ECOLOGY OF THE WOLVERINE ON THE CENTRAL ARCTIC BARRENS

PROGRESS REPORT
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ABSTRACT

In the spring of 1993, initial exploration of terrain and techniques for research into wolverine (*Gulo gulo*) ecology began in the Napaktolik Lake region of the Northwest Territories' Central Arctic. We travelled 2000 km hunting for wolverines during March and April. From tracks, we estimated the density of wolverines in the area to be a minimum of 1 per 136 square km. We sighted 4 animals of which 3 were captured, all males. Immobilization from snowmachines proved demanding in rough terrain but effective in less rugged areas. We radio collared 2 adult males. Radio tracking from the ground was difficult due to the uneven rocky topography. Wolverines did not approach scent stations baited with commercial predator lures.

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INTRODUCTION

Although the total number of wolverines (*Gulo gulo*) harvested is not large in comparison to other furbearers, the wolverine is a desirable and sought after animal in Northwest Territories (NWT). Many wolverine pelts taken each year never reach the fur market but are sold locally. Harvest studies in the Central Arctic indicate that the harvest based on fur records alone underestimates the actual harvest by 50 percent or more (Gunn 1987). This is of particular concern for the NWT as it is one of the major contributors to the annual national harvest (Dauphine 1987).

Few wolverine studies have been carried out in North America. Major undertakings in Alaska (Magoun 1985) and in the Yukon (Banci 1987) still leave much to be learned about the biology and ecology of the animal, especially on the barrens. Lack of knowledge of the wolverine hampers justification and management of its harvest. The Committee on the Status of Endangered Species in Canada (COSEWIC) has listed the wolverine east of Hudson Bay as endangered, and as vulnerable in the rest of Canada. In addition, World Wildlife Fund Canada (Hummel 1990) has identified the wolverine as requiring more research in Canada. All of these factors have contributed to interest by the Department of Renewable Resources in exploring the ecology of the

In the spring of 1991 two potential sites for wolverine studies were explored in the Cental Arctic (Lee and Niptanatiak 1993). The eastern area around Napaktolik Lake (aka. Takiyuak Lake) (Fig. 1) was chosen as a suitable location to undertake a study. In March 1993, the first field season of that project was initiated. This report summarises the results of that field season.

OBJECTIVES

Our objectives were to:

1 - determine the feasibility of capturing wolverines by darting from a snowmachine,

2 - determine the practicality of using barrel traps for wolverine live capture,

3 - determine the feasibility of radio tracking from the ground,

4 - identify lactating females and locate maternity dens,

5 - explore the applicability of backtracking to determine daily movements and initial movements after capture and handling,

6 - determine if wolverine will approach scent posts,

7 - familiarize the senior author with the terrain, extended snowmachine travel, and camping on the barrens.

METHODS

Study Area

The study area is approximately 200 km southeast of Coppermine centered around Napaktolik Lake (Fig. 1). It is an

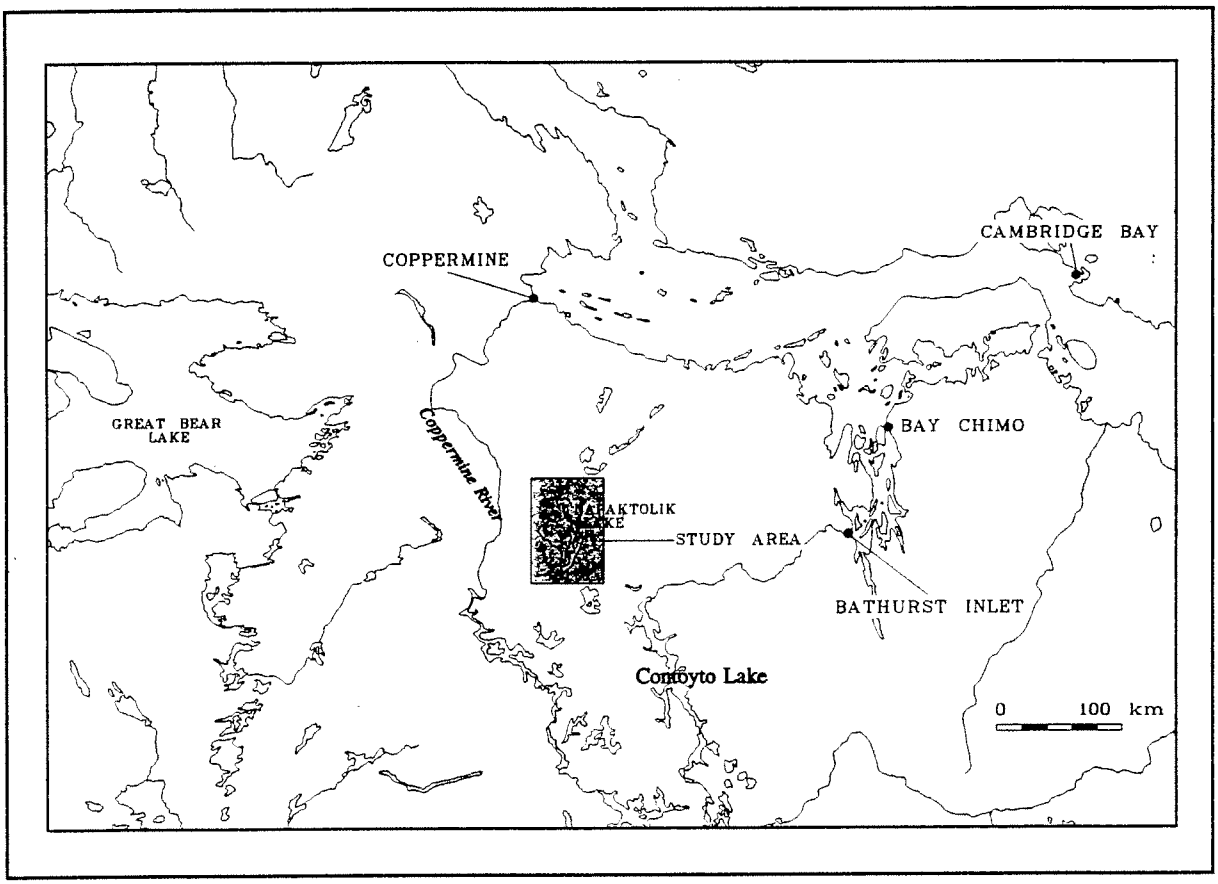

Figure 1. Napaktolik Lake wolverine study area in the Central Arctic.

area of high relief in the east and more rolling lower hills in the northwest. Northwest of Napaktolik Lake, the dominant land features tend to run northwest-southeast in contrast to the

somewhat jumbled topography east of the lake. Eskers are present throughout the area, but appear more numerous to the west and north. The entire region is cluttered with a myriad of small and large lakes with Napaktolik Lake being the dominant one. Napaktolik Lake is bisected north to south by a large, high peninsula that at times reaches 300 meters above the lake. Toward the Coppermine River to the southwest, trees become common. There the snow changes from hard, wind-packed snow familiar to the barrens to a softer deeper consistency.

The Inuit Land Use Atlas (1992) identifies the area between the Coppermine River and Bathurst Inlet as an area traditionally hunted for caribou, grizzly bears, and wolves. And although not currently heavily used, Napaktolik Lake is part of a traditional travel route from the coast to the Contoyto Lake area.

Capture

Wolverines were located by searching from snowmachines. Fresh tracks encountered were followed, and the wolverine located and darted. We attempted to cover the country immediately surrounding Napaktolik Lake with particular attention to the northern portion. Actual routes followed were determined by A. Niptanatiak, based on his experience hunting wolverines.

We used Telazol at an approximate dosage of 10 mg/kg to immobilize the wolverines. We prepared several 5 ml Cap-Chur darts in advance with a dose of 150mg (1.5ml of drug solution (100mg/ml) plus 1 ml sterile water). Delivery was with a carbon

dioxide dart pistol. The pistol was carried in a shoulder holster under a parka to keep the propellent warm. The dart was loaded into the pistol just prior to shooting the wolverine. Captured wolverine were eartagged, weighed, and measured. In an attempt to identify tracks later, we trimmed the fur away from one foot. Age was estimated in several ways. The over-all size of the animal and the condition of the teeth were considered indicators of age; a large animal with worn and discoloured teeth was considered an adult. We also measured the length of the testes in males and the length of the teats in females. An animal was considered to be an adult if the testes length exceeded 25mm or the length of the teat was greater than 10mm (Magoun 1985).

Radio Tracking

Telonics Mod 335 transmitters (240gm) and Mod 400 (380gm) in the 150-151mhz frequency range were deployed. Each transmitter included a mortality sensor.

Scent Stations

Scents used at stations were commercially available natural wolverine lure and fish oil. The scents were placed about 90 cm above the snow on the top of wooden stakes (122cm x 4cm x 0.5cm). Scents were also placed on grassy tussocks and rocks protruding from the snow 20 to 30 cm. Scent stations were distributed at

approximately 3 to 5km intervals. Most of these locations were chosen by A. Niptanatiak based on his trapping experience.

Scat analysis

All scats were washed through sieves and items identified. Relative proportion of items was estimated visually. Atomic absorption was used to identify elements.

RESULTS AND DISCUSSION

Capture

We initially planned to use barrel traps made locally from 45 gal. drums to capture wolverines. We decided against it upon close examination of the traps. The barrel traps might have captured wolverines and would doubtlessly have held them, but there were too many places on the trap where an enraged and frightened wolverine would seriously injure itself attempting to escape. These barrel traps might have some utility in a situation where the animal could be attended to immediately.

Our sole capture method became snowmachine hunting. We spent March 27 to April 7 and April 16 to April 26 hunting for wolverine and wolverine tracks around Napaktolik. Our effort was concentrated primarily to the north and west (Fig. 2; Appendix A). We travelled a total of 3059 km: 1818 km hunting for

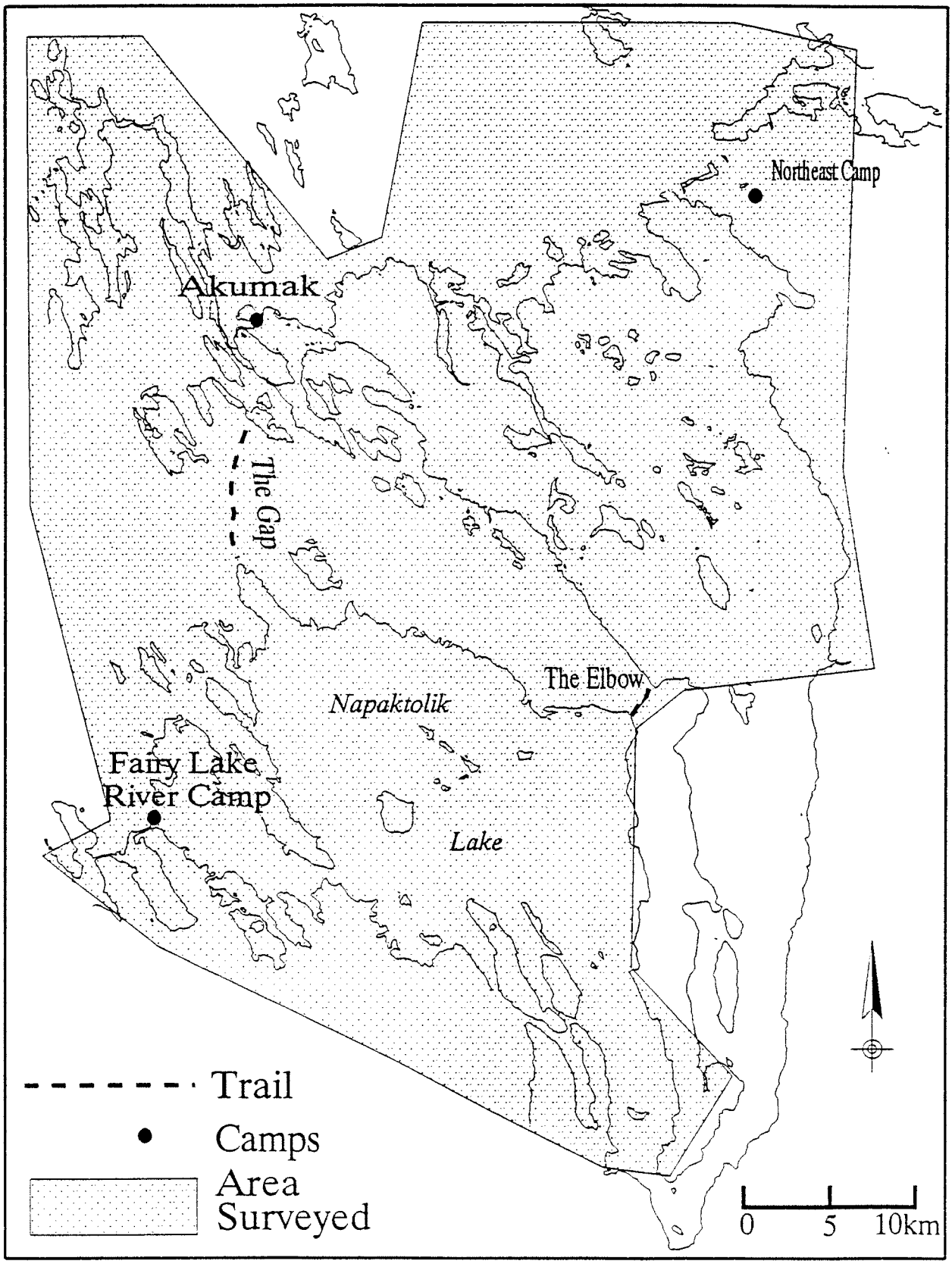

Figure 2. Area surveyed for wolverine in the Napaktolik Lake area, March/April 1993.

wolverines and fresh tracks, 172 km following wolverine tracks, and 1069 km travelling in weather conditions or terrain where hunting was not practical, or travelling to and from camp areas. We averaged 150km/day while hunting.

We did not find the densities of wolverines we expected from the track survey in April 1991. Based on recent tracks, relative locations, and radio identification, we estimated that we encountered sign from a minimum of 15 and maximum of 25 different wolverine of all sex and age classes (Fig. 3). Estimating the area we surveyed at 3400 km^2 yielded an minimum estimate of 1 wolverine per 226 km^2 and a maximum of 1 per 136 km^2. This calculation includes resident and transient animals. These densities are considerably lower than that of 1/48 km^2 reported for North Western Alaska (Magoun 1985) and 1/65 km^2 in Montana (Hornocker and Hash (1981). The density of 1 wolverine/125 km^2 (adults and juveniles only, no transients) derived for the Susitna River basin in Alaska (Whitman and Ballard 1983, cited and recalculated in Magoun 1985) is more comparable. All these studies excepting Magoun (1985) occurred below the Arctic Circle and in forested areas. Its is likely that the density in the Napaktolik Lake area was higher than what we calculated, as 14 wolverine were harvested from that vicinity in the months prior to our survey.

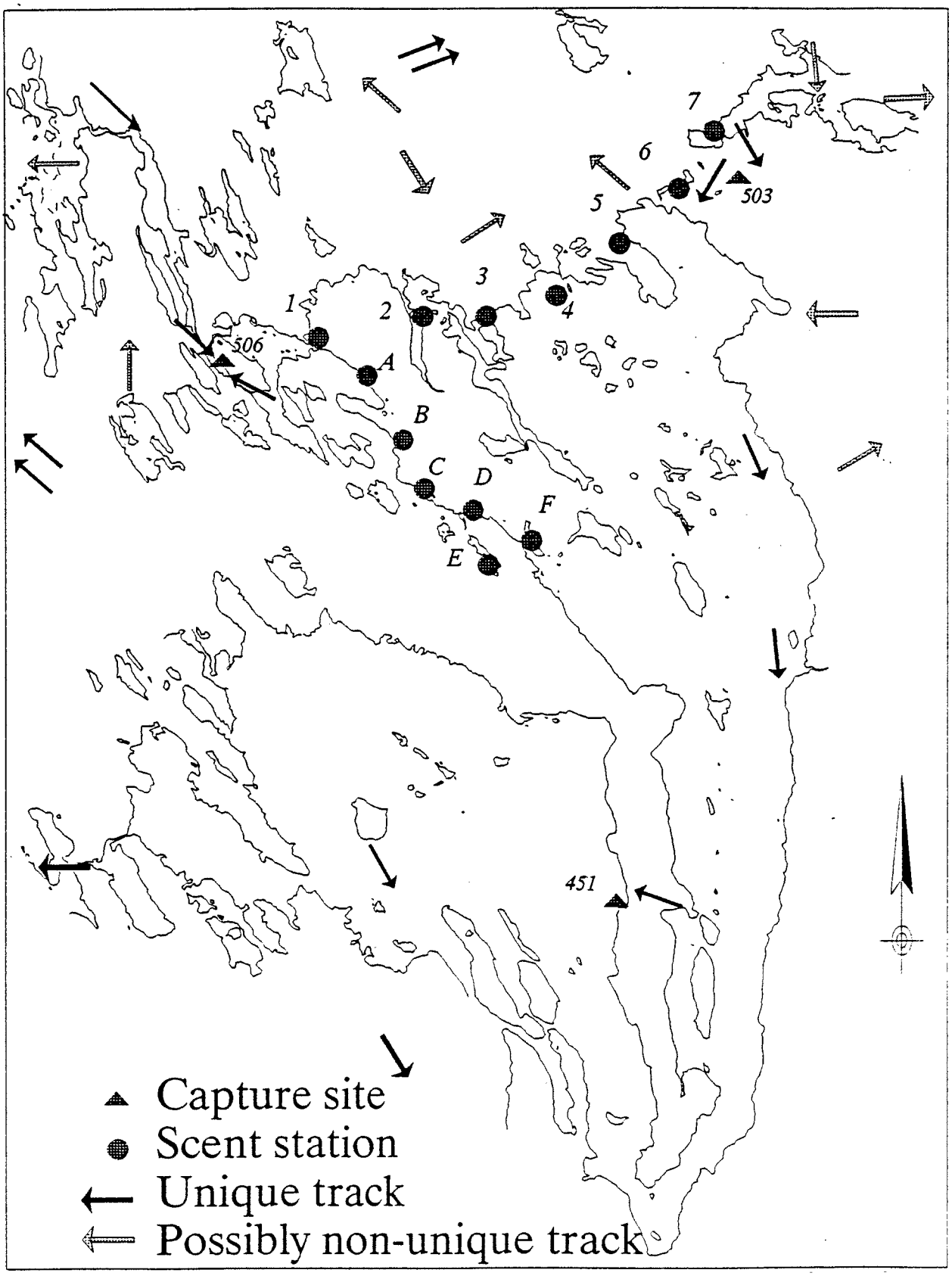

Figure 3. Location of scent stations and wolverine capture sites near Napaktolik Lake in March/April 1993.

We saw 6 wolverines: 2 on the trail between Coppermine and Napaktolik Lake (out side the study area), and 4 in the study area. Of these 4, 1 hid in a den and was not captured. We captured the other 3 (Fig. 3); all were males, 2 adults and 1 juvenile. The juvenile was much smaller, with clean white teeth and soft pink toe pads. Testes measured 25mm and were in fact only partially descended. The 2 adult wolverines were radio collared: one with a Mod-400 (eartag 503/504, radio frequency 150.329 MHz) and the other with a Mod-335 (not eartagged, radio frequency 150.451 MHz) (Table 1).

Table 1. Wolverine capture data from Napaktolik Lake, March/April 1993. (A=adult, J=juvenile).

Wolverine Capture Data						Measurements			
ID	Date	Sex	Est Age	Lat	Long	Weight Kg	Length cm	Neck cm	Testes mm
451	28Mar	M	A	6611	11259	18.8	---	---	---
503/504	02Apr	M	A	6634	11251	15.5	106	38	42
506/507	17Apr	M	J	6628	11930	12.5	86	35	25.0

Although wolverine 451 was not eartagged due to the situation, it was identifiable by a missing toe, the second from the inside on the front left foot. This missing toe proved very

useful as we were able to identify this track several times in several different locations. In an endeavour to duplicated this kind of marking, we trimmed the fur from around a hind foot of the other wolverines we captured. Unfortunately, this type of identification was not always readily detectable. However in 1 case, it eliminated the possibility that the wolverine tracks we were following belonged to 503. There may be some potential for hair trimming, but toe clipping would produce more consistently identifiable tracks.

Of the 3 animals captured, none was simply encountered, all had to be tracked. Tracking and chase time ranged from 5 minutes to over an hour. It was often difficult to tell just how fresh tracks were. Tracks an hour or so old were obvious, as were those that were many days old. However, the age of tracks falling between the 2 extremes was often uncertain. We tracked at least 3 wolverines to dens they appeared to have just recently entered. Whether they heard us coming and took refuge is not clear. We were reluctant to excavate the dens as the sex and reproductive status of the animal was unknown and we did not want to unduly disturb a maternity den. As well, some of the den sites were located such that it was likely the den was not just in the snow, but also into the rock jumble below.

Darting wolverines from a snowmachine appears to be an effective technique for capturing the animals in relatively flat open terrain but less so in rugged relief or boulder strewn areas. In such areas the chase can be unduly prolonged as the

animal will frequently evade the snowmachine by heading for abrupt or rocky areas. With an very experienced and tenacious pursuer, the wolverine will no doubt be captured, but not without excessive wear and tear on animal and machine. The 2 animals we radio collared were discovered in such areas on the east side of Napaktolik Lake, and led us on an absorbing pursuit. However, the young male 506 was encountered on a flat area and took less than 5 minutes to dart and have tractable. Similarly, the 2 wolverine we encountered on the trail between Napaktolik Lake and Coppermine, as well as the animal encountered at Napaktolik Lake in April 1991, were in smoother country and would have been quickly and easily darted.

Although we placed baits (caribou and wolf carcasses) at 2 locations, no wolverine approached them. There were numerous gut piles from wolf and hunter-killed caribou on both arms of Napaktolik Lake. We encountered recent tracks at 2 of these. A. Niptanatiak reported that wolverines come to carcasses more readily in the early winter. November or December may be a more effective time to attempt baiting.

With abundant caribou carcasses available, wolverines around Napaktolik Lake were probably well fed this winter. While following tracks during April 1991, we often encountered diggings where a wolverine had uncovered caribou remains (Lee and Niptanatiak 1993). Whether these were caches or remains of old carcasses was unclear, but we found little sign of such activity this year, although we followed a greater number of tracks.

In April 1991, we saw no caribou in the Napaktolik Lake area during our brief trip. However, this spring we encountered caribou and caribou tracks daily. Hunters from Coppermine reported caribou around Napaktolik Lake all winter. Many people travelled there to hunt. This increased hunting activity not only provided an excellent food source for wolverines, but also increased the hunting pressure on them as well. The wolverine harvest collection for 1992/93 shows 14 wolverine being taken in the Napaktolik area in contrast to an average of 3 per season over the 1986/87 to 1988/89 seasons (Gunn and Lee in prep). This might explain the apparent scarcity of wolverines in spring 1993 as compared to spring 1991.

None of the wolverines we handled was female. In the spring (March-May), adult females with young tend to severely restrict their movements as they spend considerable time in the den nursing (Magoun 1985). The harvest collection data tend to support this. The proportion of adult females occurring in the monthly harvest dropped to 33% in April from 50% and 40% in the fall and winter, respectively (Gunn and Lee in prep). The best time to capture adult females would probably be November and December.

Although we had planned to use radio collared adult females to locate maternity dens, we did not encounter any females. The den site near where 503 was captured showed evidence of being a maternity den. The den had 2 entrances approximately 50 meters

apart. The animal using the den was small as evidenced by the tracks and one sighting. Fresh, numerous, small tracks were in evidence around the den during all the time we were in the area (April 1 to April 26). The male, 503 appeared to be in the vicinity of the den every several days, perhaps awaiting a breeding opportunity (Magoun 1985). Although his tracks and scent markings were around the den, he did not appear to ever enter the den. In fact, when we originally tracked the male and finally approached him, he was sitting in a day bed about 3 meters from the den entrance. Rather than take refuge in the den, he ran away indicating it was probably not his den and was already occupied.

Radio tracking

Wolverine 451 was captured on March 28, 10 km south of The Elbow on the west side of Napaktolik Peninsula. We returned to the capture location the following day but were unable to pick up a radio signal. Tracks were obscured by thick blowing snow. On March 30 we again searched unsuccessful for 451's radio signal from top of the Gap (Fig. 2), 245 meters above Napaktolik Lake. On March 31 we located a faint wind blown set of tracks heading east across Napaktolik Lake from the Elbow. These tracks had the second inside toe missing from the left front foot and were most probably 451, but the tracks were too obscured to follow. On April 3, while passing through the Elbow from east to west we crossed 451's tracks also heading west. We tried unsuccessfully

to obtain a radio signal. We followed the tracks to the top of the Napaktolik Peninsula where it ended at a den. The radio confirmed that it was 451 and that he was in the den. Although only a kilometer away previously, the rocks had effectively blocked the radio signal. On April 4, we picked up a weak signal from 451 in the general area of the den. On April 6 we tried unsuccessfully to radio locate 451 from scent station 'F' and from the top of The Gap.

On April 17, after being away from study area for over a week we received 451's signal on mortality, weak but distinct, to the south east of scent station 'F'. We located the collar buried in the snow next to a den 25km away. There was wolverine hair stuck in the attachment area of the collar. When the transmitter was put on, the hair had not been cleared and may have became an aggravation to the animal. That might explain why the wolverine was still working at removing the collar weeks after deployment. Subsequent examination of the collar by the manufacturer revealed the transmitter had become 'jammed' on mortality due to an internal malfunction. The external whip antenna was broken off where it exited the collar. It was fortuitous that the wolverine removed it.

Wolverine 503 was captured April 2 at the northeast corner of Napaktolik Lake near a den site. We returned to the area on April 3 and from scent station 6, picked up weak signals from 503. He was slightly south of the capture location. We attempted unsuccessfully to locate 503 several times between

April 4 and April 7. There were many new tracks daily in the area of his capture but identification as 503 was not possible. Most of the tracks were smaller. We returned to the study area on April 21 and located his signal in the den area. We flushed the wolverine from a day bed about 1 km due north of the den site. Although we could see the animal and the radio signal was strong both disappeared as the wolverine crested the top of the rock. From April 22 to April 25, we camped about 1 km south west of the den site. We searched for 503's signal approximately once per hour over the daylight hours each day. On April 23 there was a fresh track in the den area. A weak signal from 503 was detectable north west of camp. The radio signal moved slowly north all afternoon, very weak and intermittent. It disappeared 4.5 hours after it was first detected. We did not relocate the wolverine again that spring. On July 12, 503 was relocated from the air 12km south west of the original capture location.

Based on radio relocations and identification of tracks, we estimated the area potentially occupied by 451 and 503 at approximately 300-400 km sq and 100-200 km sq, respectively (Fig. 4). The area used by 451 was about twice that of 503. Being able to identify the track of 451 made relocations possible without radio contact, which contributed to the larger area. The effort made to radio locate both animals was similar: we searched for both animals from many different locations throughout the study area. However, 503 was consistently found near the den in the northeast and this contributed to the smaller area.

Monitoring a female soon to become receptive is consistent with 503's apparent restricted movement (Magoun 1985). Wolverine 451 did not appear to frequent any specific location.

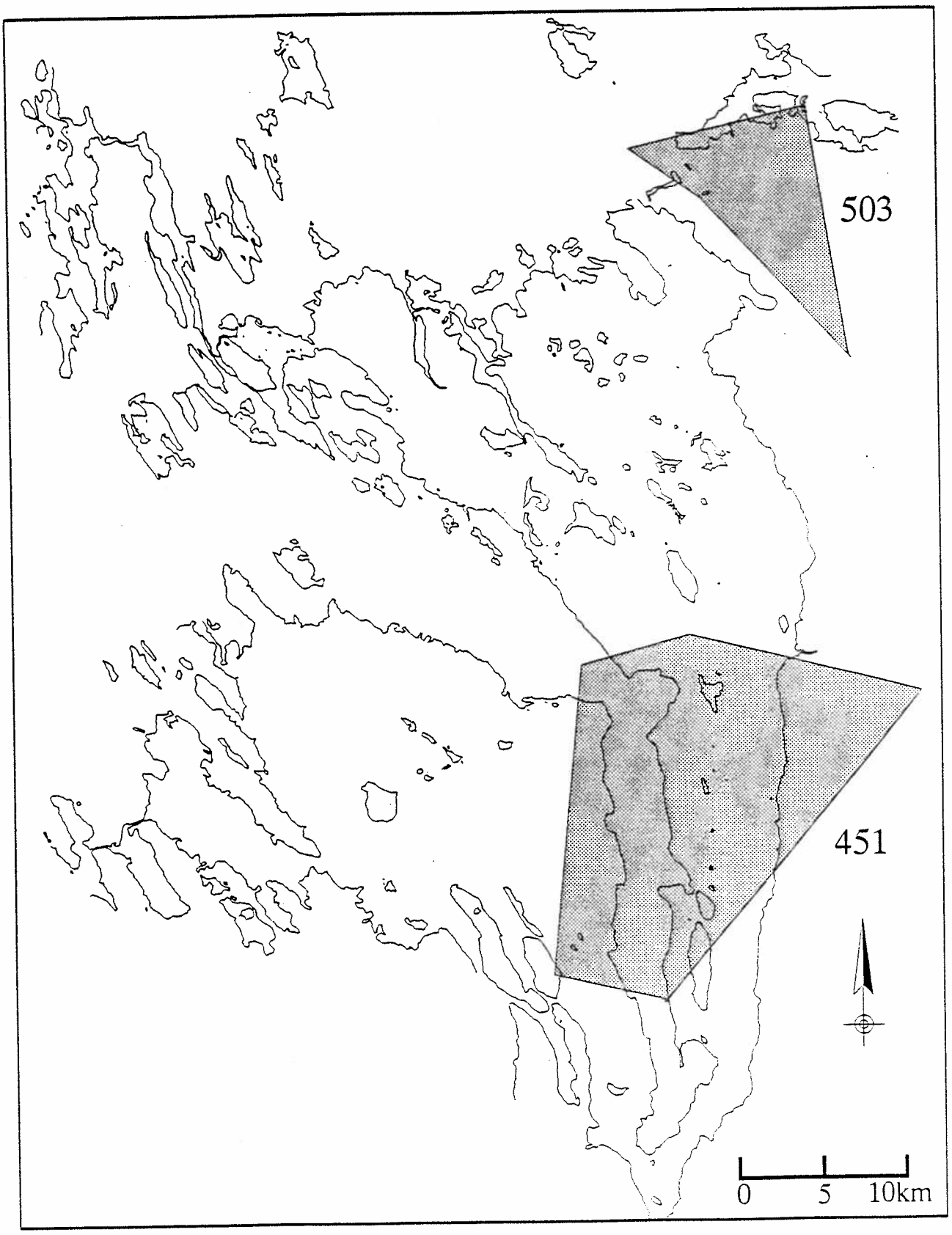

Figure 4. Estimated size of area occupied by 2 radio collared adult male wolverine during March and April 1993 in the Napaktolik Lake area

The effectiveness of radio tracking from the ground in the high rocky areas around the east side of Napaktolik Lake was questionable. We were unable to relocate animals on a regular basis. In some instances where the wolverine was nearby, its signal was not detected because of the rugged relief. However, the elevation of the area, in places reaching 250 meters above the lake, provided impressive visual and radio vistas. From such elevations we were able to receive the signal of a test collar from 18 km and from the thrown collar of 451 at 25 km. If an instrumented wolverine had been visible to the receiver, there was potential for detection from a substantial distance.

Dens

We frequently encountered wolverine dens. These could be roughly separated into 3 types: a deep den with evidence of extensive use (tracks, day beds, marking) such as the one near 503's capture site; a deep den or hole with only a few tracks in the immediate vicinity often just entering and/or leaving; and, a shallower hole in the snow usually not more than 1 or 2 meters in length running more horizontal than vertical. This latter den was often associated with food scraps. Although not actually a hole, we also found, shallow depressions in the surface of the snow. These were invariably located in slightly elevated positions on the side of a hill, snow bank or ridge. These day beds appear to be a location to rest and scan the countryside. The shallow holes associated with food scraps are likely eating

dens where a wolverine can eat and rest without being exposed. The deeper occasional dens without much associated activity sign may be one of several similar dens within a home range that are known to the animal and utilized for escape or as a safe haven during inactive periods. The heavily used den may be associated with a denning female.

Scent Stations

We placed 7 scent stations (1-7) along the north end of Napaktolik Lake on April 2, and 6 (A to F) stations on the north side of the Napaktolik Peninsula on April 4 (Fig. 3). We monitored the scent lines on alternate days. The response to scent stations was disappointing. On April 6th, several wolves passed by the fish oil scent at site 6 and made a detour towards it. They approached no closer than 4 meters. On April 19, a fox made a cursory investigation of the fish oil scent at site 2. No wolverines approached any of the scent stations during the time we were present in the area.

On April 20, we placed a few drops of wolverine lure scent on a low rock (6-10 cm high) near some fresh tracks about 200 meters southwest of the den site near 503's capture location. On April 21, we checked the den area and the scent had been visited. The wolverine had dragged its body over it and deposited a few drops of urine. It made a small detour, about 3 meters, to visit the scent. We checked the scent again on April 22 and 23 but it had not been visited. On April 24 a fresh wolverine track

approached the scent making a deviation of about 5 meters in its direction of travel to do so. We left a portion of scat (scat #1, from an animal that had been scent marking frequently; Table 2) approximately 12 meters away from the original scent mark. We checked both the scent and scat on April 25 but neither were active.

The utility of scents to lure wolverine to a site is unclear. A wolverine did visit the scent placed near the den site but did not visit scent stations 6, 2 km away or site 7, 4 km away. Another wolverine passed within less than a km from site 6 but did not approach it.

Hash (1987) suggested that wolverine were responsive to scent and bait stations. Stations placed further apart and at a greater density would improve the probability of animals encountering them. The use of bait and scent together may be more effective. An understanding of why, where, and how a wolverine scent marks would provide insight on how to utilize a scent for bait.

Similar to Magoun (1985), we found several methods of scent marking: urine, faeces and rubs. Both the urine and some faeces were associated with objects (grass tussocks, rocks) protruding from the snow. The faeces in these cases were small, narrow and 4 to 5 cm long. One wolverine we followed for 11km scent marked approximately every 0.5km. His markings consisted of urine, rubs, faeces or combinations thereof. The rubs were on rocks 40 to 70cm in diameter. The area rubbed looked greasy and smelled

strongly of musk. When backtracked from its capture location, 506 had deviated from his path to drag himself over a low willow tussock. No signs of urine were evident, he had simply straddled the bush perhaps depositing scent from the ventral or anal glands.

Scat analysis

We collected all wolverine scats encountered(Table 2).

Table 2. Contents of wolverine scats collected in the Napaktolik area April and May 1993.

	DATE	LOCATION	CONTENTS	COMMENTS
1	April 21	6630 11310 1 km N scent station 6	caribou 90% clay 10%	small scat, animal marking frequently
2	April 21	6634 11315 10 km N scent station 2	caribou 50% clay 50%	at site of old wolf carcass
3	April 19	6617 11235 20 km E of Ikuhik Bluff	caribou 60% ptarmigan 20% clay 20%	scat of 451 where he dropped radio collar
4	April 4	6626 11348 20 km W of Akumuk	caribou 100%	at old wolf carcass
5	April 4	6617 11300 west side of Elbow	caribou 80% clay 20%	451's small scat left as a mark.
6	April 5	6623 11347 den 20 km W of Akumuk	caribou 70% clay 30%	at den site 12-24 hr old, scat creamy white
7	April 4	6623 11347 den 20 km W of Akumuk	caribou 70% clay 30%	at den site 1 to 2 days old.

Caribou remains were present in all scats and made up the largest portion. Scats 6 and 7 were very white in colour and somewhat pasty and clay-like when thawed. Wolf scats on the land are known to whiten with age (Williams pers. comm.), but these wolverine scats were recently deposited. Kruuk (1972) determined that the very white powder occurring in the faeces of hyenas was the same as the inorganic matter in bone. He suggested that hyenas were able to digest the organic matrix, mostly collagen. We analyzed samples of white powder from 1 of the white scats we collected and it showed high levels of calcium and total phosphorus suggesting that wolverine may have a similar ability. This would be consistent with reports of wolverine subsisting on only bone for long periods (Magoun 1985).

SUMMARY AND OBJECTIVES FOR 1994/95

Wolverine capture from snowmachine worked well in relatively smooth areas and lost its effectiveness in high, rocky terrain. Due to the terrain and the large number of wolverine harvested in the Napaktolik Lake area before we arrived, we travelled considerable distances to locate animals. Some way to supplement the capture is required, such as 2 teams, baits placed earlier in the season, or a trapline of leg snares, leghold traps or live traps. Live traps would need to be carefully constructed to be almost entirely smooth on the inside to prevent the wolverine from injuring itself. Snares and leghold traps would also pose

some probability of injury.

Radio tracking from the ground was not a viable way to collect information on home range and movements in the Napaktolik Lake area. We could not rely on relocating the collared wolverines when more than 1 day passed between attempts. However, in several instances, it was valuable to be able to identify the animal we suspected was in the vicinity. Radio tracking and snow tracking together would provide an effective way of maintaining daily contact with a known individual. Knowing the age and sex of the animal being followed, and others with which there were interactions, would aid in interpreting behaviour.

No females were captured although 1 suspected maternity den was located. The probability of capturing females may be greater earlier in the season.

Two of the 3 wolverines captured appeared to leave the immediate capture area (>10km) after being handled. Tracks of both 451 and 506 headed directly away from the capture location in the 24 hours following capture. We were not able to detect any radio signal from 451. 503 was still in the vicinity of his capture 24 hours later. We located wolverine 451 again in the vicinity of the capture area 6 days after he was handled.

On cursory examination, scent stations appeared not to be much of an enticement for wolverines. However, use of baits and more widely distributed scents need to be explored.

Objectives for 1994/95.

1. Considering the difficulties in radio tracking from the ground and the expense of using aircraft, we plan to use 2 to 3 small, recently developed satellite transmitters. These will be deployed in March to test the system and determine the effectiveness of wolverines as a transmitter platform.

2. Assess the problems and develop contingencies for snowmachine track transects proposed for determining relative use by wolverines of habitat adjoining a winter road (Lee 1993).

3. Resurvey the Napoktolik Lake area for wolverine tracks to estimate density.

4. Further explore the reactions of wolverines to bait/scent stations by expanding the area covered by scent stations and distributing baits in an area with less caribou hunting.

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APPENDIX A

APPENDIX A. Actual routes followed while hunting and tracking wolverine around Napaktolik Lake, March and April 1993.


TAKIYAK
LAKE
River