the site can be visited with a helicopter we will not know if the collar has slipped or if W14* has died.

The Wolverine pack uses the area around Crossley Lakes for most of the year and has had dens in the area, however, the pack has also travelled east close to Tadenet Lake in March and April 1988.

Anderson River Pack

W18* was estimated to be 2 years old at capture (1987) and 4 years old now (1988) and is the dominant female of the pack. W19 was estimated to be 3 years old when captured (1987) and 5 years old now (1988). In February 1988 the Anderson River pack had 5 wolves, but between 8 February 1988 and 12 March 1988, W17 had separated and was with other uncollared wolves which were then called the Lucifer pack. In April 1988 the 2 uncollared wolves with the pack were captured (W65 and W66). Both were yearling females.

The Anderson River pack produced pups in 1987 as 2 pups were seen on 22 June 1987 with W18* at the den site. The pups did not appear to have survived the winter. In 1988 this pack produced 7 pups. By 18 November 1988 the pack was still 10 members, possibly 4 adults and 6 pups. This pack has concentrated most of its activity along the Anderson River southwest of Tadenet Lake. Caribou and moose are the large prey species available to this pack.

Lucifer Pack

W17 was a yearling when captured in 1987 and separated from the Anderson River Pack between 8 February 1988 and 12 March 1988 and joined 5 other wolves, 3 of these wolves W40 (2 years old), W41* (3 years old), W42* (5 years old) were captured and ear-tagged. W40 and W42* were also radio-collared. Two other untagged and uncollared wolves with this pack were a yearling male and a female pup. W40 separated from the pack on 14 April 1988 and was located alone several times before being located with the Wolverine pack on 24 May 1988. On 16 April 1988 the remainder of the Lucifer pack was killed on Tadenet Lake by Paulatuk hunters. We were in the field at the time and were able to collect samples from all of the wolves killed. During necropsies of the Lucifer pack members it was discovered that both adult females W41* and W42* were pregnant

with 5 fetuses each.

Ridge Pack

W26* (5 years old), W27* (2 years old), W28* (2 years old), W32 (4 years old) and W50 (yearling), W51 (2 years old) and 2 other wolves not captured comprised the Ridge Pack in April and May 1988. The 5 collared wolves remained together during the spring and summer. In October 1988, W28* and 3 other adults separated from the pack and became the Eskers pack. The Ridge Pack in October and November had 9 wolves. On 15 February 1989 the pack had 7 wolves. W26* was found dead east of the Anderson River on 15 February 1989. The Ridge Pack produced 4 pups in 1987 and 1988. This pack used the area east of Crossley Lake over to Tadenet Lake, but most of their activity was just east of the lower Anderson River, near the Anderson Forks.

Rendezvous Pack

W29* (4 year old) and W30 (3 year old) have used the area around Rendezvous Lake for the past 2 years. In 1987 the pack produced 5 pups, however by 8 February 1988 only the 2 collared wolves remained. Again in 1988 the pair produced 5 pups and 4 of them were still alive on 26 November 1988, however, only 1 uncollared wolf remained with W29* and W30 on 10 February 1988 and no other wolves were seen with this pair on 29 March 1989.

Horton River Pack

W31* (3 year old) and W36 (3 year old) were with 6 other wolves in April 1988 when W59 (pup), W60* (yearling), W61 (unsexed pup) W62* (pup), W63 (pup) and W64 (yearling) were captured. W62 was shot at Tadenet Lake on 19 April 1988. During the predation rate study in April 1988, only 6 wolves were seen as part of the Horton River Pack. In the summer of 1987 the pack was seen with 5 pups of which at least 4 had survived until April 1988. In September 1988 the pack was seen with 7 pups for a total pack size of 12

wolves. In November the pack was down to 10 wolves and by 16 February 1988, 8 wolves. In the past year the Horton River Pack used an area that ranges from the Horton River to Sitidgi Lake.

Ewariege Lake Pack

W33 was a yearling male when captured in March 1987, was located with the Anderson pack in May 1987, but has remained alone for most of the monitoring period. In March 1988 he was located with one other uncollared wolf and in April 1988, W47, a yearling was captured with W33 and one other uncollared wolf. W33 was shot by a Paulatuk hunter on 9 April 1988 at Tsoko Lake. W47 then joined the Melville Hills pack (13 April 1988) and travelled east with them to the Horton River then separated from them in May 1988 and joined the Erly Lake pack in the summer of 1988. The first confirmed telemetry location and visual of W47 with the Erly Lake pack occurred on 19 August 1988.

Melville Hills Pack

W39 was captured in 1987 and was with 7 other light grey wolves in April 1988. W46 (a male pup) was captured with the pack and collared in April 1988. The pack split briefly in mid-April 1988, but then came back together in late April 1988. The pack again split in May 1988. W39 and W46 and other uncollared wolves denned along the Horton River and produced 5 pups. By 24 November 1988, 7 wolves remained with the pack. W47 left the pack in late May 1988 and travelled to the Hornaday River to join W56, a 2 year old male and other adult wolves which became the Erly Lake pack.

Hars Pack

W38* was captured as a yearling in 1987, is now 3 years old and is likely the dominant female in the pack. W45 was captured as a 2 year old, is now 4 years old and is likely the dominant male in the pack. This year the pack denned on the Horton River and has travelled as far west as the Miner River (13 February 1989). W38*

and W31* denned in close proximity in 1987 and both were seen with pups in separate areas on 20 September 1987. In April and May 1988, W38*, W45 and 2 other wolves were the Hars pack. On 22 September 1988, the pack was seen with 5 pups and 4 adults. Nine wolves were still with the pack on 3 November 1988. In February 1989, 5 wolves were seen in the pack. W38*'s collar has failed, but she is still with the pack.

Andrew River Pack

W34* a yearling when captured in 1987 was 3 years old when taken by a Tuktoyaktuk hunter in 1988. W49* was a yearling when captured with W34* in April 1988 and now is 2 years old. W49* was located alone all summer and fall of 1988. On 10 February 1989, W49* was seen with 5 other wolves.

Tadenet Lake Pack

W25* was captured as a pup in 1987 and is now 2 years old. W43* was captured as a pup in April 1988 with W25* and one other uncollared wolf. Both wolves were seen together until mid April 1988 when they separated. W25* was located alone most of 1988, but was seen with 4 other wolves on 15 February 1989. W43* has not been observed with other wolves since she left the Tadenet pack.

Sundog Pack

W44 was captured as a pup in April 1988. W14* and W15* were in the same area as W44, but it is not known if they were part of the same pack. W44 thereafter was never located with the Wolverine pack. For most of 1988, W44 was located alone, however on 24 November 1988 he was seen with one other wolf. On 3 March 1989, W44 was located alone.

Erly Lake Pack

W56 was captured alone as a 2 year old male in April 1988. W47 was captured as a yearling in April 1988 with the Melville Hills pack, but left the pack after 22 May 1988 and joined W56 and other pack members on the Hornaday River. The pack had a den on the Hornaday River and 3 pups were seen at the den on 20 July 1988 (Obst pers. comm. 1988). W47 and W56 were not located together in the fall and winter of 1988. Both W47 and W56 were taken by hunters near Fort Good Hope in January 1989.

Iroquois Pack

W52 was captured as a 2 year old in April 1988. On 12 April 1988, W52 was seen with 2 other wolves, but since then has been located alone. W52 was still alone on 3 March 1989.

Eskers Pack

W28* was captured as a pup in 1987 and was part of the Ridge pack until 26 October 1988 when she and 3 other adult wolves presumed to be from the Ridge pack separated from the pack. The Eskers pack was located 3 March 1989 and was still made up of 4 wolves.

W16

W16 was captured as a pup in 1987 with the Wolverine pack. As a yearling in the summer of 1987, W16 left the Wolverine pack and was not seen until 11 March 1988 when he was seen with 2 other unmarked wolves. A signal was located for W16 on 14 July 1988, but no wolf was seen and it is expected that the collar may have slipped or that W16 may have died. W16 has not been heard since July 1988.

4.3 Wolf Movements And Distribution

As discovered in 1987-88 there appear to be two strategies concerning wolf movement and distribution. Some wolves such as the Williams Lake, Sitidgi, and Rendezvous Lake packs use a relatively small area year round (Figures 4, 5, 11). Other wolves like the Horton River, Has, Wolverine River, Eskers, Melville Hills and Tadenet Lake packs use much larger areas and will travel from one area to another depending on the season and caribou distribution (Figures 6, 10, 12, 13, 14, 16). The limited movements of some packs and extensive travels of others results in a wide range of size in pack areas (Table 2).

For packs that were monitored in 1987-88 and 1988-89 a comparison of their areas was made by plotting 1987-88's area polygon on the 1988-89 maps. Some packs used similar areas in both years (Figures 5, 11, 12, 16). Other packs such as the Williams Lake and Anderson River packs used areas that were much smaller in 1988-89 (Figures 4 and 7). Several packs travelled further east and south of where they travelled in 1987-88 (Figures 12, 13, 14). The shift in wolf movements this year is probably a partial result of the caribou not going as far north as they did in the two previous winters. Also many caribou stayed farther east (west of the Anderson River) later than in the previous two years. In January, February and March 1988, several packs were along the Anderson River south of Rendezvous and Tadenet Lakes. This year we have not seen the congregation of packs in this area. Coincidentally this year the caribou did not come into the area until the first part of March 1988.

Daily Movements

During predation rate monitoring in April and October-November 1988, wolf pack daily movements were recorded. Wolves were located each day to determine if they had made a kill. The daily movements made by packs are being analyzed and will be available for the next progress report.

Table 2. Wolf Pack and Lone Wolf Areas Determined by Telemetry Locations, Western Arctic Wolf Research, 1988/89.

Wolf Pack or Lone Wolf	Collars/ Pack	Wolves/ Pack	Telemetry Locations	Areas (sq.km)
Williams Lake	1	1 - 5	9	667
Sitidgi Lake	1	2 - 5	8	942
Wolverine River	3	3 - 5	20	14,915
Anderson River	2	4 - 10	46	1,829
Ridge	5 -(4)	8 - 9	47	6,201
Esker	0 - 2	0 - 4	10	8,615
Rendezvous Lake	2 -(1)	2 - 6	52	2,043
Horton River	2	6 - 10	46	12,113
Hars	2 -(1)	4 - 9	37	13,858
Melville Hills	2	8 - 7	27	9,672
Erly Lake	2 -(1)	5 - 1	9	23,774
Tadenet Lake	1	2 - 1	12	21,669
Ewarige	2 -(0)	1 - 3	3	362
Sundog	1	1 - 2	6	9,401
Andrew River	1	2 - 1	18	1,765
Iroquois	1	3 - 1	9	11,977
Lucifer River	2	5 - 0	10	1,654
Smoke River	1	1 - 0	1	183
W24	1 (0)	10 - 1	6	2,524

( ) indicates collars remaining per pack as of March 1989 after pack split or collar malfunction or wolf mortality.
na - not applicable2

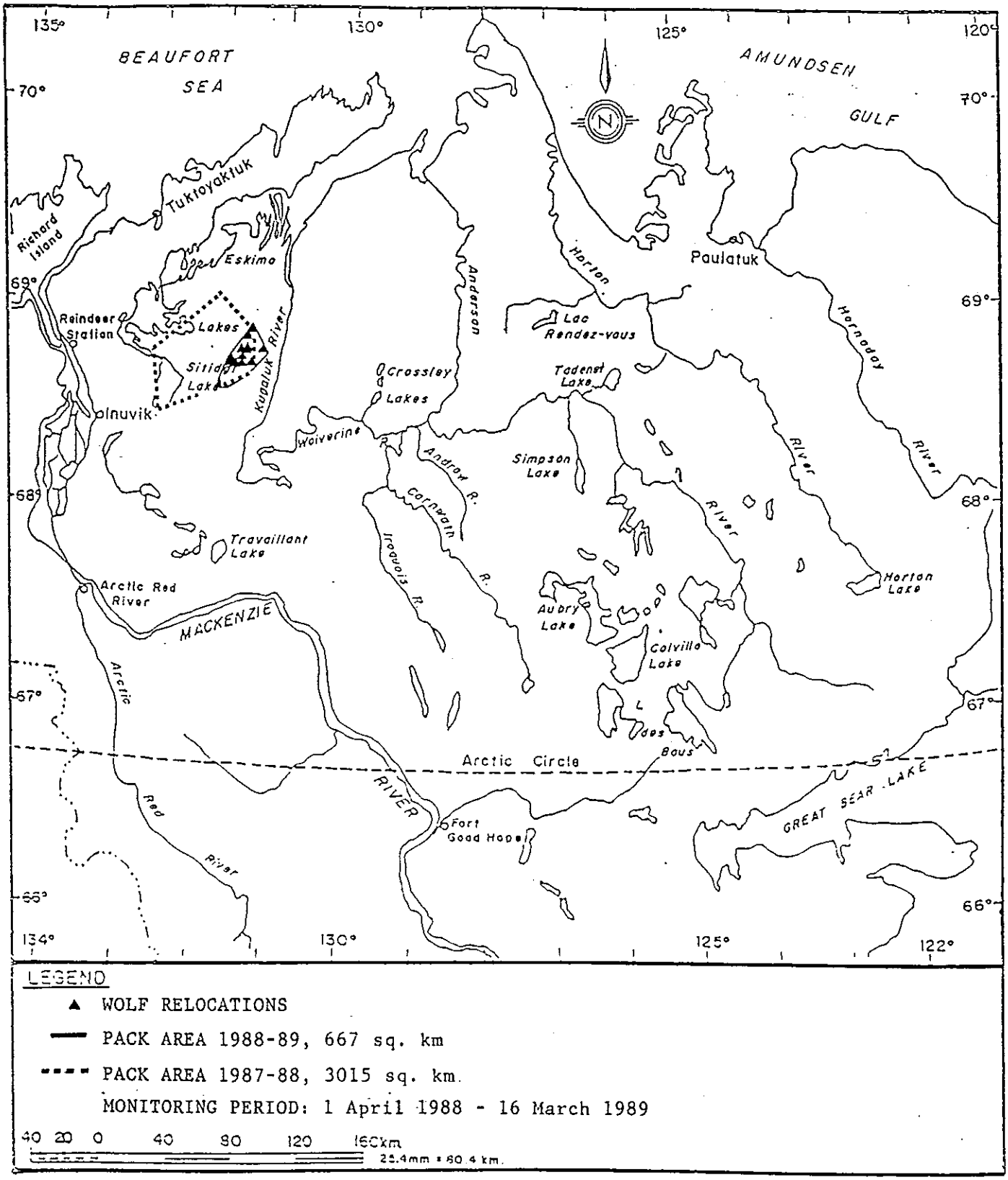


Figure 4. Telemetry locations and area for the Williams Lake pack, Western Arctic Wolf Research, 1988-89.

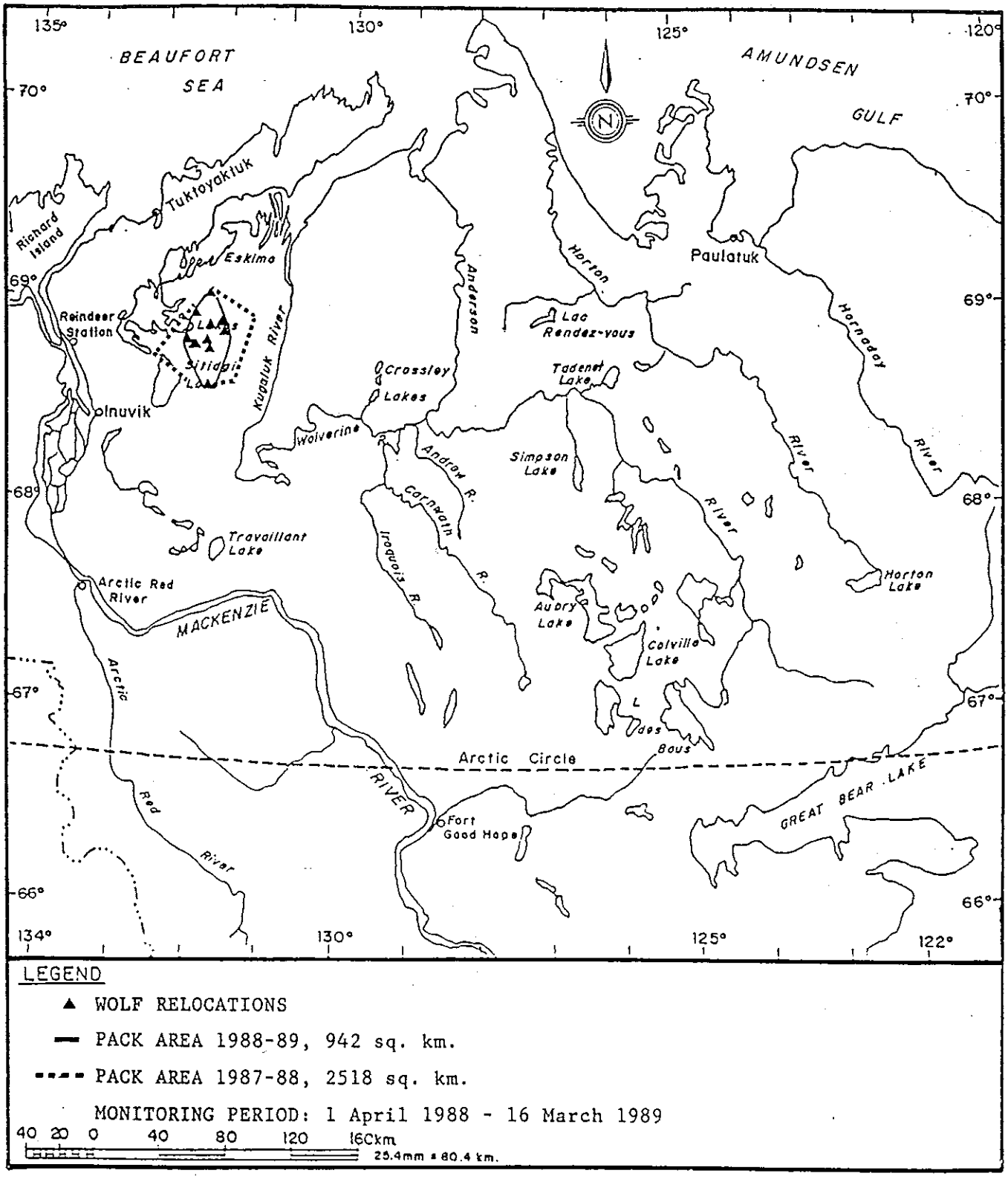
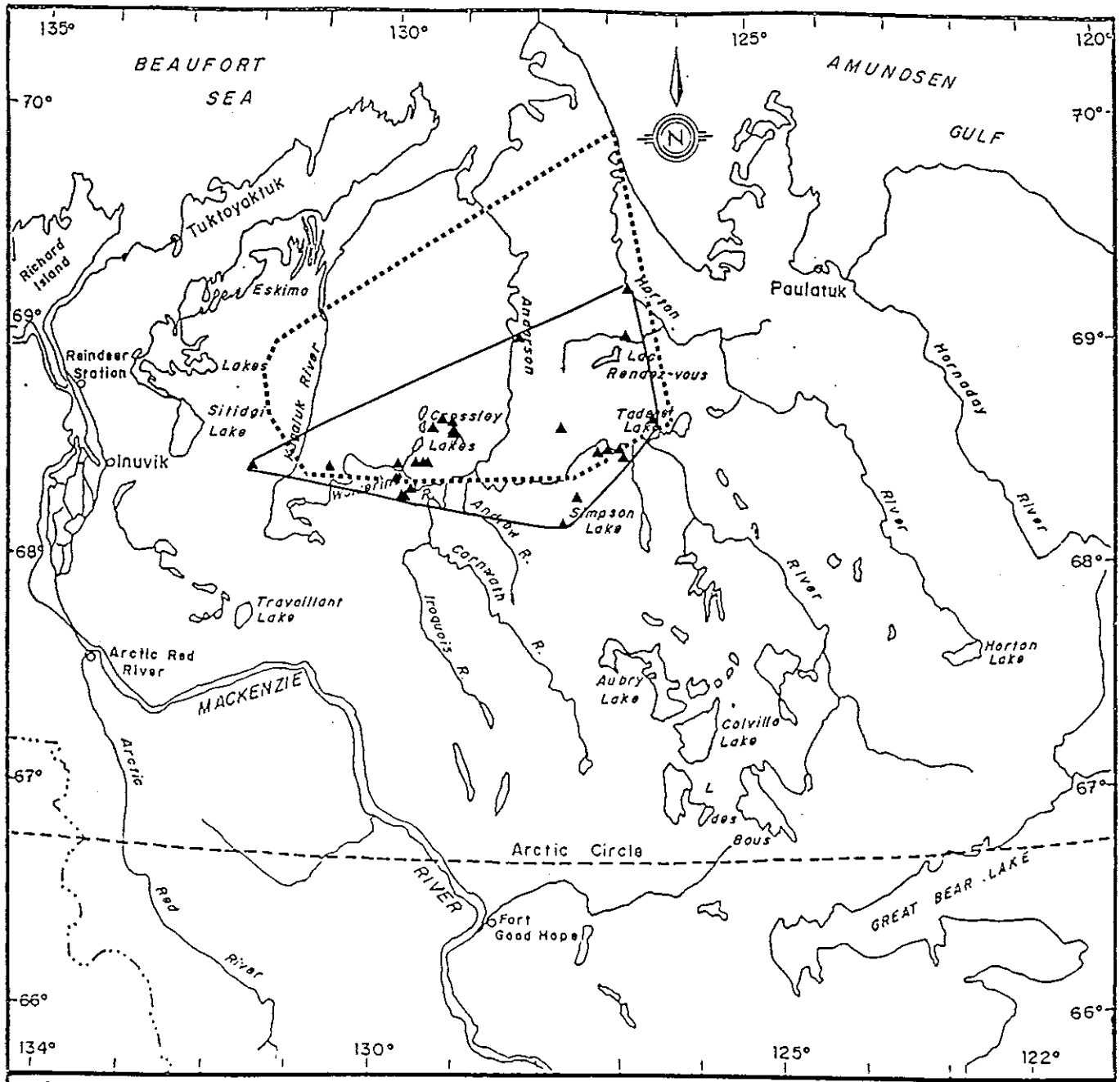


Figure 5. Telemetry locations and area for the Sitidgi Lake pack, Western Arctic Wolf Research, 1988-89.



LEGEND

▲ WOLF RELOCATIONS

PACK AREA 1988-89, 14,915 sq. km

PACK AREA 1987-88, 28,566 sq. km

MONITORING PERIOD: 1 April 1988 - 16 March 1989

40 20 0 40 80 120 160Km

25.4mm = 80.4 km.

Figure 6. Telemetry locations and area for the Wolverine River pack, Western Arctic Wolf Research, 1988-89.

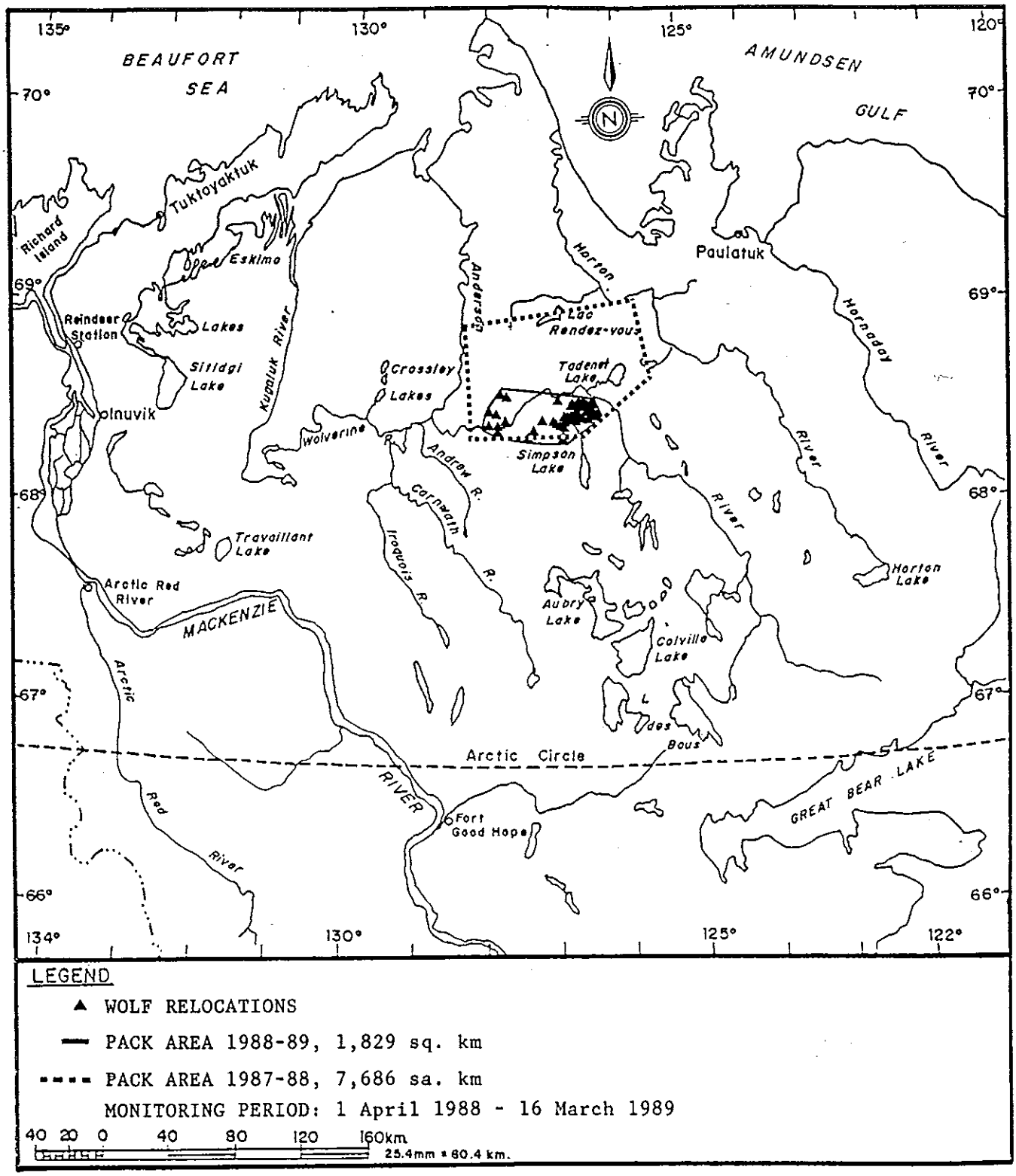


Figure 7. Telemetry locations and area for the Anderson River pack, Western Arctic Wolf Research, 1988-89.

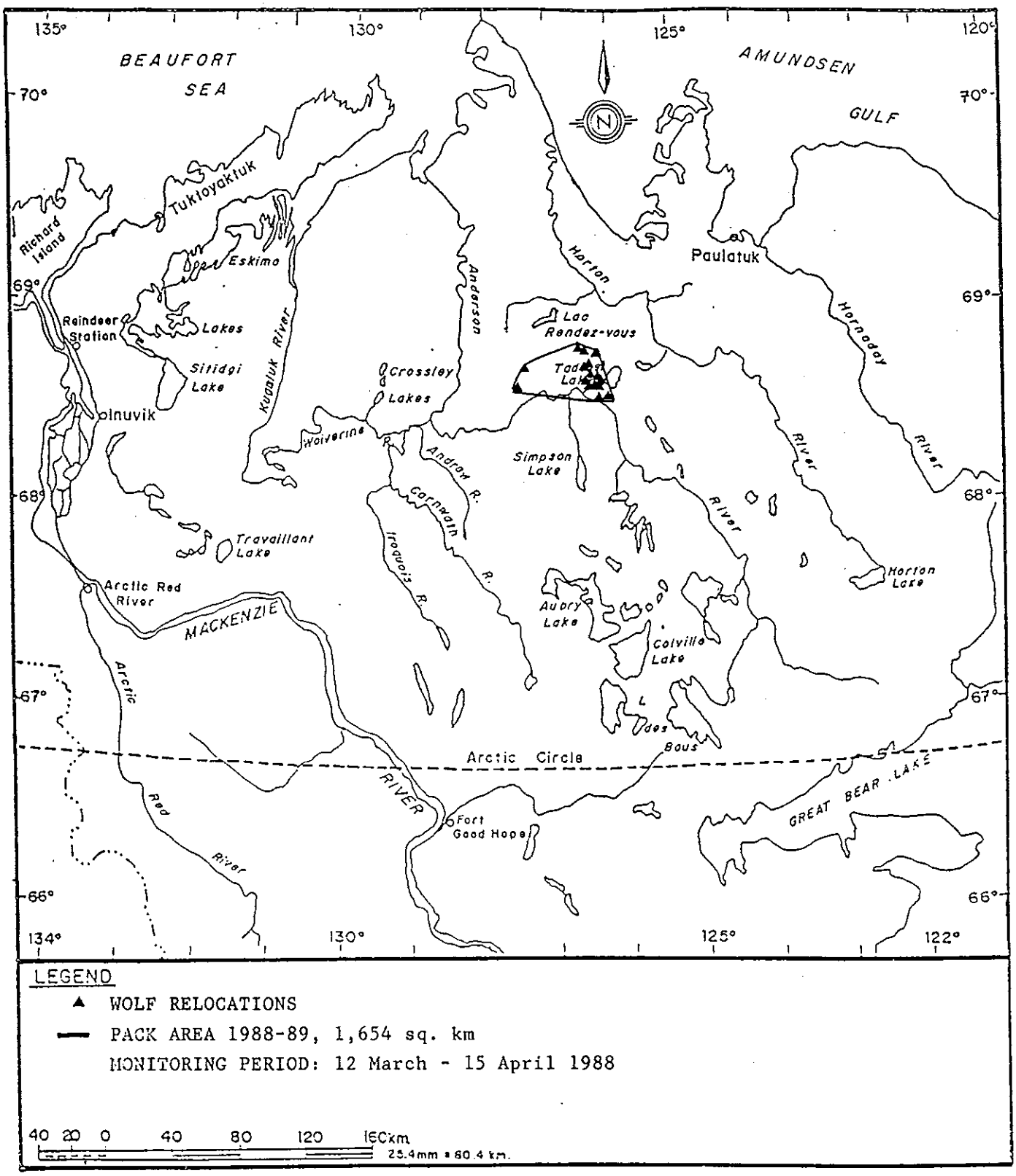


Figure 8. Telemetry locations and area for the Lucifer pack, Western Arctic Wolf Research, 1988-89.

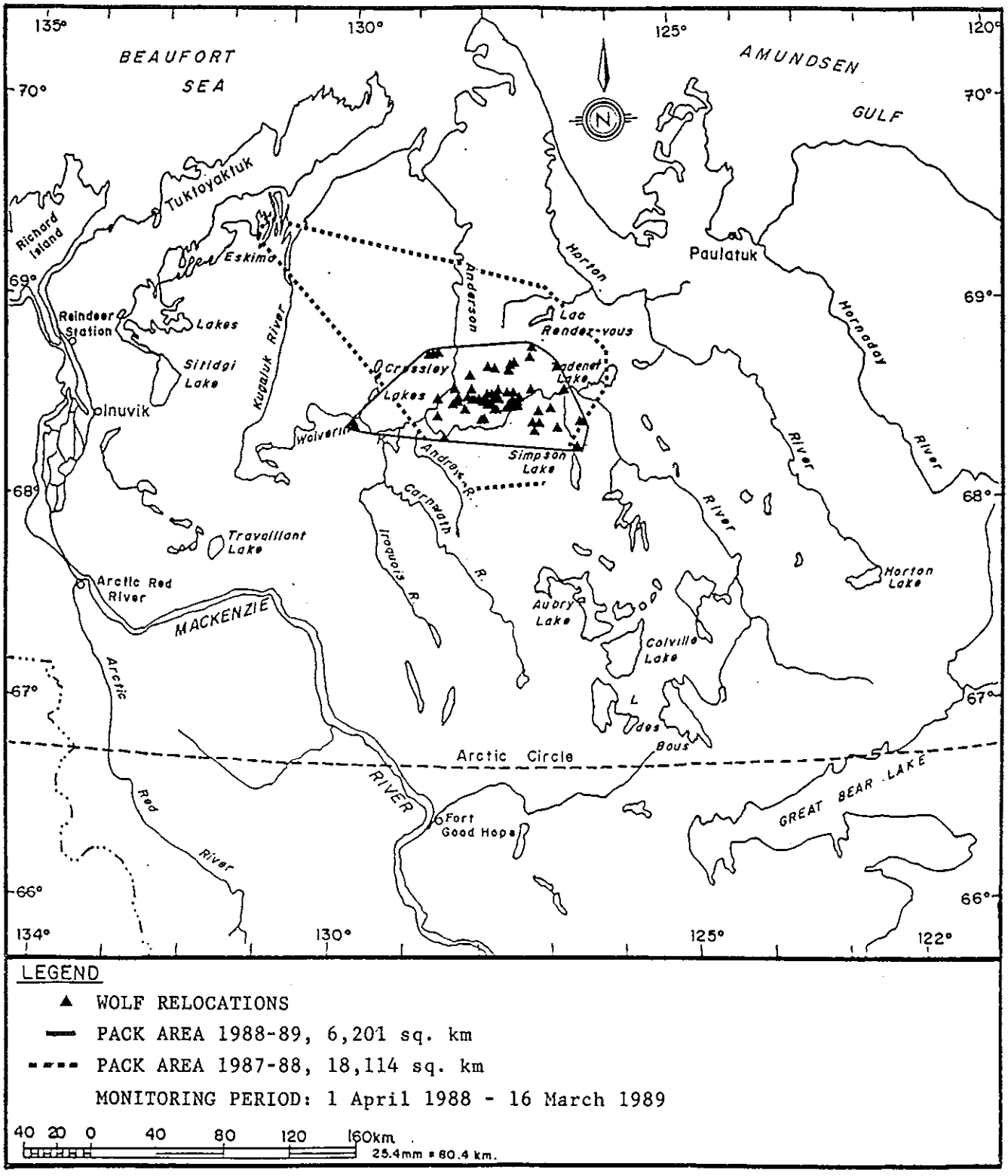


Figure 9. Telemetry locations and area for the Ridge pack, Western Arctic Wolf Research, 1988-89.

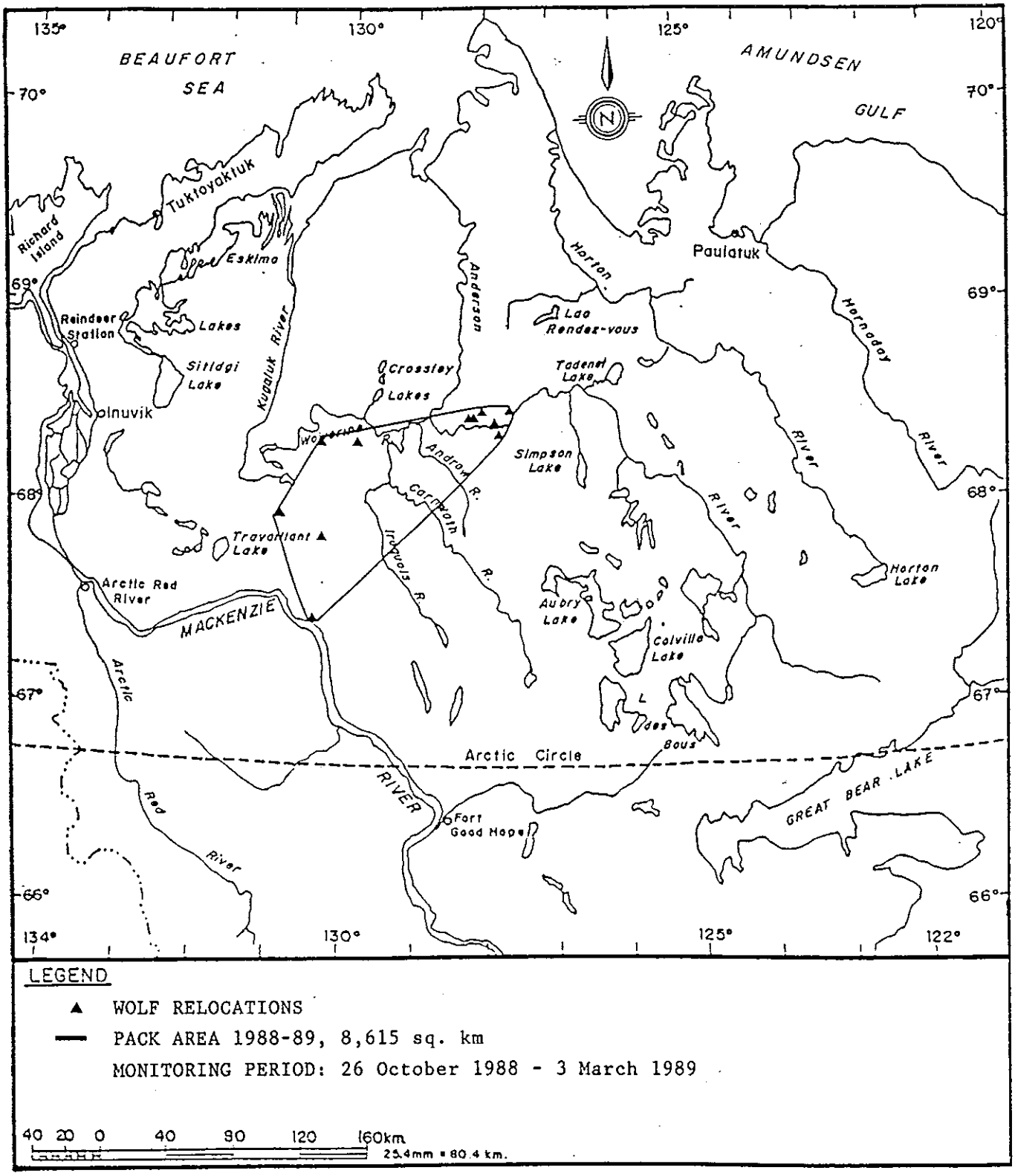


Figure 10. Telemetry locations and area for the Eskers pack, Western Arctic Wolf Research, 1988-89.

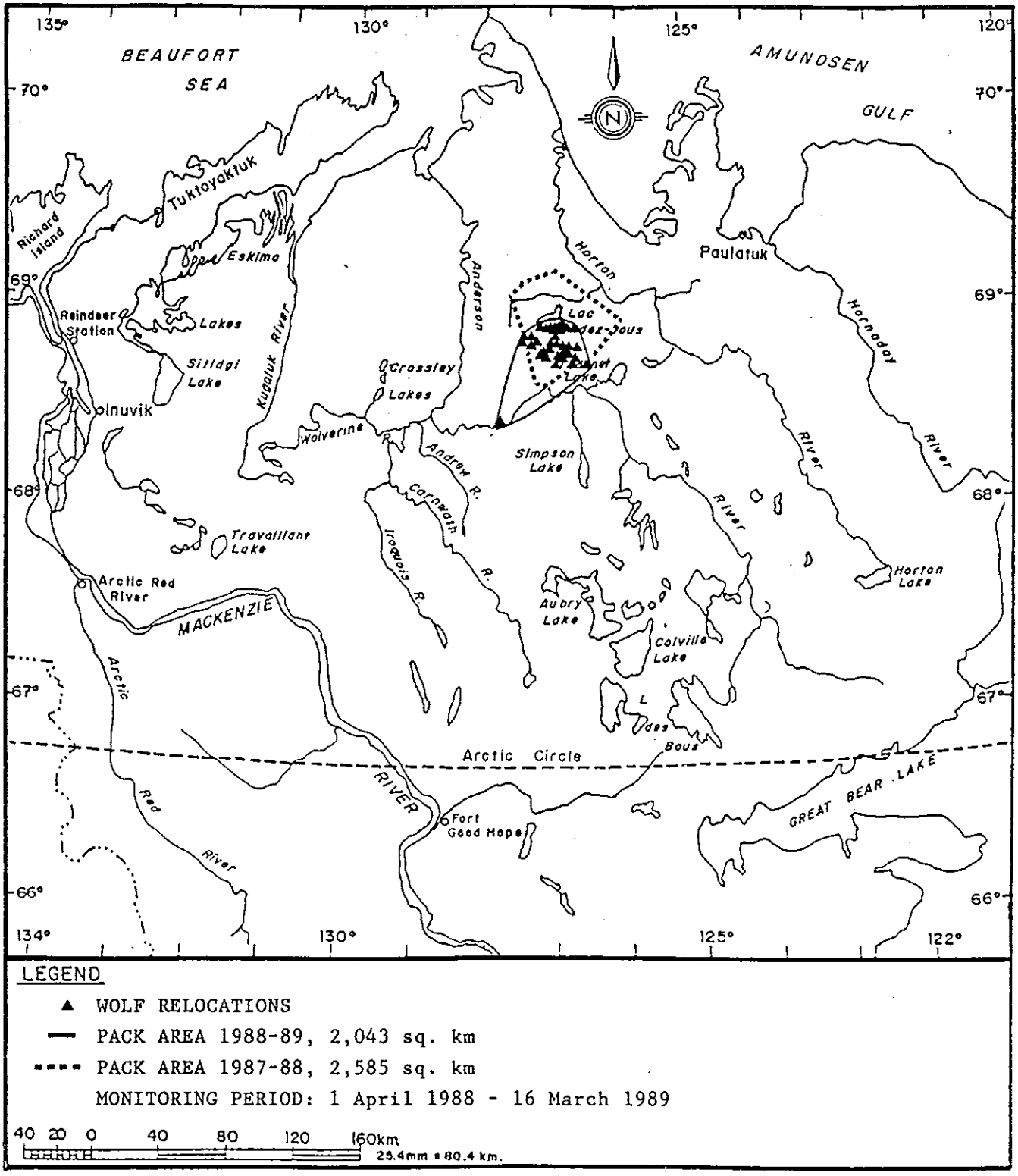


Figure 11. Telemetry locations and area for the Rendezvous Lake pack, Western Arctic Wolf Research, 1988-89.

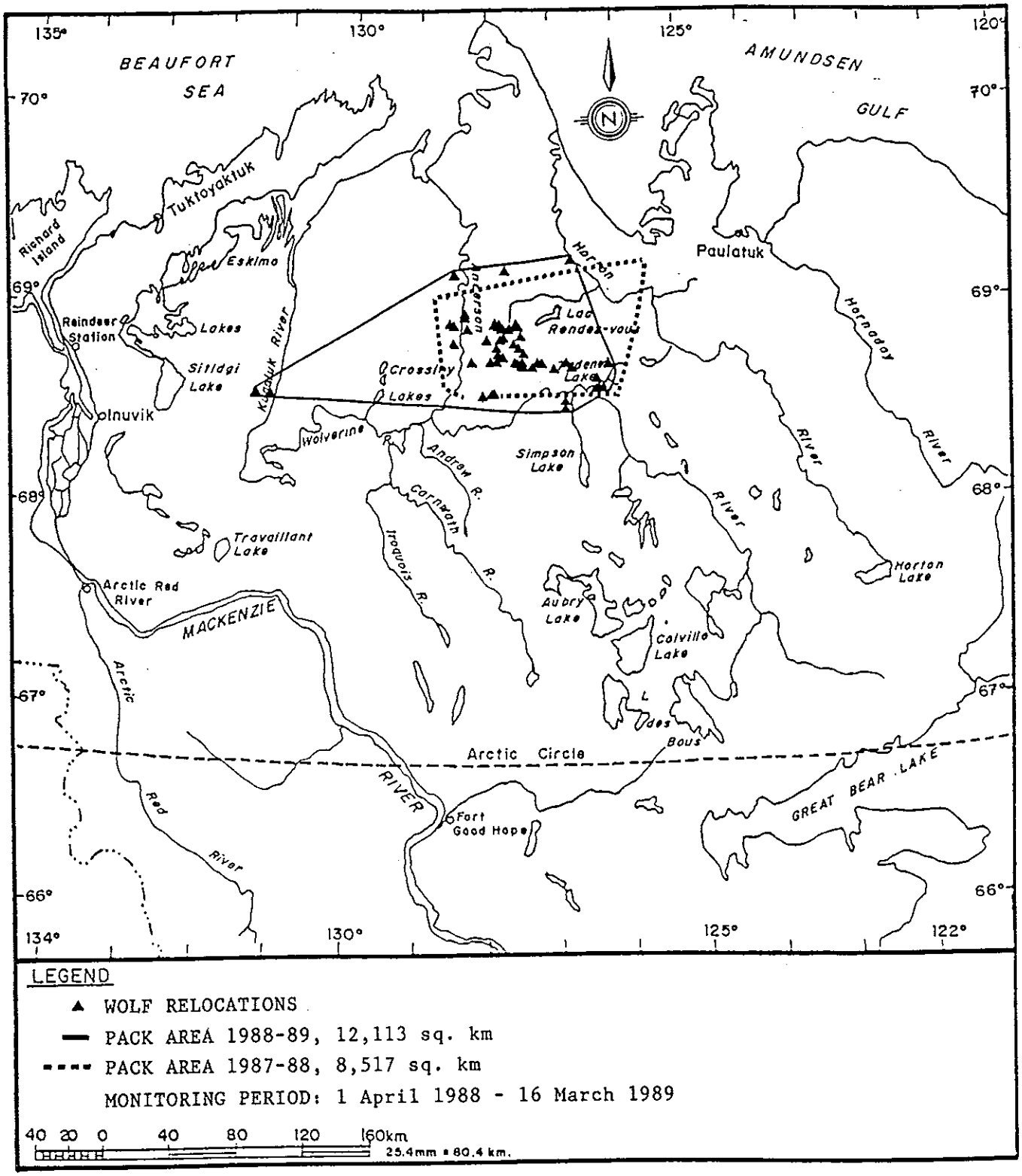


Figure 12. Telemetry locations and area for the Horton River pack, Western Arctic Wolf Research, 1988-89.

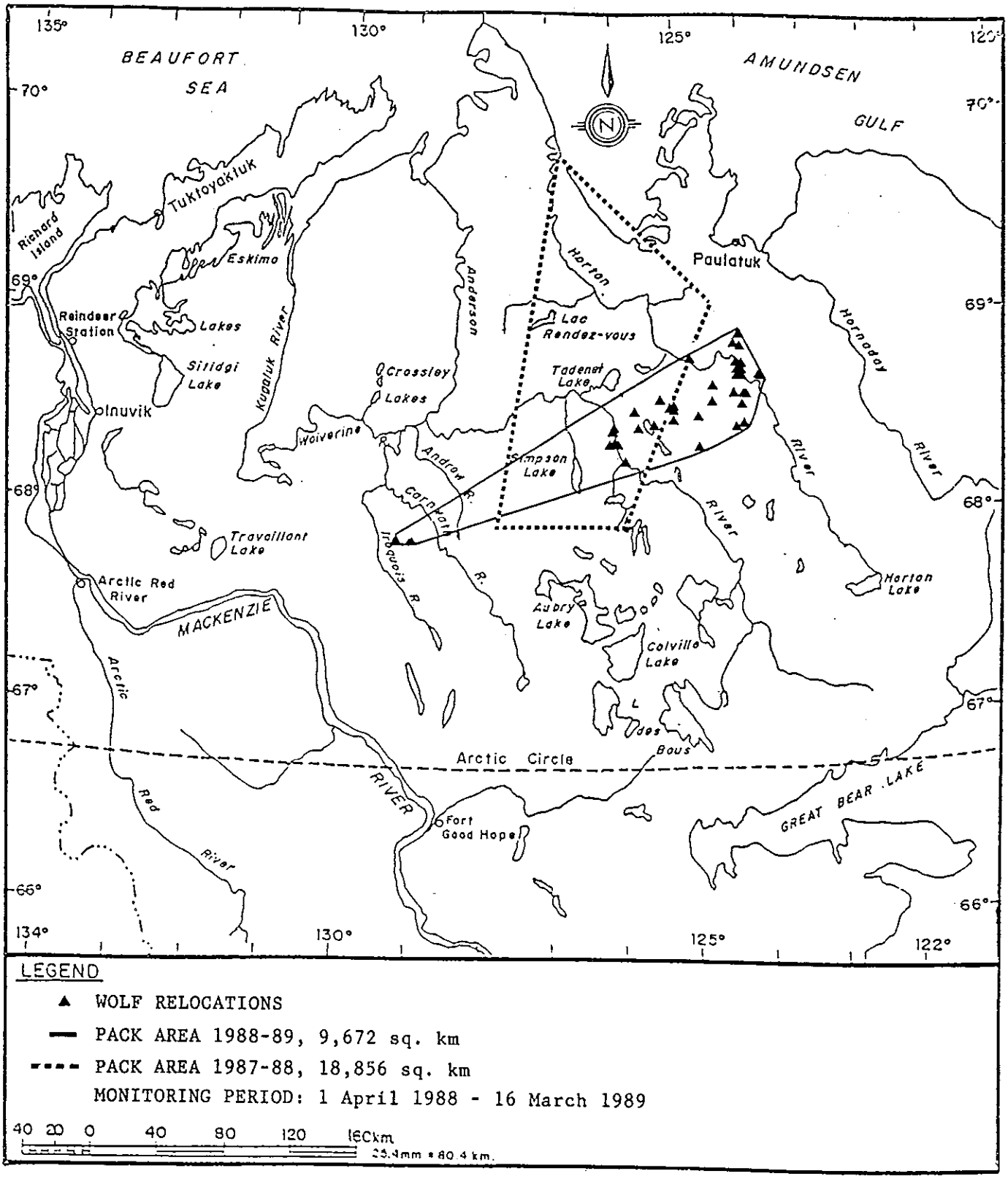


Figure 13. Telemetry locations and area for the Melville Hills pack, Western Arctic Wolf Research, 1988-89.

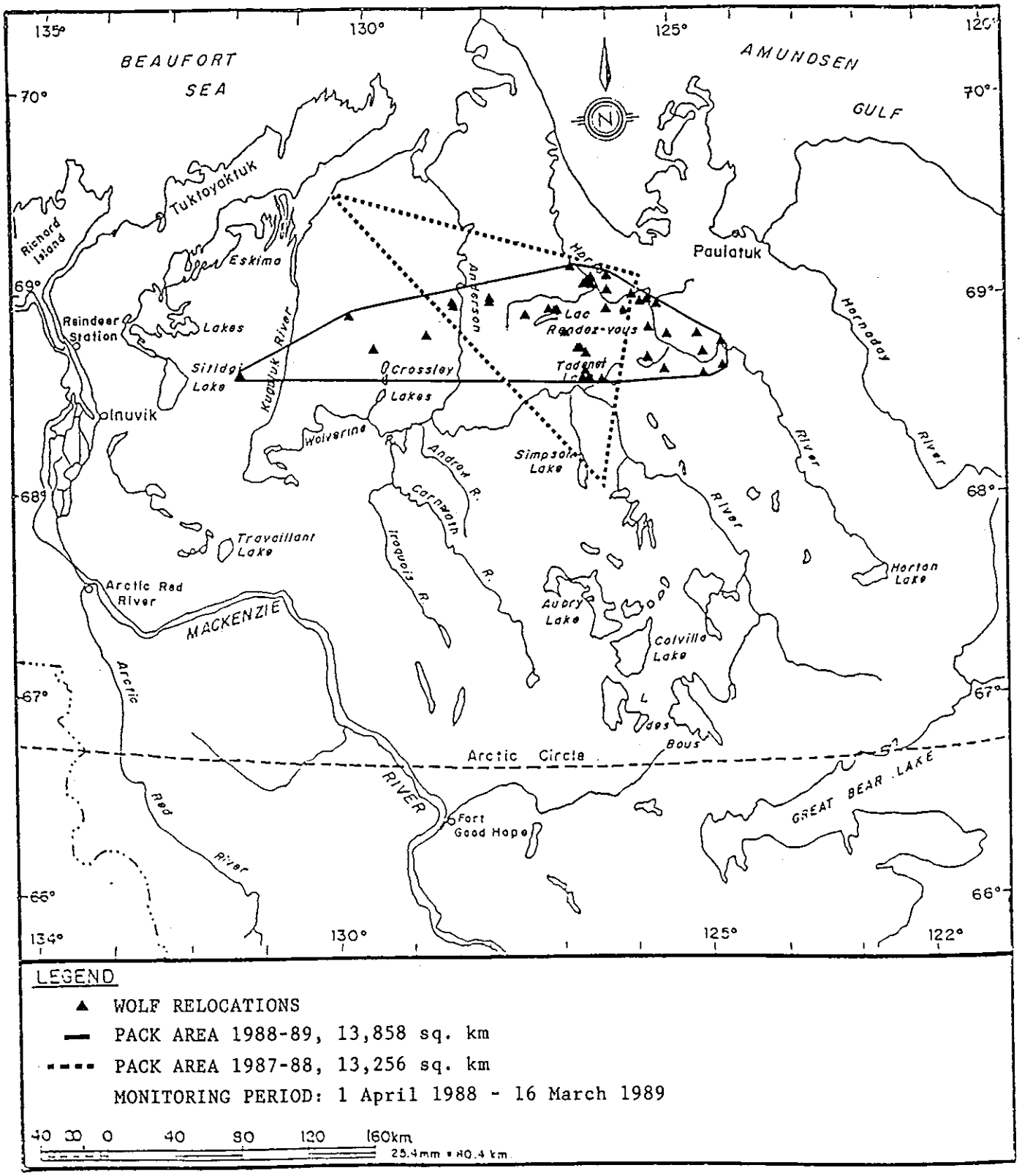


Figure 14. Telemetry locations and area for the Hars pack, Western Arctic Wolf Research, 1988-89.

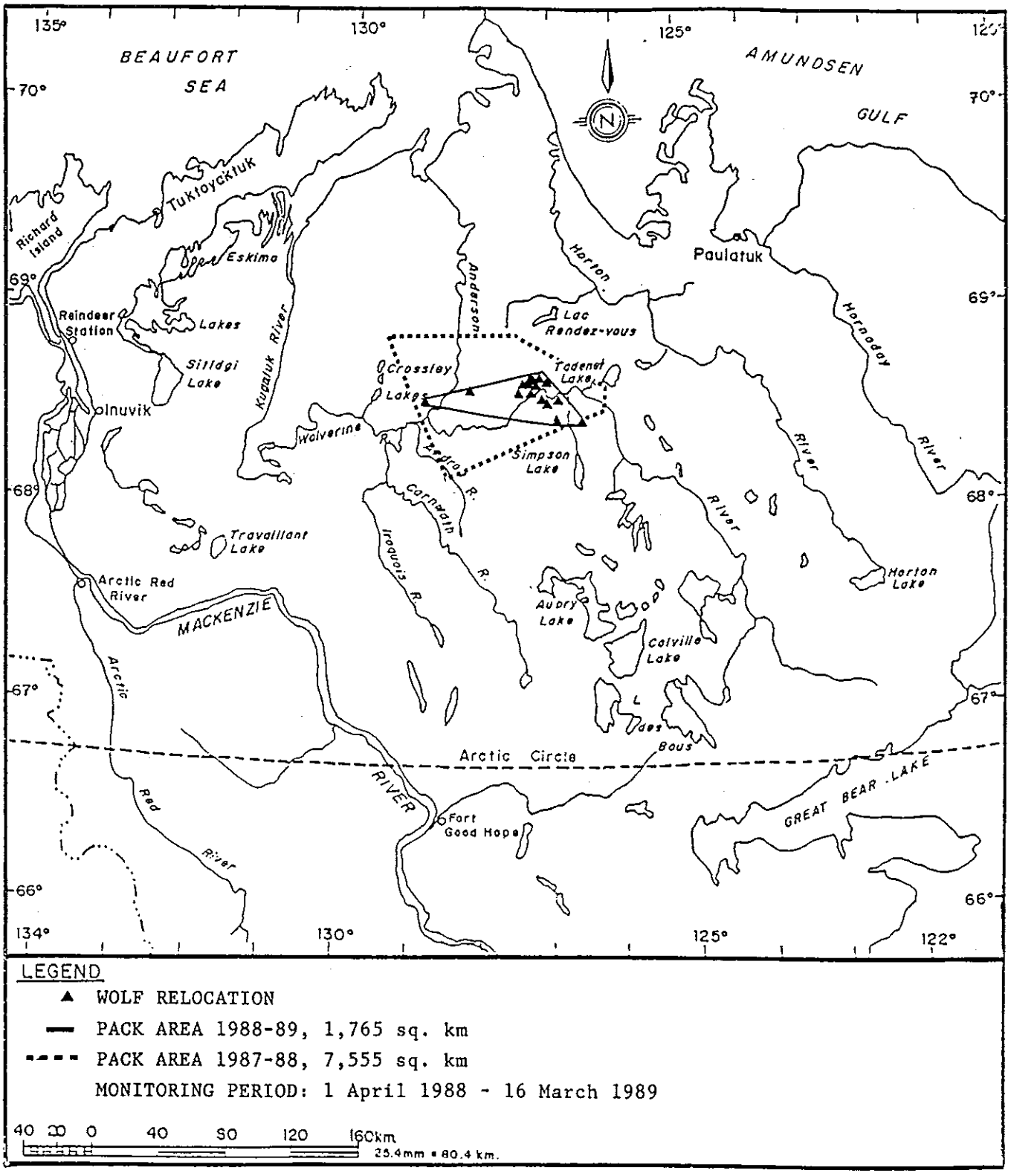


Figure 15. Telemetry locations and area for the Andrew River pack, Western Arctic Wolf Research, 1988-89.

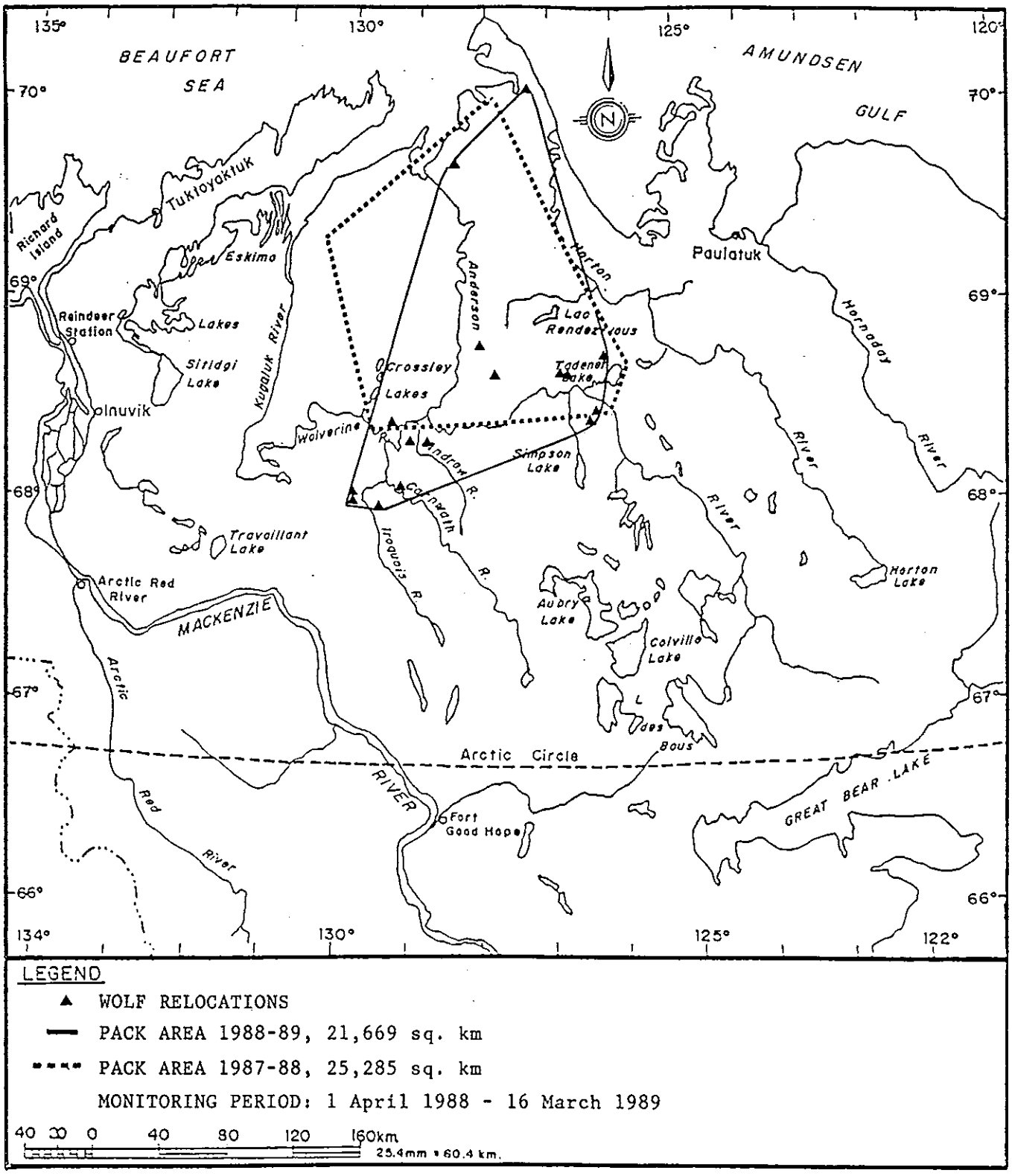


Figure 16. Telemetry locations and area for the Tadenet Lake pack, Western Arctic Wolf Research 1988-89.

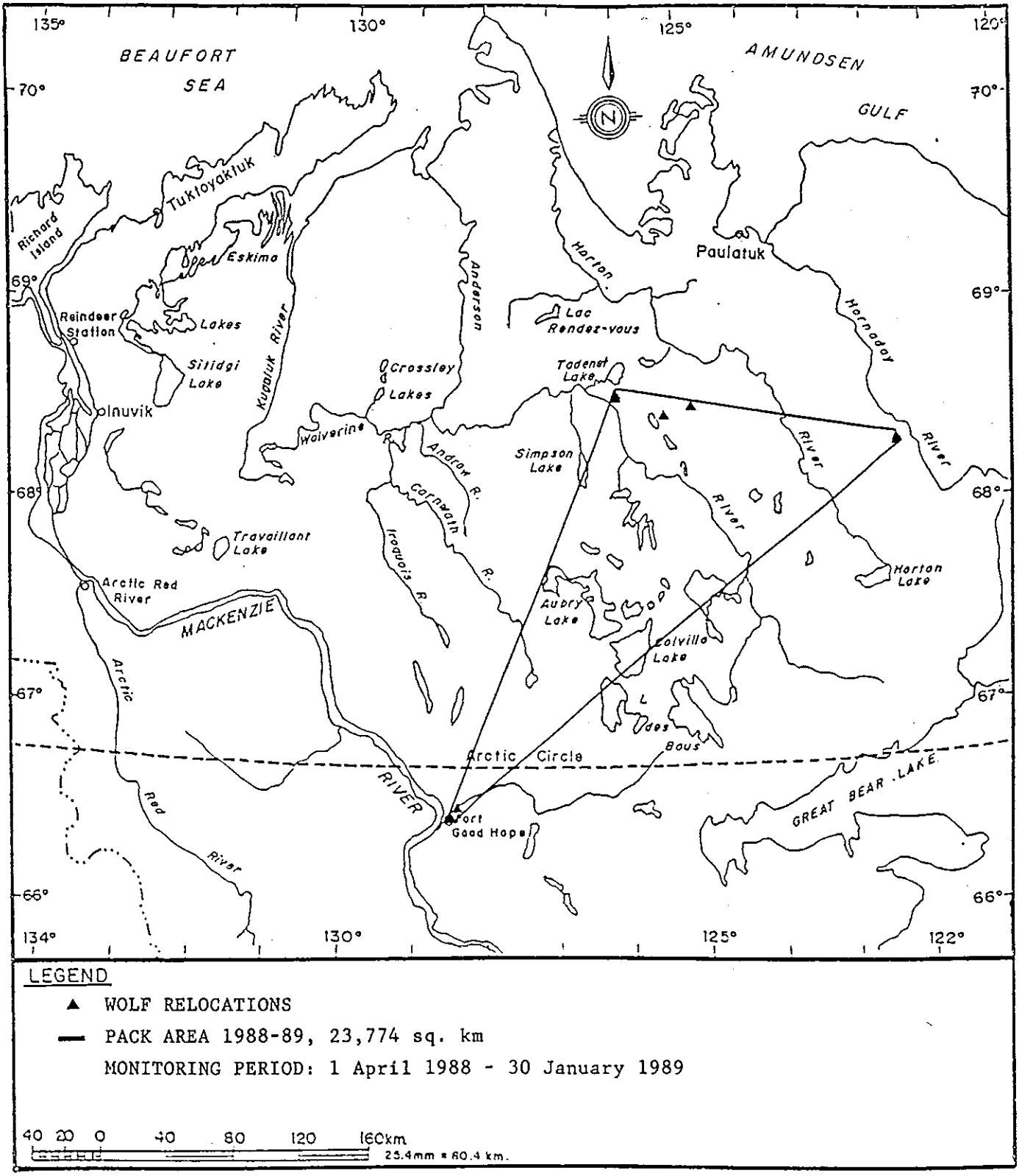


Figure 17. Telemetry locations and area for the Erly Lake pack, Western Arctic Wolf Research, 1988-89.

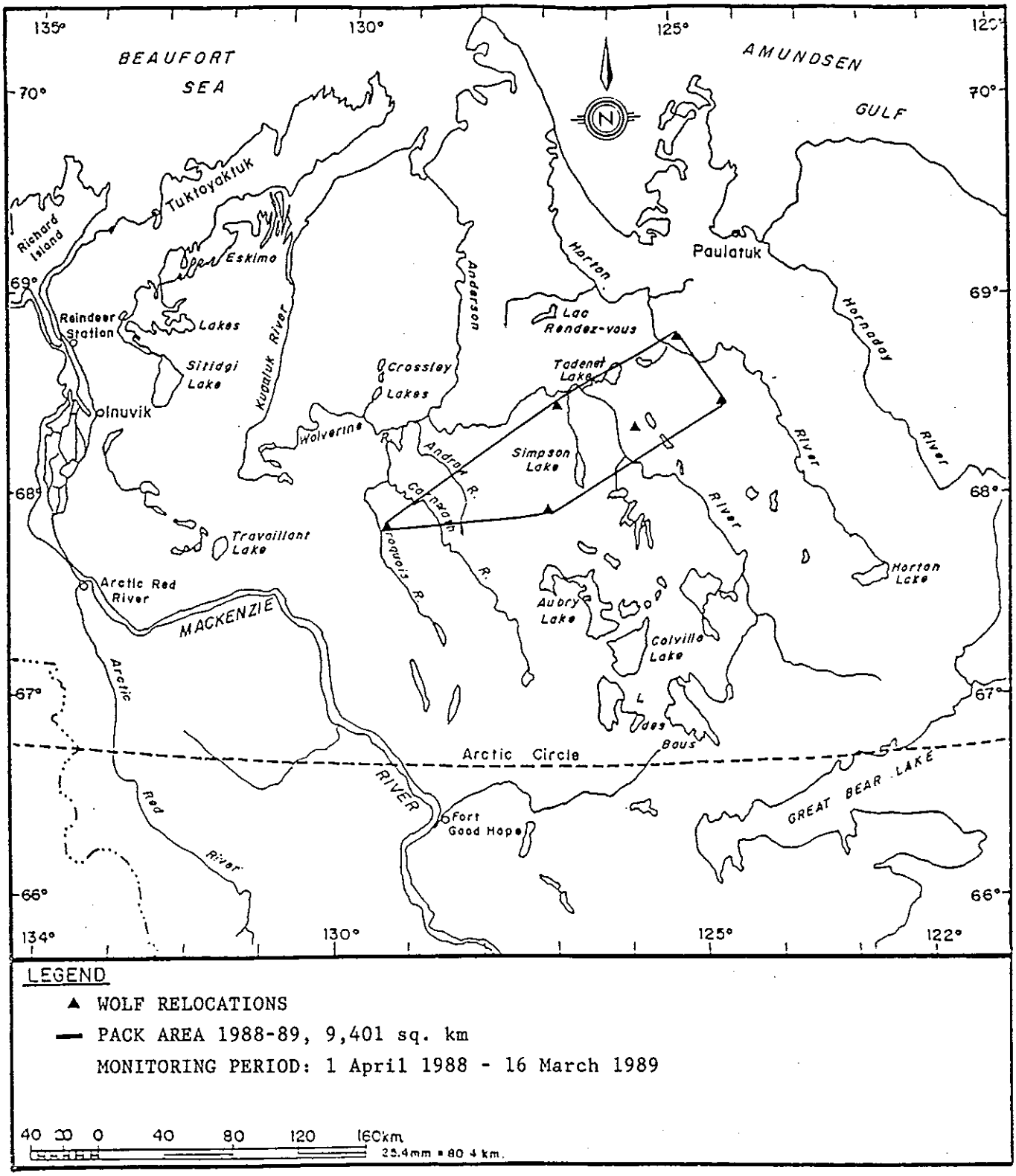


Figure 18. Telemetry locations and area for the Sundog pack, Western Arctic Wolf research, 1988-89.

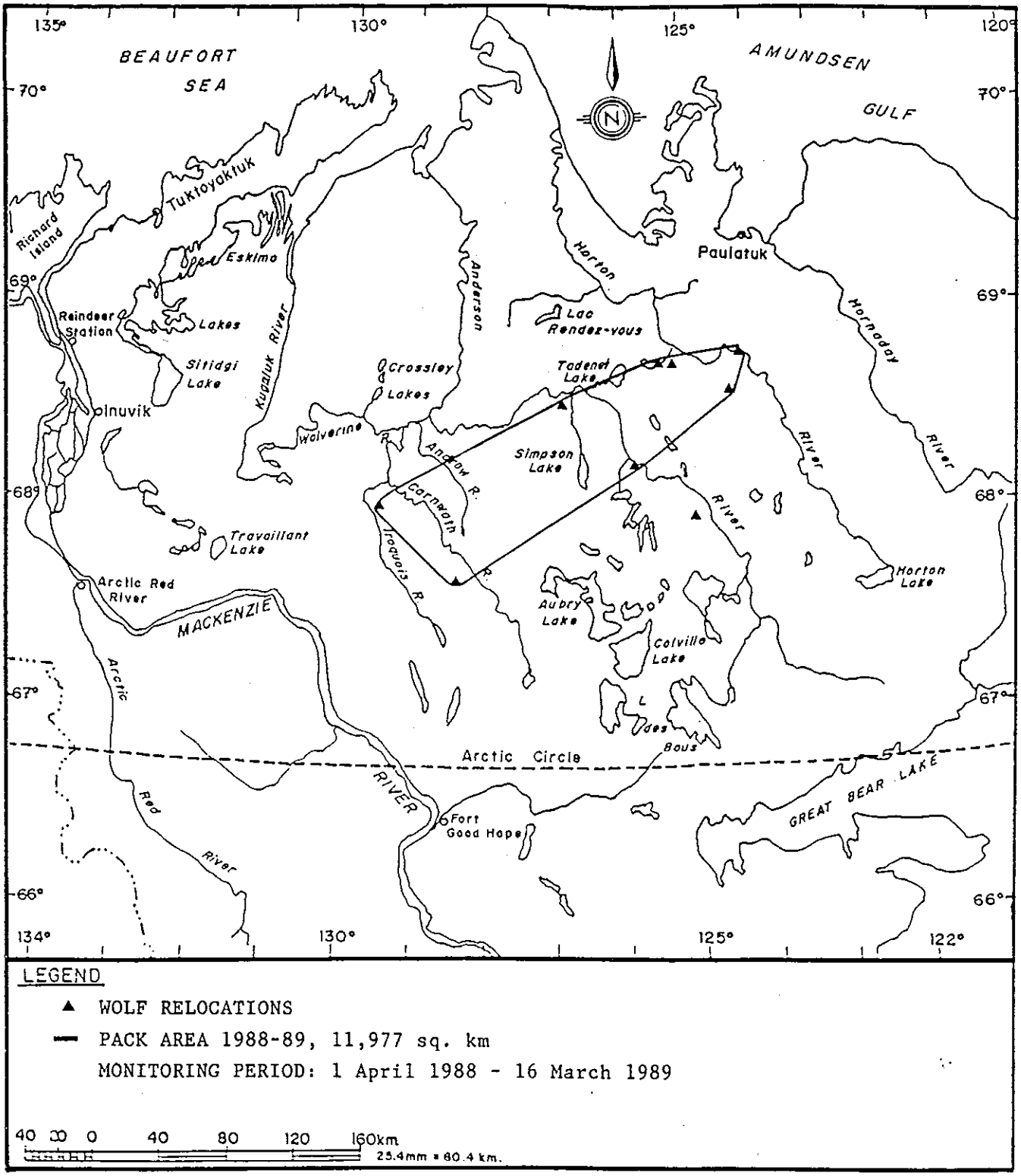


Figure 19. Telemetry locations and area for the Iroquois River pack, Western Arctic Wolf Research, 1988-89.

4.4 Reproduction

During capture work in April 1988, none of the 14 females immobilized showed signs of breeding condition. Some wolves were thought to be pregnant based on an external examination (McCleary pers. comm. 1988). The collared wolves were monitored during April and May 1988 and dens were found for most packs. Throughout the summer and fall monitoring flights, pup counts were attempted to determine the number of pups at each den and their survival rate as the fall and winter progressed (Table 3). After November it was difficult to distinguish between pups and adults.

Williams (1989) observed wolf pups at the Rendezvous Lake and Melville Hills pack dens and determined there were five and six pups respectively at each den. The Wolverine pack was expected to produce pups, however, pups were never seen at the den site or during later relocations. It is not known if the Wolverine Pack did not have pups or if they died or were killed while still in the den. W14* (5 yrs. old) was certainly old enough to have pups and had pups in 1987. This year appears to be a better year for pup production than 1987 as two packs (Ridge and Horton) had seven pups.

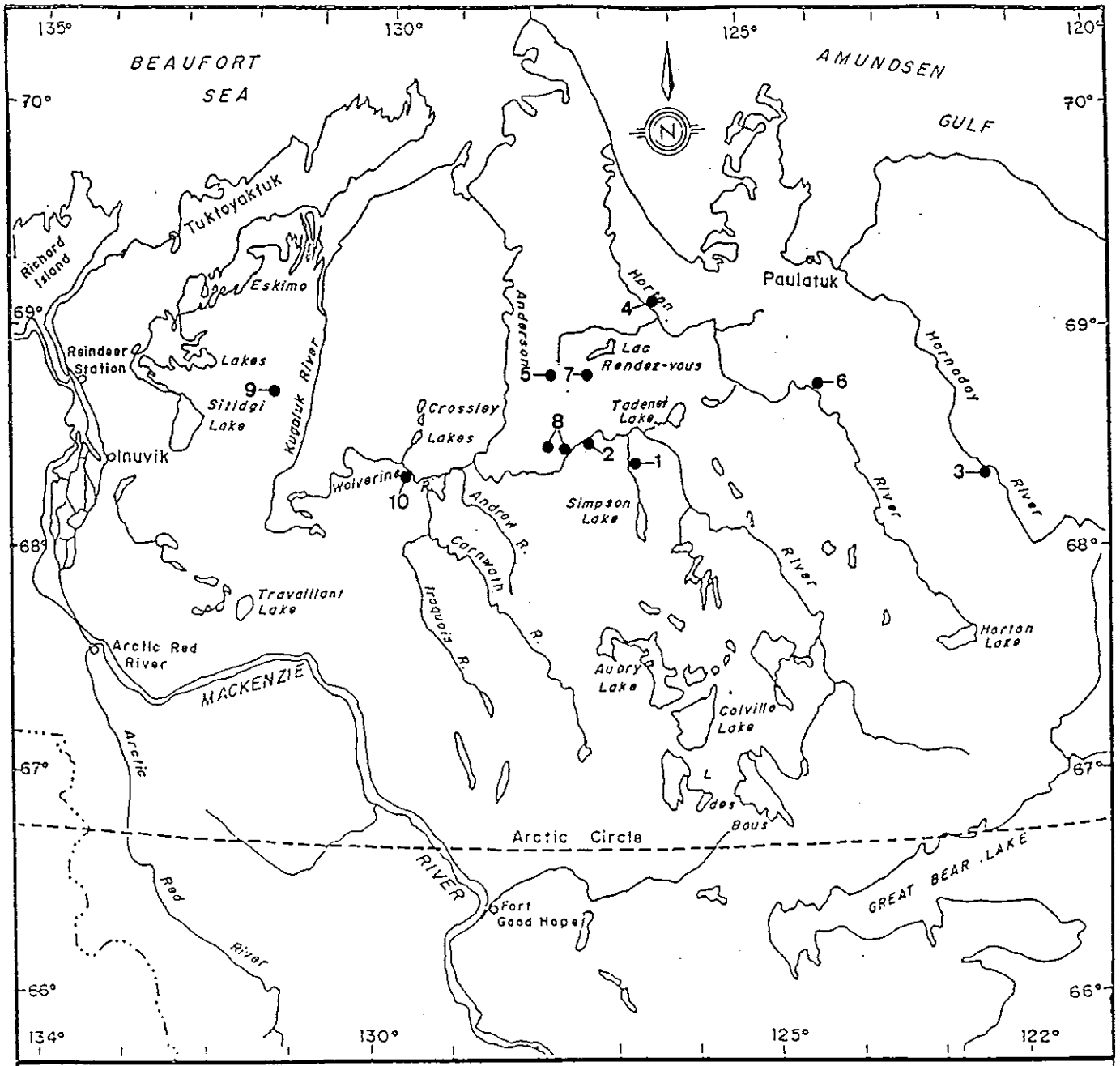
Table 3. Western Arctic Wolf Research Pups Produced per Wolf Pack.

Wolf	Pack Association	1987 Pups/Date	1988 Pups/Date
W3	Williams Lake	0	5 / 19-9-88
W4	Sitidgi	1 / 9-10-87	3 / 19-9-88
W14,W15	Wolverine	3 / 9-10-87	0 / 6 TO 11-88
W18,W19	Anderson River	2 / 6-87* 0 / 4-88	7 / 25-7-88
W25,W26,W27 W28, 50	Ridge	4 / 9-9-87	4 / 20-9-8
W29,W30	Rendezvous Lake	5 / 6-87* 2 / 28-12-87 0 / 4-88	5 / 6-88* 4 / 25-9-88 4 / 26-11-88 1 / 15-2-89
W31,W36	Horton River	5 / 20-9-87 5 / 14-10-87 5 / 4-88	7 / 22-11-88
W38,W45	Hars	5 / 6-87* 4 / 20-9-87	5 / 22-9-88 5 / 25-9-88
W47,W56	Erly	--	3 / 21-6-88 0 / 10,27-11-88
W39,W46	Melville	--	5 / 7-88*
W49	Andrew	--	0 / 25-9-88 0 / 26-10-88

4.5 Den Sites

Dens were located for 10 packs in May and June 1988 (Figure 20). The wolves commonly chose the same general area for denning, however only the Rendezvous Pack used the same den site. Many of the packs chose dens close to last years. The Erly Lake pack denned on the Hornaday River making their den the furthest easterly den. Dens are scattered across the range of the Bluenose Caribou herd, but there still appears to be a concentration of dens in the center of the caribou range. As discussed in Clarkson and Liepins (1989a) this would give them maximum access to caribou throughout the year. Williams (per. comm. 1989) supports this theory by finding that most of their summer diet is also caribou.

In August 1988 Williams measured den characteristics and picked up wolf scats at dens being monitored for wolf pup survival. We were also able to measure some of the dens and record site characteristics (Appendix 1). The den site information is being analyzed and will be presented in the next progress report.



LEGEND

- 1988 DEN LOCATIONS

1 ANDERSON RIVER	5 HORTON RIVER	9 WILLIAMS LAKE
2 ANDREW RIVER	6 MELVILLE HILLS	10 WOLVERINE RIVER
3 ERLY LAKE	7 RENDEZVOUS LAKE	
4 HARS	8 RIDGE	

40 20 0 40 80 120 160km
25.4mm = 80.4 km.

Figure 20. Wolf den locations in 1988 Western Arctic Wolf Research, 1988-89.

4.6 Predation

Monitoring wolf predation on the existing prey species has continued to be an important part of the wolf research program. Wolf predation sites were located during monthly monitoring flights of collared wolves and during two intensive predation rate studies where 5 to 6 packs were located daily for over 3 weeks. If possible all kill sites were investigated and samples taken (Clarkson and Liepins 1989a). Since the beginning of the study 128 killsites have been located (Table 5).

4.6.1 General Predation Monitoring

During monthly monitoring flights in 1988-89, 24 kill sites were located (3 moose, 2 muskox, 15 caribou and 4 unidentified kills) (Figure 21). Kill sites were identified throughout the year, but were more visible during the winter snow cover period. Caribou were taken across the study area, while muskox were only taken in the east. Prey taken by the wolves reflects the existing prey available to them. Wolves using an area with moose or muskox will occasionally kill those species. Williams (1988 and 1989) investigated wolf summer food habits by collecting scats at wolf dens and found that wolves were still depending on caribou.

4.6.2 April Predation Rate Study

Six wolf packs were monitored from 6 April - 1 May 1988 (26 days) to determine how many caribou they were killing at this time of the year. During this period 28 kills were located by monitoring the six packs (Figure 21). Each pack killed a minimum of 3 to 6 caribou during the 26 days. Good information was collected for all packs except the Melville Hills pack which travelled east to areas with patchy snow cover and then the pack split for part of the monitoring period. It was not possible to locate all the packs every day for the monitoring period because of weather and aircraft

problems. Each pack was located from 18 to 23 times during the 26 days. Predation rate was calculated at kg (of prey)/wolf/day for the entire monitoring period and for the days the pack was relocated. This gave a mean for all packs of 2.67 kg/wolf/day over the entire monitoring period and 3.22 kg/wolf/day for the days the packs were relocated (Table 6). The majority of the kills made in the spring were cows and calves. Consumption of most kills in the spring is high (90-100%). Some packs remained in local areas while other packs travelled extensively.

Caribou were the predominant prey during this period. The caribou at this time of the year are migrating eastward to their calving grounds. The main movement of caribou through the area is cows and calves for most of March and April. Near the end of April there are more bulls and yearlings migrating through the area.

4.6.3 October-November Predation Rate Study

From 26 October to 19 November 1988, six packs were monitored to determine their fall predation rate. During this period 27 kills were located (Figure 22). Unfortunately only 10 kills were investigated because of thin ice on lakes and inaccessibility of kills. All of the kills investigated were adult males and it is presumed that most of the kills made at this time of the year are adult males. A predation rate mean of 3.26 kg/wolf/day was calculated for the entire monitoring period and 5.39 kg/wolf/day for the days the wolves were relocated (Table 7). Cold temperatures, ice fog, and extensive pack movements prevented daily monitoring of all packs. The fall predation rate is higher than the spring rate because male caribou are larger than females and calves resulting in more kg of prey per kill.

Table 4. Wolf Kill Sites 1987-88, Western Arctic Wolf Research 1988-89.

Kill No.	Date	Pack/Wolf Assoc.	Coordinates Lat.	Long.	Kill Species	Sex	Age
K01	20/02/87	--	69.01	131.56	Reindeer	M	5
K01a	05/05/87	Anderson R.	68.30.3	127.21.4	Caribou	F	--
K01b	05/05/87	W23	68.32	126.28	--	--	--
K01c	19/05/87	Sitidgi	68.44	132.05	Caribou	--	--
K01d	19/05/87	W34	68.33.5	126.39	Caribou	F	4
K01e	20/05/87	Ridge	68.73	126.39	Caribou	--	--
K02	21/02/87	--	69.03	131.58	Caribou	F	--
K03	21/02/87	--	69.03	131.58	Caribou	M	--
K04	23/02/87	--	68.50	132.26	Caribou	M	2
K05	23/02/87	--	68.55	132.35	Caribou	--	--
K06	23/02/87	--	68.45.5	133.15.2	Caribou	F	2
K07	26/02/87	Dennis Ck.	68.47	132.52	Caribou	F	--
K08	02/87	--	68.56	132.25	Caribou	--	--
K09	02/87	--	68.56	132.27	Caribou	--	1
K10	02/87	--	68.50	132.42	Caribou	--	1
K11	02/87	--	69.00	132.15	Caribou	--	4
K12	18/03/97	Wolf Lake	68.36	127.25	Caribou	--	0
K13	21/03/87	--	68.33	127.33	Caribou	F	--
K14	19/03/87	Wolf Lake	68.33	126.40	Caribou	--	0
K15	21/03/87	--	68.35	127.03	Caribou	F	--
K16	03/87	--	68.55	132.26	Caribou	--	--
K17	03/87	--	68.41	132.28	Caribou	--	--
K18	03/87	--	68.45	131.32	Caribou	--	--
K19	19/05/87	--	68.44	132.05	Caribou	--	--
K20	19/05/87	--	68.44	126.39	Caribou	--	--
K21	20/05/87	--	68.37	126.39	Caribou	--	--
K22	05/05/87	--	68.30.3	127.21.4	Caribou	--	--
K23	05/05/87	--	68.32	126.28	Caribou	--	--
K24	02/04/87	--	68.29	127.50	Caribou	--	--
K25	20/04/87	--	68.35.1	125.55.1	Caribou	--	--
K26	23/03/87	--	69.08	132.16	Caribou	--	--
K27	27/03/87	--	68.31	127.33	Caribou	--	--
K28	27/03/87	--	68.35	127.13	Caribou	--	--
K29	03/87	--	68.42	127.05	Caribou	--	--
K30	11/08/87	W34	68.41	132.16	--	--	--
K31	12/08/87	--	69.53	126.54	Caribou	--	--
K32	09/09/87	--	68.38	127.12	Caribou	--	--
K33	09/12/87	--	67.28	126.17	Caribou	--	--
K34	29/12/87	--	68.05	126.15	Caribou	--	--
K35	08/02/88	W49	67.56	126.20	Moose	--	--
K36	03/03/88	--	68.27	126.35	Caribou	--	15
K37	07/03/88	--	67.50	126.39	Caribou	--	--
K38	04/03/88	--	67.15.5	127.24	Caribou	--	--
K39	11/03/88	--	68.14	127.47	Caribou	--	0
K40	11/03/88	--	68.23	127.10	Caribou	--	--
K41	11/03/88	--	68.26	126.50	Caribou	--	--

K42	12/03/88	--	68.32	126.45	Caribou	--	--
K43	13/03/88	--	68.37	131.50	Caribou	--	--
K44	08/04/88	W22	68.34	126.28	Moose	M	--
K45	06/04/88	Melville	68.27	126.05	Moose	M	--
K46	07/04/88	Melville	68.22.4	126.03.5	Caribou	--	--
K47	08/04/88	Melville	68.26	125.59	--	--	--
K48	11/04/88	Ridge	68.31	127.33	Caribou	--	--
K49	12/04/88	W52	68.31	126.50	Caribou	--	--
K50	12/04/88	Hort./Tadenet	68.41	126.33	Caribou	F	--
K51	13/04/88	Tadenet	68.40	126.18	--	--	--
K52	13/04/88	Horton	68.37	126.26	Caribou	--	0
K53	13/04/88	Horton	68.37	126.26	Caribou	F	2
K54	14/04/88	Williams	68.47	131.34	Moose	F	1
K55	14/04/88	--	68.37	126.15	Caribou	--	0
K56	07/04/88	Rendezvous	68.45	126.45	Caribou	--	--
K57	07/04/88	Hars	68.40	126.32	Caribou	F	--
K58*	08/04/88	W22	68.34	126.28	Moose	M	--
K59	08/04/88	--	--	--	Caribou	F	--
K60	11/04/88	W53	68.35	127.00	Caribou	--	0
K61	11/04/88	W54, W55	68.37	126.22	Caribou	F	9
K62	12/04/88	Anderson	68.34.5	126.33	Caribou	--	1
K62a	15/04/88	Ridge	68.38.9	127.26.1	Caribou	--	--
K63	15/04/88	Anderson	68.28.4	126.45	Caribou	--	6
K64	16/04/88	W25	68.37.8	127.49	Caribou	M	--
K65	16/04/88	Anderson	68.28.5	126.49.4	Caribou	F	7
K66	16/04/88	--	68.35	126.25	Caribou	F	0
K67	17/04/88	Horton	68.45	127.35	Caribou	M	2
K68	17/04/88	Melville	68.35.5	127.09.1	Caribou	--	--
K69	18/04/88	Horton	68.46	127.31	Caribou	F	1
K70	20/04/88	Wolverine	68.43	126.33	Caribou	F	1
K71	20/04/88	Anderson	68.26	127.03	Caribou	--	0
K72	20/04/88	Ridge	68.32	127.27	Caribou	M	1
K73	20/04/88	Hars	68.46.5	124.41	Caribou	M	9
K74	20/04/88	--	68.26	125.30	Caribou	--	7
K75	21/04/88	Rendezvous	68.48	126.48	Caribou	F	12
K76	23/04/88	Ridge	68.38	126.53	Caribou	M	3
K77	23/04/88	Anderson	68.33	126.44	Caribou	--	--
K78	23/04/88	Horton	68.50	127.44	Caribou	--	0
K79	25/04/88	Horton	68.53	127.44	Caribou	F	12
K80	25/04/88	Rendezvous	68.50	127.04	Reindeer	M	4
K81	27/04/88	Ridge	68.47	127.27	Caribou	--	6
K82	30/04/88	--	68.44	127.07	Caribou	--	--
K83	01/05/88	Hars	69.14	126.08	Caribou	F	--
K84	01/05/88	Melville	68.45	124.09	Caribou	F	7
K85	01/05/88	W52	68.45	125.37	Caribou	--	--
K86	01/05/88	Ridge	68.43.5	127.14	--	--	--
K87	02/05/88	W49	68.36	127.08	Caribou	M	--
K88	09/04/88	Hars	68.38	126.19	Muskox	--	--
K89	12/07/88	Hars	69.07	125.48	Muskox	--	--
K90	24/05/88	Wolverine	68.30.8	129.40.0	--	--	--
K91	14/07/88	Melville	68.43.5	124.12	Caribou	M	--

K100	26/10/88	Rendezvous	68.46.0	126.45.0	Caribou	M	--
K101	26/10/88	Horton	68.36.7	128.07.0	Caribou	--	--
K102	27/10/88	Rendezvous	68.46.0	126.54.0	Caribou	--	--
K103	28/10/88	Ridge	68.34.3	127.40	Caribou	M	--
K104	30/10/88	Horton	68.42.5	127.50	Caribou	M	NA
K105	30/10/88	Anderson	68.34.0	127.0.0	--	--	--
K106	01/11/88	Anderson	68.32.5	126.40.0	Caribou	--	--
K107	01/11/88	Ridge	68.36.5	128.06	Caribou	M	NA
K108	02/11/88	Hars	68.53.8	128.57	Caribou	M	--
K109	03/11/88	Anderson	68.25.0	126.42.	Caribou	M	--
K110	03/11/88	Eskers	68.29.5	128.09	Caribou	--	--
K111	03/11/88	Ridge	68.28.5	128.3.0	Caribou	M	NA
K112	03/11/88	Horton	68.41	128.16.5	Fox	--	--
K113	10/11/88	Rendezvous	68.51	126.46	Caribou	--	--
K114	10/11/88	Anderson	68.29.5	127.54	--	--	--
K115	10/11/88	Ridge	68.30.2	128.12.0	--	--	--
K116	09/11/88	--	68.39	126.52	Caribou	--	--
K117	11/11/88	Anderson	68.27.3	128.00	--	--	--
K118	12/11/88	Anderson	68.27	127.49	--	--	--
K119	12/11/88	Esker	68.01.0	130.56.0	Caribou	--	--
K120	12/11/88	Ridge	68.34.5	128.25	--	--	--
K121	12/11/88	--	68.43.3	126.32	Caribou	M	--
K122	15/11/88	Anderson	68.26.0	127.51.0	--	--	--
K123	16/11/88	Horton	68.54.0	127.35.0	--	--	--
K124	17/11/88	Horton	68.56.5	127.58.5	--	--	--
K125	18/11/88	Ridge	68.38.3	127.59	Caribou	M	--
K126	18/11/88	Ridge	68.38.6	127.57.0	Caribou	--	--
K127	18/11/88	Horton	68.44.3	127.55.0	Caribou	--	NA
K128	26/11/88	Rendezvous	68.45.9	126.44	Caribou	M	NA
K129	08/11/88	Wolverine	68.19.2	130.25.0	--	--	--
K130	30/10/88	Hars	69.07.2	127.58.5	Fox	--	--

NA - not aged
* scavenged
-- information unknown

Table 5. April - May 1988 Predation Rate Study.

Wolf Pack (wolves)	Monitoring period (days)	Location	Kills	Kg of Prey/Wolf/Day Monitoring Period	Relocations
Rendezvous (2)	6 Apr-1 May (26)	23	3	3.93	4.44
Anderson (4)	6 Apr-1 May (26)	22	5	2.70	3.20
Ridge (8)	6 Apr-1 May (26)	18	6	1.95	2.81
Horton (6)	6 Apr-1 May (26)	23	6	1.74	1.91
Hars (4)	6 Apr-1 May (26)	21	4	3.17	3.92
Melville*(8)	6 Apr-1 May (26)	22	5	2.51	2.97
				Mean = 2.67	3.22

26 Caribou
1 Moose, 1 Muskox
28 Kills 9 females, 5 males, 14 undetermined
80% of whole weight

* Melville pack split for part of the monitoring period.

Table 6. October - November 1988 Predation Rate Study.

Wolf Pack (wolves)	Monitoring Period (days)	Relocations	Kills	Kg of Prey/Wolf/Day Monitoring Period	Kg of Prey/Wolf/Day Relocations
Rendezvous (6)	26 Oct-18 Nov (24)	17	3	2.44	3.45
Anderson (10)	26 Oct-18 Nov (24)	15	7	3.24	5.47
Ridge (9)	26 Oct-18 Nov (24)	15	7	3.80	6.08
Eskers (4)	26 Oct-12 Nov (18)	9	3	4.80	9.77
Horton (10)	26 Oct-18 Nov (24)	13	6	2.93	5.41
Hars (9)	29 Oct- 3 Nov (6)	6	1	2.18	2.18
			Mean =	3.26	5.39

80 % of whole wts.

Prime adult male caribou 146.6 kg.
.8

117.28

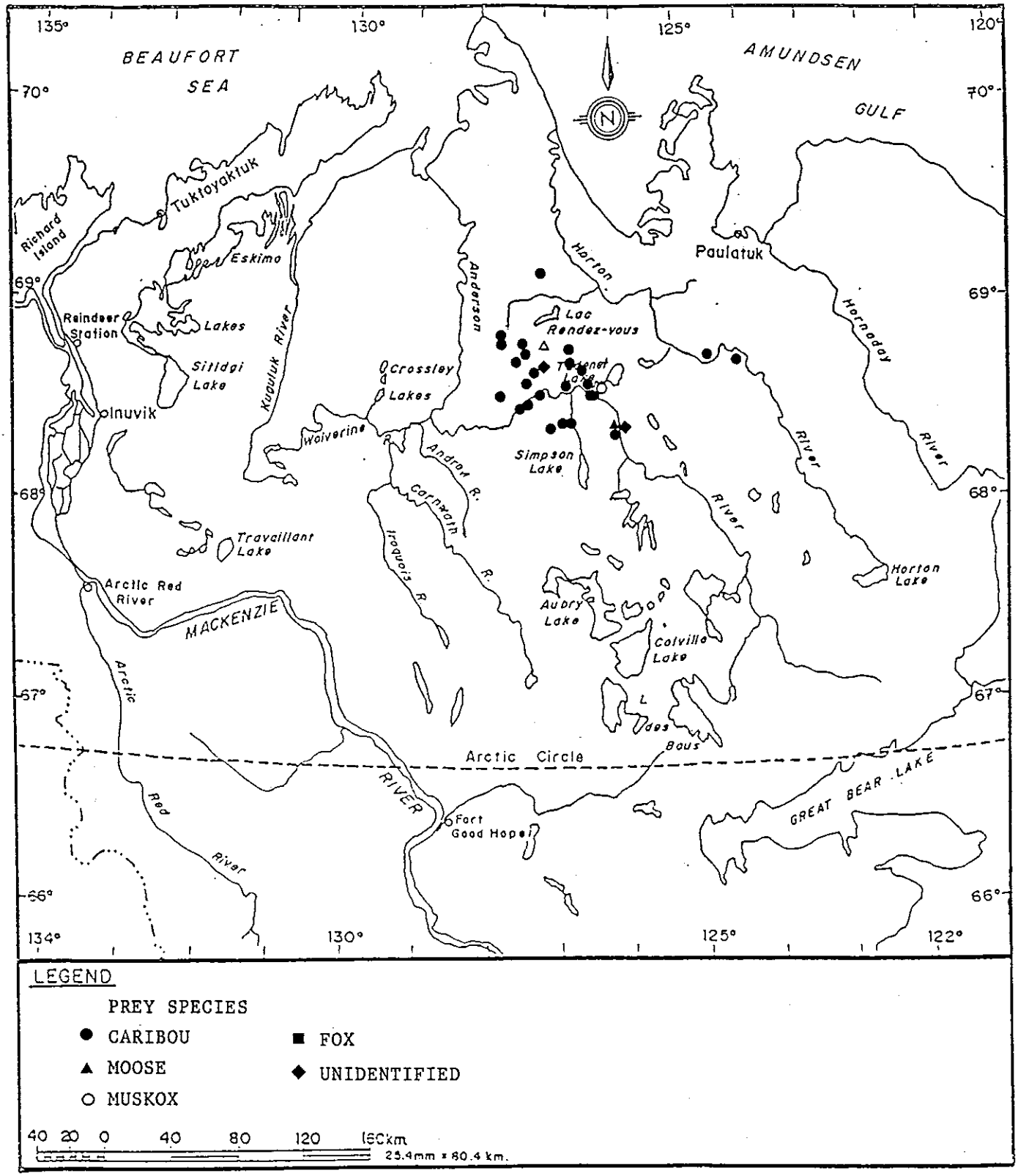


Figure 21. Predation rate study in April-May 1988, Western Arctic Wolf Research, 1988-89.

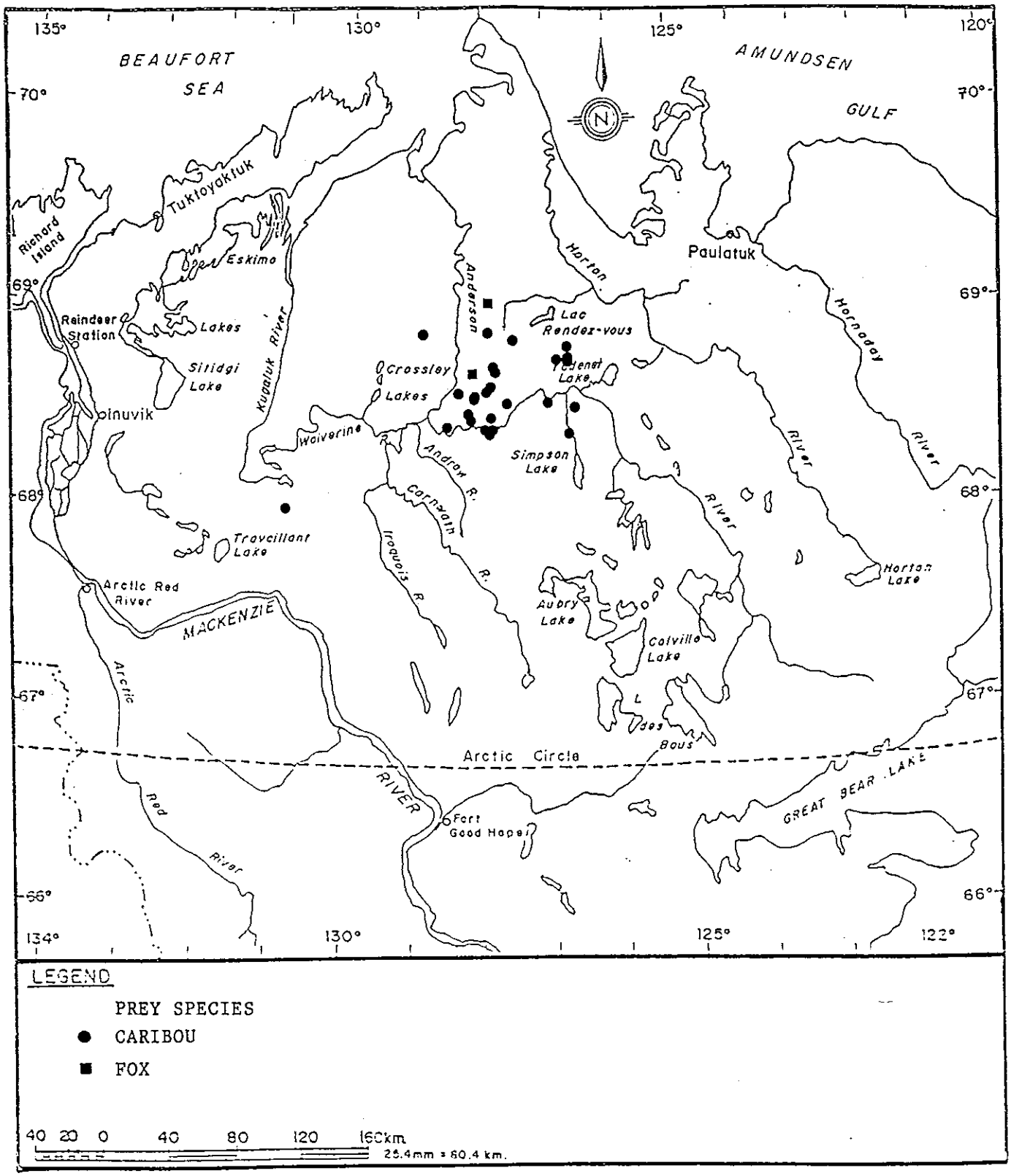


Figure 22. Predation rate study, October-November 1988, Western Arctic Wolf Research 1988-89.

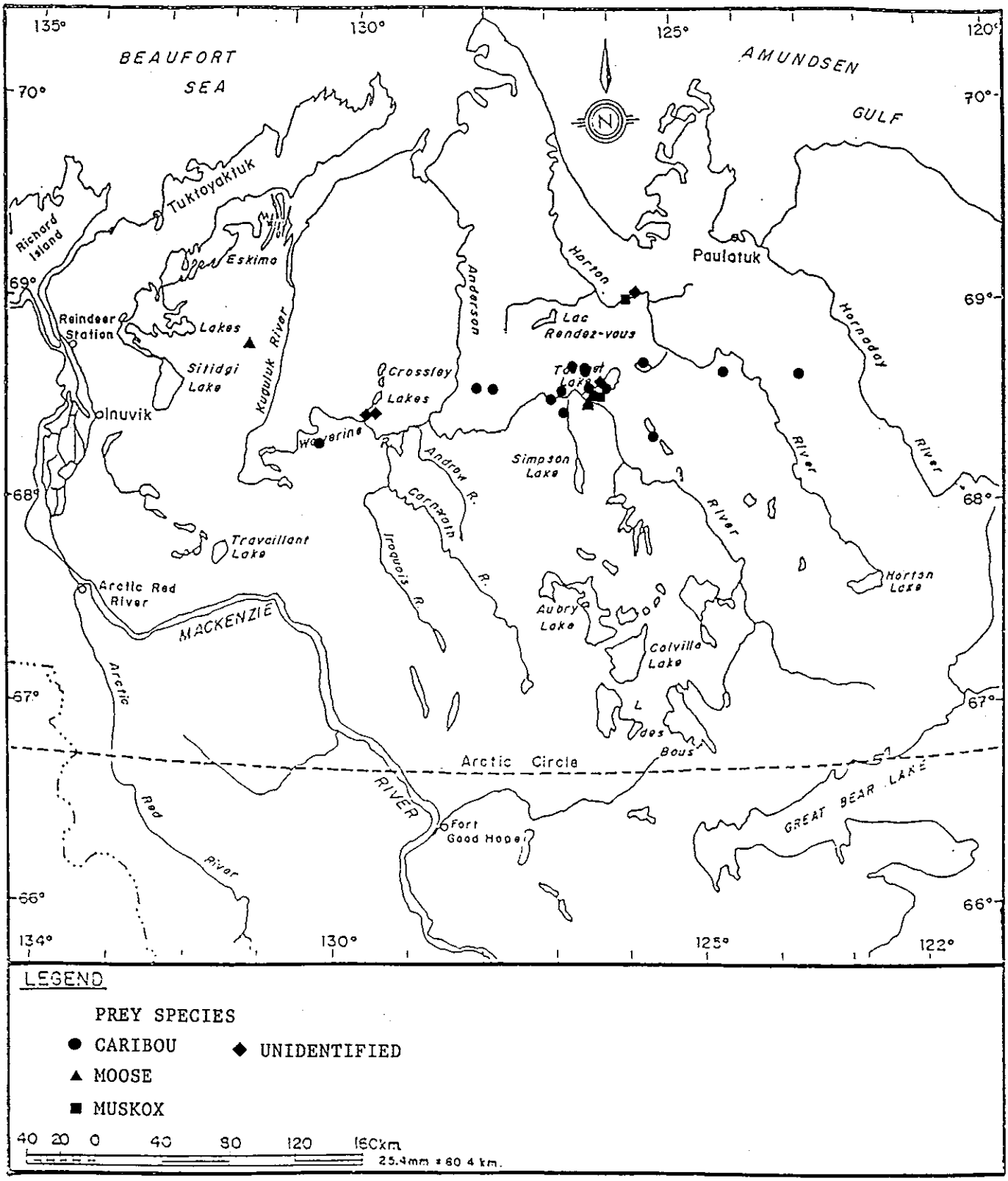


Figure 23. Predation sites observed during telemetry monitoring, Western Arctic Wolf Research, 1988-89.

4.7 Wolf Diseases And Parasites

4.7.1 Parasites

During the 1988 capture program all wolves captured were analyzed for parasites. No external parasites such as ticks, fleas or lice were seen on any of the 29 wolves. One wolf shot by D. Ruben (Paulatuk hunter) had patches of bare skin, but no mange could be found in skin scrapings.

A total of 23 fecal samples were analyzed of which 8 contained roundworms and 5 had tapeworms. Blood samples were also taken when the wolves were immobilized. The blood samples were prepared and analyzed for heartworm. All 29 samples analyzed were negative for heartworm. Information on parasites found in necropsied carcasses is being analyzed and is not available for this report.

4.7.2 Diseases

Blood serum from captured wolves (1987 and 1988) was analyzed for brucellosis, infectious canine hepatitis, canine distemper, canine parvovirus and rabies. Brucellosis was present in 21 (45%) of 47 samples analyzed. Canine distemper was found in 3 (9%) of 34 samples. All tests for infectious canine hepatitis (n=60), canine parvovirus (n=26) and rabies (n=60) were negative, indicating no occurrence.

4.8 Wolf Mortality

Both natural and trapper induced wolf mortality continued to play a part of the wolf population dynamics in the study area. This report discusses wolves taken by trappers from November 1986 to May 1988 (Figure 24 and 25). Collared or tagged wolves taken from June 1988 to March 1989 are also included (Figure 26). This report does not include unmarked wolves taken by trappers from November 1988 to March 1989. These wolves will be analyzed in April 1989 and the analysis presented in the next progress report.

4.8.1 Natural Mortality

In 1988-89, 4 collared wolves died of natural causes (Table 7) and one wolf was found dead on a lake by hunters from Paulatuk. W24 was an 8 year old female that was found dead in April 1988. She was previously located with 10 other wolves which were all part of the Tedgi Lake pack (8 February 1988). W24 was found in a natural sleeping position. A field necropsy showed bite marks on her stomach and hind quarters. She may have been in a fight with another female wolf during the breeding season. She was not pregnant which supports the speculation that she may have been in a fight. She had about 2 kg of caribou hair in her stomach, which may suggest that she was starving. Her weight when necropsied was 32.3 kg, which would be high for a starving wolf.

W48, a 5 year old female died after being captured, however a field necropsy revealed that she had been in a fight with another wolf and had suffered a serious bite on the lower back, behind her ribs. The bite had punctured the hide and cut a major artery. Her abdominal cavity contained blood and it is likely this injury is what caused her death.

W39b a 2 year old female was with the Horton River Pack when captured, but was usually located a couple of kilometers from the pack during the fall and winter of 1987-88. The necropsy of W39b did not show any signs of injuries. She was thin with no visible body fat and weighed only 21 kg when necropsied. It is likely that W39b died of starvation.

In April 1988 hunters from Paulatuk found a 6 year old male wolf dead on a lake near Tsoko Lake. The wolf had been dead for some time as ravens had been scavenging on it and had eaten most of the body cavity. Bite marks were found on the wolf's neck, but unfortunately most of the wolf was too decomposed and scavenged to

determine actual cause of death.

W26, a 5 year old female was found dead on 15 February 1988. She had died some time between her last visual location 26 November 1988 and 15 February 1989. A necropsy on W26 will be completed in April 1989.

Three of the 4 dead wolves necropsied had been in fights with other wolves. It is not possible to determine if the fights were inter or intra-pack, however, given that 4 of the 5 dead wolves were older (1 - 8 yrs., 1 - 6 yrs., 2 - 5 yrs.) suggests that wolves 5+ years of age are more vulnerable to intra-specific fighting and that their survival tends to be reduced because of this. The only natural mortality of a collared wolf in 1987-88 was an older adult male which had been in a fight with another wolf (Clarkson and Liepins 1989a).

Figure 26 shows where collared or tagged wolves have died of natural causes or were taken by hunters and trappers. The two areas of concentration identify where people from Tuktoyaktuk (west) and Paulatuk (east) hunt caribou and wolves.

Pup mortality is another form of natural mortality observed during the study. Williams continued his observations during the summer to record pup mortality at the den site in 1988. Unfortunately den abandonment by wolves under observation stopped the direct observation in July 1988. Cameras were still operating at 4 other dens. Monitoring of wolf packs in the fall and early winter has shown that some packs lost pups in the fall and early winter (Table 3).

Table 7. Collared and Tagged Wolf Mortality.

Wolf	Age (at death)	Pack Assoc.	Cause of Death	Date Mo./Yr.	Mortality or Last Known Location
8701	(1)	Husky Lakes	Trapper	April/87	68.54 131.46
8702	1	Husky Lakes	Trapper	March/87	69.04 131.17
8706	1	500 Lakes	Trapper	March/87	68.53 132.27
8707	1	500 Lakes	Trapper	March/87	68.46 132.08
8708	1	Dennis Creek	Trapper	March/87	68.48 132.09
8709	0	Old Man Lake	Capture	March/87	68.59 132.13
8710	(1)	Old Man Lake	Trapper	March/87	69.21 131.08
8711	3	Dennis Creek	Trapper	March/87	69.02 131.59
8712	4	Miner River	Trapper	March/87	68.57 132.03
8713	8	Wolverine R.	Natural	May/87	68.40 126.50
8717	2	Lucifer	Trapper	April/88	68.38 126.03
8720	(0)	Horton River	Trapper	May/87	68.37 125.15
8721	(0)	Horton River	Capture	March/87	68.36 127.25
8722	(1)	Garnet River	Trapper	April/88	68.38 126.03
8723	2	Smoke River	Trapper	April/88	69.17 129.26
8724	7	Tedgi Lake	Natural	April/88	68.32 126.32
8726	5	Ridge	Natural	Feb./89	68.33 128.25
8733	4	Ewariege	Trapper	April/88	68.24 125.33
8734	2	Andrew River	Trapper	April/88	68.37 127.13
8735	1	Anderson R	Trapper	Jan./88	67.02 116.25
8737	2	Lone Wolf	Trapper	April/87	68.24 125.33
8739b	2	Horton River	Natural	April/88	68.44 127.30
8841	3	Lucifer	Trapper	April/88	68.38 126.03
8842	5	Lucifer	Trapper	April/88	68.38 126.03
8848*	5	Unknown	Natural	April/88	68.27 125.38
8854	1	Unknown	Trapper	March/89	67.00 116.00
8862	0	Horton River	Trapper	April/88	68.38 126.03
8847	2	Erly Lake	Trapper	Jan./89	66.17 128.32
8856	3	Erly Lake	Trapper	Jan./89	66.16 128.37

() age estimated from tooth eruption and wear, other ages estimated from cementum analysis.

* 8848 died after being captured but had serious wound from a previous fight with another wolf.

Capture work in April 1988 also confirmed that some packs had lost pups during the winter. The Rendezvous pack which had 5 pups in June 1987, had 2 in December 1987 and 0 in April 1988. In June 1988 the Rendezvous pack was observed with 5 pups, by September 4 and in February and March only 1 (Table 3). The Anderson River Pack had also lost all of its pups born in the summer of 1987 by April 1988.

In 1988 the Wolverine Pack was never seen with pups which indicates the pack did not have pups or the pups all died in the summer. There are some indications that other packs also lost pups over the winter as the packs were smaller in size in late winter and spring, however unless all of the pack members are captured it is no longer possible to identify who is a pup or adult due to growth of pups.

Given the mixing of wolves between packs in the study area it would be possible for a pack to lose some or all of its pups and have other wolves join the pack. With this uncertainty it is not possible to conclude that a reduction in pack size over the winter is the result of pup mortality. Pack splitting can also reduce a pack size in the fall, winter or spring.

4.8.2 Hunter/Trapper Mortality

All of the wolves taken by hunters and trappers from November 1986 to May 1988 have been mapped (Figures 24 and 25). During this time there were 129 (74 in 1986-87, 55 in 1987-88) wolf samples submitted by hunters and trappers. The wolf harvest in the study area for this period may include an addition 50 wolves, making the total harvest near 180. A comparison of the hunter wolf harvest between 1986-87 and 1987-88 shows that fewer wolves were taken above the treelike near Husky Lakes in 1987-88. This is possibly a result of two factors: 1) there were fewer caribou in this area

in 1987-88 and therefore fewer wolves and 2) the wolves did not have to travel above the treelike to find caribou as there were plenty of caribou further south. Wolves that survived the hunting in 1986-87 may have avoided open, flat areas that made them more susceptible to hunting in 1987-88. More wolves were taken in the eastern part of the study area near Tadenet and Tsoko Lakes in 1987-88 than the previous year. This could be because more wolves were in the area or there were more hunters hunting caribou and wolves.

From April 1988 to March 1989 there were 8 collared wolves taken by hunters in the study area. W23 and W34 were taken east of Husky Lakes by Tuktoyaktuk hunters (Table 7). W22, W33, W17 and W42 were taken by Paulatuk hunters in April 1988 near Tadenet and Tsoko Lakes (Table 7). W47 and W56 were taken in January just outside of Fort Good Hope. W41 and W62 were both taken by hunters at Tadenet Lake in April 1988.

The wolves taken by hunters were mostly pups and yearlings (Figure 27). These two age classes represent 72.1 percent of the harvested wolves (Table 8). Figure 27 and Table 8 show that most of the wolf population is comprised of young wolves.

Table 8. Wolves Killed by Hunters and Trappers in Inuvik, Paulatuk and Tuktoyaktuk Prior to 30 April 88.

Age	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	65	50.1	65	50.4
1	28	21.7	93	72.1
2	13	10.0	106	82.1
3	9	7.0	115	89.1
4	2	1.6	117	90.7
5	3	2.3	120	93.0
6	1	0.8	121	93.8
7	3	2.3	124	96.1
8	1	0.8	125	96.9
9	3	2.3	128	99.2
10	1	0.8	129	100.0
	n=129	100.0		

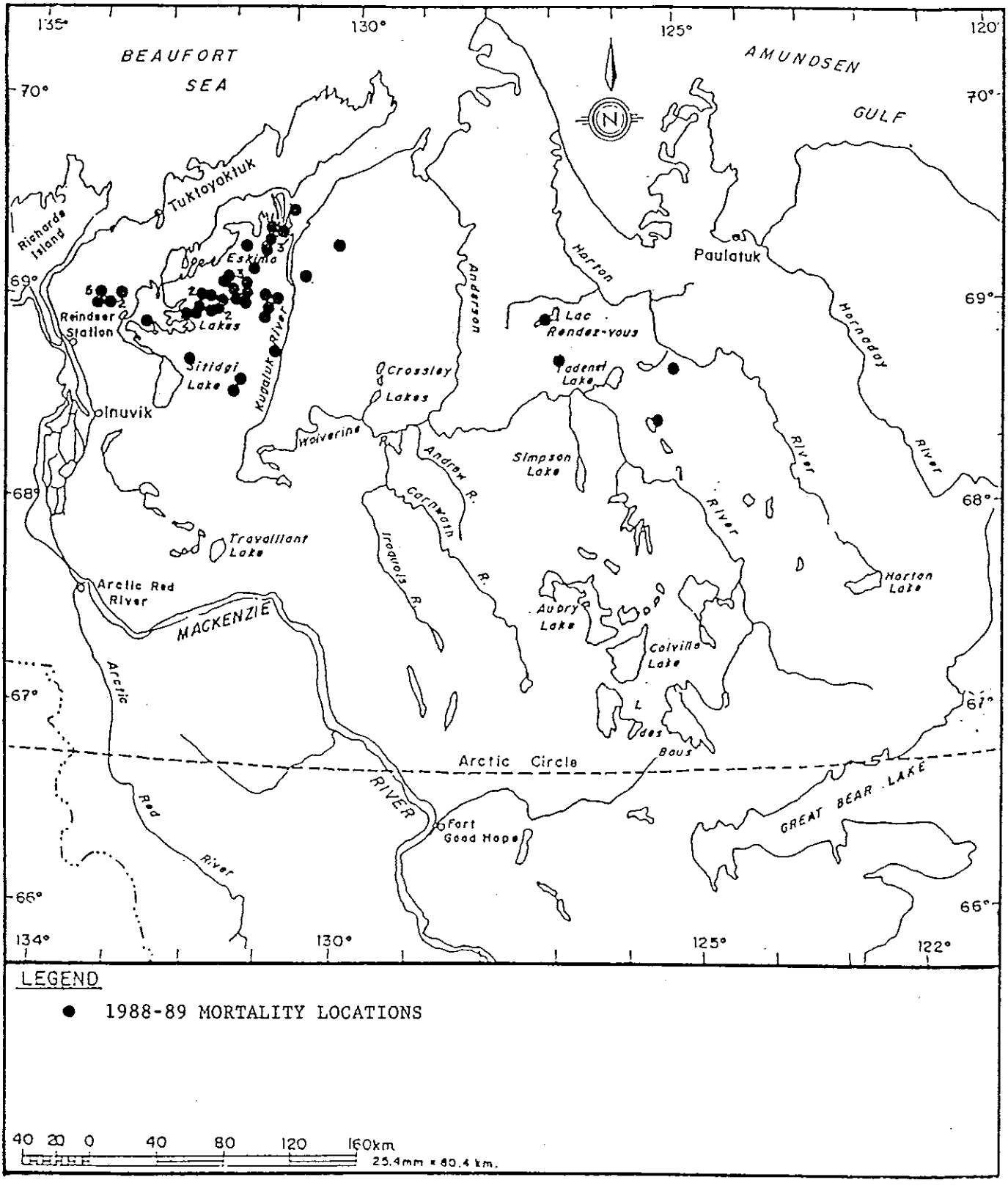


Figure 24. Hunter/Trapper wolf mortality locations from 1986-87, Western Arctic Wolf Research, 1989-89.

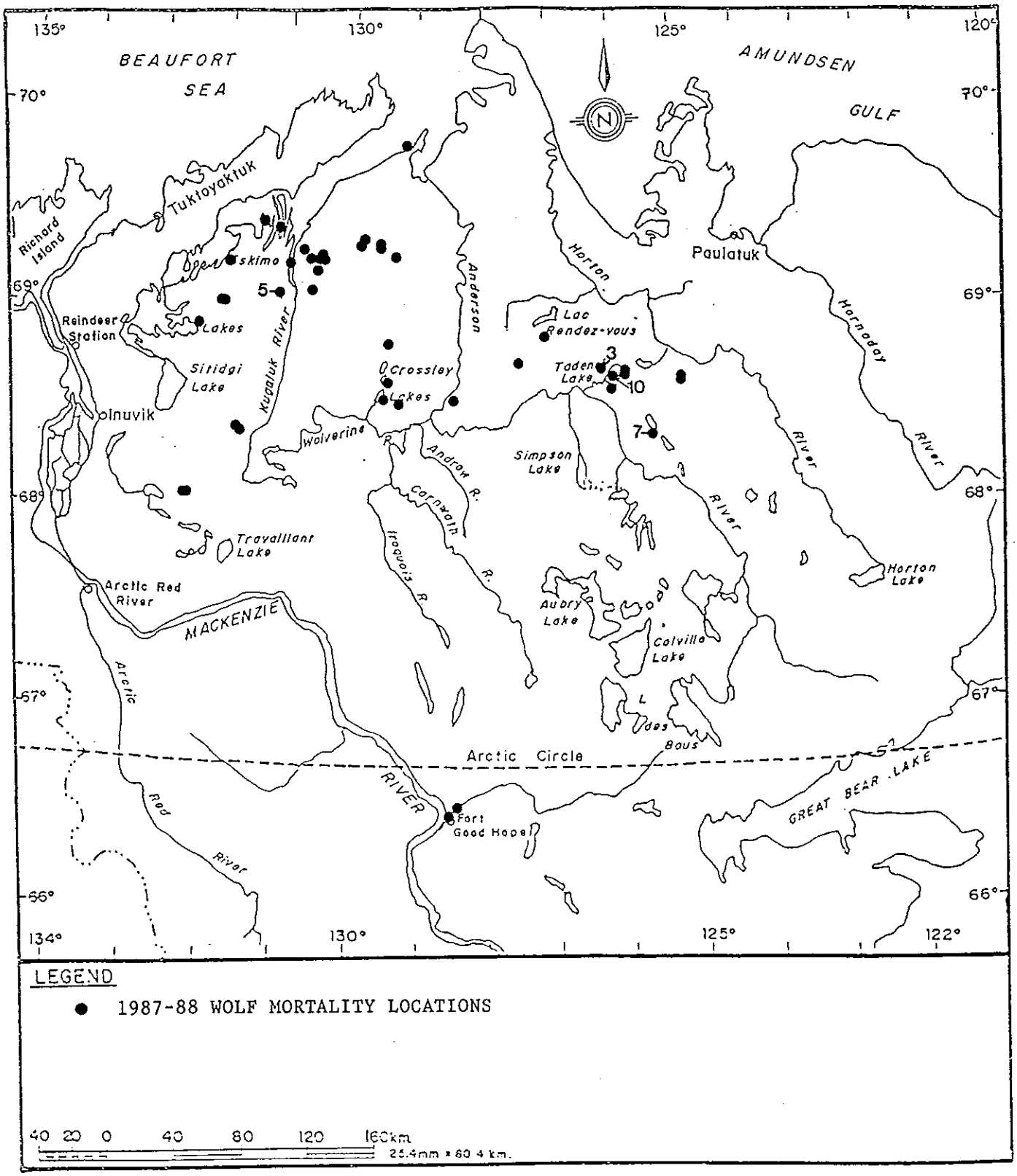


Figure 25. Hunter/Trapper wolf mortality locations from 1987-88, Western Arctic Wolf Research, 1988-89.

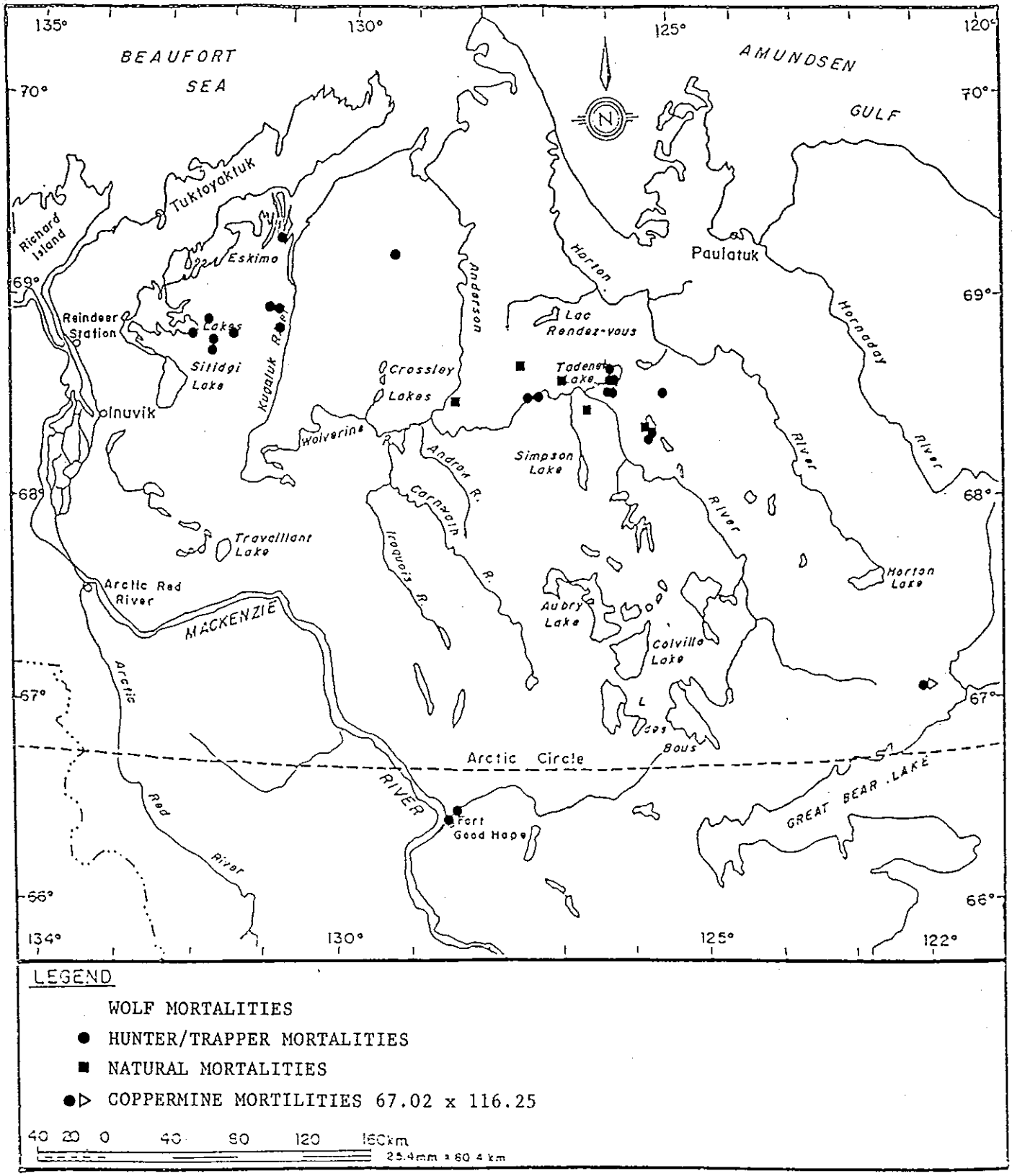


Figure 26. Wolf mortality locations of radio-collared and tagged wolves, Western Arctic Wolf Research, 1988-89.

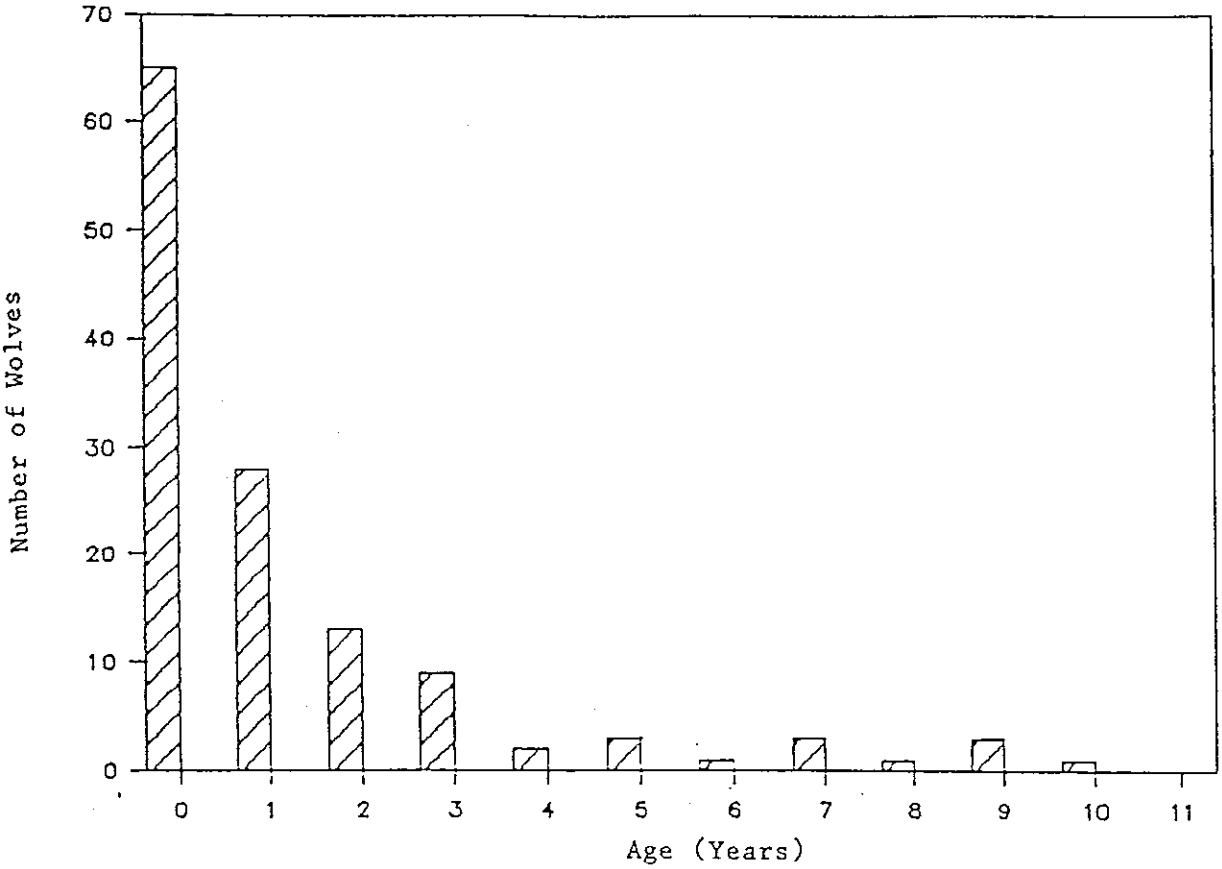


Figure 27. Age of wolves taken by hunters and trappers in the study area from November 1986 to May 1988 (n=129)

4.9 Skull And Carcass Information

A total of 36 carcasses and 59 skulls were submitted by hunters and trappers in 1987-88. All of the samples were collected from the communities and analyzed at the Inuvik Lab in April 88. Measurements taken on the skulls and carcasses were recorded and will be analyzed after the 1988-89 samples have been collected and measured.

4.9.1 Cesium Analysis

Twenty-four wolf tissue samples from Tuktoyaktuk, Aklavik and Inuvik were sent to D. Holleman at the Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska for testing of radiocesium concentrations. The samples from the Tuktoyaktuk area had a mean Cesium-137 concentration of 156 Bq/kg (n=12, S.D. 170). One sample had a high Cesium-137 concentration of 677.7 Bq/kg (Table 9). Aklavik area wolves had a mean concentration of 89 Bq/kg (n=5, S.D. 44) and Inuvik a mean value of 245 Bq/kg (n=7, S.D. 88). The results for this year are similar to those found last year with wolves in the Aklavik-Richardson Mountains area having lower Cesium-137 concentrations that wolves east of the Mackenzie River (Clarkson and Liepins 1989a).

4.9.2 Genetic Analysis

Twenty-six wolf tissue samples were frozen and sent to Drs. M. and P. Kennedy (Memphis State University, Memphis Tennessee) for genetic analysis using starch-gel electrophoresis. This brought the total sample size to 134 when combined with 108 samples from 1987. The samples were from Tuktoyaktuk, Aklavik and Inuvik. The analysis has been completed on all the samples and is presented in a paper co-authored by Dr. P. and M. Kennedy, P. Clarkson and I. Liepins. This paper will be presented this summer. The overall conclusions from the genetic analysis show that there was some polymorphism, however the level of heterozygosity (2.4%) was medial

when compared to previous testing on carnivores and high relative to canids. In general, wolves associated with the different caribou (Porcupine, Bluenose and woodland) are genetically similar. The amount of travel and mixing observed in the various radio-collared wolf packs likely explains this degree of genetic similarity.

Table 9. Cesium-137 Concentration From Wolf Tissue Samples, Western Arctic Wolf Research, 1988-89.

Sample ID	Community	Weight (gm)	Cesium Concentration pCi/kg	Bq/kg	Coefficient of Variation (%)
927	AK	1179	4206	155.6	1.1
928	TU	957	5400	199.8	1.0
929	IN	720	8196	303.3	0.9
930	IN	918	10022	370.8	0.8
931	TU	1096	4446	164.5	1.1
932	TU	1000	1661	61.5	2.1
933	AK	904	996	36.8	3.3
934	TU	864	2084	77.1	1.9
935	TU	1100	3317	122.7	1.3
937	TU	947	2226	82.4	1.8
938	IN	728	6019	222.7	1.1
939	TU	1008	1792	66.3	2.0
940	AK	1057	1729	64.0	2.0
941	TU	901	2788	103.2	1.6
942	IN	1027	3557	131.6	1.3
943	TU	1079	2664	98.6	1.5
944	IN	930	3698	136.8	0.6
945	AK	799	2059	76.2	1.2
946	AK	880	2408	89.1	1.9
947	TU	694	18317	667.7	0.7
948	IN	987	7065	261.4	0.9
949	IN	888	7858	290.8	0.9
950	TU	1093	2220	82.1	1.8

Radiocesium concentrations (Cesium-137) are in pico-curies (pCi) or becquerels (Bq - same as dps) per kg wet weight (muscle tissue).

Coefficient of variation is the standard deviation divided by the mean value and only reflects variation due to sample counting.

Communities: AK - Aklavik, TU - Tuktoyaktuk, IN - Inuvik

5.0 Summary and Conclusion

Although it is too early to accept or reject any of the hypotheses set down at the beginning of the research, some general comments can be made about the wolf population and its relationship with caribou.

The sex structure of the wolf population (based on captured wolves) slightly favours females (30 males, 36 females). It is possible that the sample may be biased towards females because most wolves captured were associated with packs and yearling and young adult males appear to disperse from the pack sooner than females. The average age of wolves in the population is less than two years based on captured and harvested wolves.

The wolves in the study area have two movement strategies. There are those packs that move over a relatively small area and packs that travel extensively. The packs that move extensively appear to be following the major concentrations of caribou. Individual wolf movements have extended from the Mackenzie River to the Dismal Lake area (south of Coppermine). More packs travelled further east, but did not move as far north in 1988-89 compared to 1987-88.

Wolf pup production and survival varies between packs. Most packs have between 5 and 7 pups in early June, however, not all of these pups survive to the fall and through the winter. By capturing some entire packs in April 1988 we were able to determine how many pups had survived the winter. The Anderson River pack which was seen with two pups in June 1987 did not have pups in April 1988. The Rendezvous pack had also lost all of its pups by April 88. The Horton River pack still had a minimum of four pups when most of the pack was captured in April 1988. Wolf dens were

located throughout the caribou range with more dens located in the center of the range. Locating a den in this area would optimize the wolves access to caribou.

Wolf predation rate was similar between the spring and fall studies. The main difference between the two study periods is that in April wolves were preying mostly on adult females and calves and in the fall the kills were adult males. The fall rut probably made male caribou more vulnerable.

Wolf mortality in the study area has been both natural and man caused. Natural mortality was low among adults and most appears to be caused by intra-specific conflicts between adult females as 3 of 4 wolves that died of natural causes were older adult females. Hunting and trapping continued to account for the majority of wolf mortality and in collared animals exceeded natural mortality.

Future study will provide much more conclusive data on wolf productivity, mortality, behaviour and variability associated with it. Information should be obtained on the fidelity of individuals to the two apparent predator strategies suspected to occur in this area and on the extent these strategies affect wolf productivity and that of the main prey species.

ACKNOWLEDGEMENTS

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Lab analysis for diseases was coordinated by Dr. F.A. Leighton, University of Saskatoon, Saskatoon, Sask. and conducted by Dr. L. Forbes, Agriculture Canada, Saskatoon, Sask., and Dr. T.O. Bunn, National Animal Disease Lab., Ames, Iowa. Genetic Analysis was conducted by Drs. M. and P. Kennedy, Memphis State University, Memphis, Tenn., and S. Neff, Texas Tech. University, Lubbock, Tex., Cesium analysis was done by D. Holleman, Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska. Cementum aging of wolf and caribou teeth was completed by Matsons Lab, Missoula, Mt. Helicopter support was supplied by Kenn Borek Air and pilot Ted Mould. Fixed-wing support was supplied by the staff and pilots of Aklak Air, Western Arctic Air and Inuvik Air Charter.

D. Blake and D. Anton entered the report on the wordprocessor and D. Polakoff assisted with drafting figures.

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6.2 Personal Communications

Bunn, T.O. National Animal Disease Lab, Ames, Iowa

McCleary, J. McCleary Vet. Clinics, Mississauga, Ontario.

Obst, Y. Naturalist, Yellowknife, N.W.T.

Russell, D. Canadian Wildlife Service, Whitehorse, Yukon

Williams, T.M. Renewable Resources, Yellowknife, N.W.T.

APPENDIX 1
WOLF DEN-DATA FORM

Den No.:_____ Date:_____ Species:_____

Drainage:_____ Elevation:_____ Lat.:_____ Lat.:_____

Specific area:_____

Activity Status:_____

Scats: No. Pup:_____ No. Adult: _____

Apparent age: _____

Food remains:_____

Macrorelief:_____

Microrelief:_____

Percent slope:_____ Aspect:_____ Wind exposure:_____

Entrances: No.:_____ Ht.:_____ Wdth.:_____

Apparent depth:_____ (Sketch construction on back)

Distance to water:_____

View from den:_____

Trails:_____

Soil:
Texture:_____ Friability:_____ Parent Material:_____
Root penet:_____ Moisture:_____ Color:_____
Active frost zone:_____ Dry or wet frost: _____
Slumping:_____

Vegetation: Growth form:_____
Plant cover:_____
Comm. association:_____
Species:_____

Prey Populations:_____

_____

Comments:_____

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