The Status Of Mountain Goats In Canada's Northwest Territories

ALASDAIR VEITCH, Department of Resources, Wildlife & Economic Development, Government of the Northwest Territories, P.O. Box 130, Norman Wells, NT, Canada X0E 0V0
ELLEN SIMMONS, ET Enterprises, Site 9B, Comp. 20, RR1, Kaleden, BC, Canada V0H 1K0
MIKI PROMISLOW, Sahtu Geographic Information System Project, P.O. Box 130, Norman Wells, NT, Canada X0E 0V0
DOUGLAS TATE, Nahanni National Park Reserve, P. O. Box 348, Fort Simpson, NT, Canada X0E 0N0
MICHELLE SWALLOW, Department of Resources, Wildlife & Economic Development, P.O. Box 130, Norman Wells, NT, Canada X0E 0V0
RICHARD POPKO, Department of Resources, Wildlife & Economic Development, P.O. Box 130, Norman Wells, NT, Canada X0E 0V0

Abstract: Mountain goats (*Oreamnos* americanus) are the least studied ungulate species that occurs in the Northwest Territories. The distribution of goats in the territory – both historically and at present - is limited to the lower half of the 130,000 km^2 Mackenzie Mountains between the Yukon-NWT border and the east edge of the range, including a portion of Nahanni National Park Reserve. Due to the limited annual harvest of goats and the extremely high cost for doing research in this remote region - few surveys to estimate size of mountain goat populations have occurred in the Mackenzie Mountains. Biologists working with federal and territorial wildlife agencies, Parks Canada, and private environmental consulting companies have sporadically collected limited information about mountain goats during the course of studies on other species in the Mackenzies since 1966. In 2001, we interviewed each of the 8 outfitters licenced to provide services to non-resident hunters in the Mackenzie Mountains to document their knowledge about mountain goat distribution and estimated numbers in their zones. Of the eight outfitting zones, five have at least some goats present. Information provided by outfitters and Parks Canada biologists suggests that there are between 768 and 989 mountain goats in the NWT. The outfitter interviews and biologists' records were digitized for mapping and analysis. Mountain goats occupy approximately 9.5% of the total area of the Mackenzie Mountains in the NWT. Harvest of mountain goats in the NWT by resident, non-resident, and non-resident alien hunters began in 1965. There is no annual quota to regulate the number of mountain goats that may be harvested in the NWT. Resident and non-resident hunters are permitted to take one goat of any age and sex annually during a season that lasts from 15 July to 31 October. Holders of General Hunting Licences (primarily aboriginal people) are allowed to take unlimited numbers of goats throughout the year. For the 35-year period 1967 to 2001, we have records of 149 mountain goats harvested by non-residents and an additional 25 goats were taken by resident hunters for the period 1981-2001. There is no current or historic known subsistence harvest of mountain goats in the Mackenzie Mountains of the NWT. For 96 harvested goats for which sex is known, 43% were female and 57% male. Over the last 10 years, an annual mean of 18.7 ± 9.9 tags to hunt mountain goats have been purchased by non-resident hunters (range 6 to 35 tags). During that same period, the mean annual harvest has been 4.1 ± 2.5 goats (range 1 to 9 goats).

Key words: Northwest Territories, Mackenzie Mountains, mountain goat, *Oreamnos americanus*, status, distribution, harvest

INTRODUCTION

Mountain goats (*Oreamnos americanus*) are the least known and least studied ungulate species within Canada's Northwest Territories (NWT). They occur only within rugged and remote areas of the Mackenzie Mountains between the Mackenzie River and the Yukon/NWT border (Figure 1).

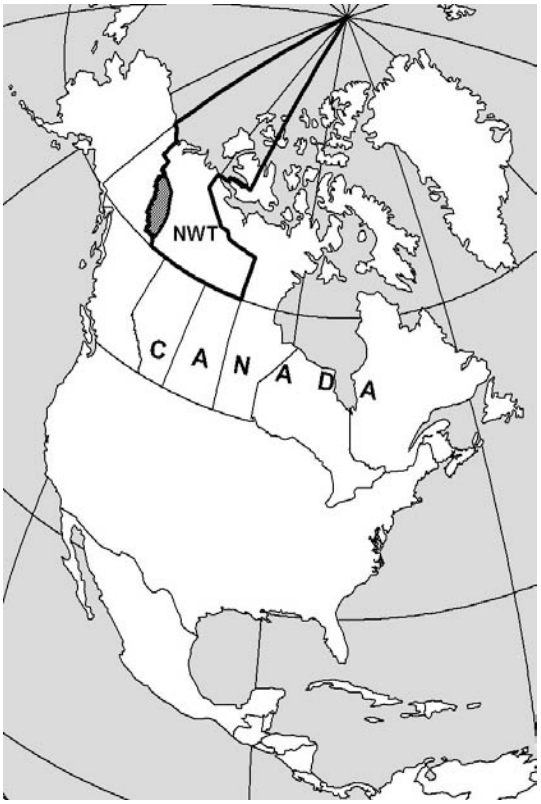

Figure 1. The Mackenzie Mountains in Canada's Northwest Territories

The Mackenzie Mountains cover both the western NWT and eastern Yukon of northwestern Canada. The NWT portion of the range covers approximately 130,000 km^2 between the Mackenzie River and the border with the Yukon. The Mackenzies are a system of irregular mountain masses resulting primarily from deformation and uplift (Simmons 1968). Since they are comprised primarily of limestone, dolomite, and shale they have been heavily eroded, which has produced unstable rubble slopes over large areas (Simmons 1982) and many spectacular canyons, ravines, and rock outcrops. Along the Yukon-NWT border some peaks reach 2700 m and a few active glaciers occur (the Backbone Range), whereas along the eastern front range (the Canyon Range) the topography is generally more gentle (1000-2000 m). The average frost-free season lasts only 70-75 days and total annual precipitation is between 25 and 30 cm (Simmons 1968).

The major large mammal species that occur across most of the mountain range are: Dall's sheep (*Ovis dalli dalli*), mountain-ecotype woodland caribou (*Rangifer tarandus caribou*), moose (*Alces alces gigas*), grizzly bear (*Ursus arctos*), wolf (*Canis lupus*), and wolverine (*Gulo gulo*). The estimated population of Dall's sheep in the Mackenzies is 14,000 to 26,000 (Veitch et al. 2000). Black bears (*U. americanus*) occur at very low density in the southern half of the range (Simmons 1968; Veitch and Simmons 2001). In 1997, a lone bull muskox (*Ovibos moschatus*) was reported at the northern end of the mountain range (Kelly Hougen, Arctic Red River Outfitters, personal communication). This is the only known occurrence of muskoxen in the Mackenzies, but muskox numbers and range are expanding west of Great Bear Lake (Veitch 1997) and animals have been seen near the bank of the Mackenzie River in 2000-2001 (Department of Resources, Wildlife & Economic Development (DRWED) unpublished files).

Reports of mule deer (*Odocoileus hemionus*) have been received in the vicinity of Nahanni Butte at the south end of the range and there have been reports of mule and white-tailed deer within the borders of Nahanni National Park Reserve since the 1970's and 1980's. In recent years both

mule deer and white-tailed deer have been moving northwards in the Yukon (Hoefs 2001) and white-tailed deer along the Mackenzie River Valley in the Northwest Territories (Veitch 2001). Within the last few years, elk (*Cervus elaphus*) have also been seen and harvested near the community of Nahanni Butte at the south end of the Mackenzie Mountains.

There are only two short (<20 km) active roads in the Mackenzie Mountains of the NWT, both along the Yukon-NWT border. In 1943-44, the Canol Road was constructed as part of a project to move oil from Norman Wells across the Mackenzie Mountains to Alaska. At the end of the project in 1945, the road was left to deteriorate over virtually its entire 357 km length on the NWT side of the border (Fradkin 1977), such that now the Canol Heritage Trail in the NWT is considered one of the premier backcountry hikes in North America (Howe 1996). Plans have been developed to make the trail a territorial park (Downie 2003). On the Yukon side, the Canol Road has been maintained as a summer-use road. An all-season highway skirts the southeastern edge of the Mackenzies in the vicinity of the communities of Nahanni Butte and Fort Liard in the NWT, and another summer-use road crosses the Yukon-NWT border at the abandoned mining community of Tungsten west of Nahanni National Park Reserve (Figure 2) and continues for <20 km within the NWT.

No people live year-round within the Mackenzie Mountains; however, recently the mine at Tungsten was re-opened and approximately 100 workers live at the mine site on a scheduled rotational basis. Five communities along the Mackenzie River, with a combined population of 1913 (Government of the Northwest Territories (GNWT) 1996; range 75 to 798), are located within 50 km of the Mackenzies in the NWT. In 1991, 63% of the residents of those communities identified themselves as aboriginal, primarily Dene and Metis (GNWT 1996).

The Tungsten mine, an inactive mine site at MacMillan Pass near the Yukon border on the Canol Road, and exploration at Prairie Creek north of Nahanni National Park Reserve are the principle ongoing industrial activities within the mountains. Many other mining claims have been staked and exploration is ongoing. Recreational tourism is also increasing in the mountains, primarily hunting, fishing, hiking, sightseeing, canoeing, kayaking, and skiing. Snowmobiles and all-terrain vehicles are used along the eastern and western fringes of the mountain range gaining access via summer roads and rivers, and high-powered jet boats are used primarily by subsistence hunters to access the mountains through some of the larger rivers.

All mountain goat populations in the NWT are native - no mountain goats or Dall's sheep have been transplanted to, from, or within the NWT (Veitch 1998). No domestic sheep or goats are farmed anywhere within 50 km of the Mackenzie Mountains in the NWT, nor are there any plans to develop or promote a domestic sheep or goat industry in the NWT (John Colford, Fish/Agriculture Coordinator, DRWED, personal communication).

DISTRIBUTION AND POPULATION ESTIMATE

The main challenge to aerial or ground surveys to assess mountain goat population distribution and numbers in the NWT is their remote location in isolated sections of the Mackenzie Mountains and their low and sparsely distributed numbers. As a result of this inaccessibility, the high cost and safety

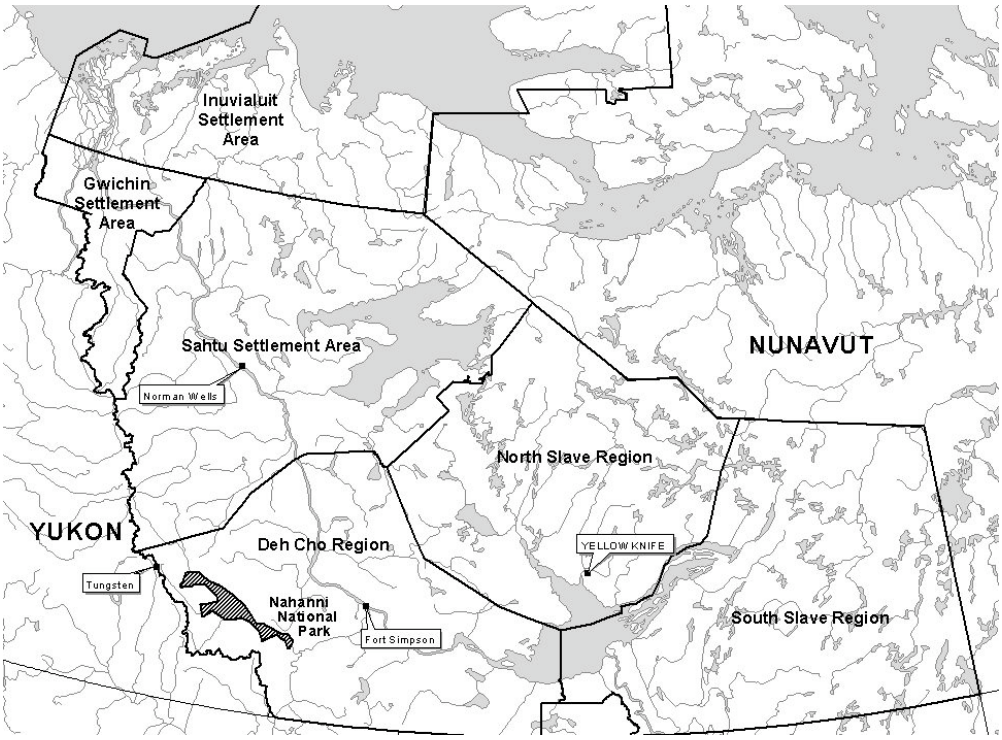

Figure 2. Political regions of Canada's Northwest Territories

risks of doing aerial survey in such a remote area, and the low annual harvest - there has been little goat research done in the Northwest Territories. Biologists working with the Canadian Wildlife Service (CWS), GNWT, and private consulting firms have kept some records of goat observations and numbers during the course of studies on other species – much of this work was done from 1968 through 1973 by Dr. Norm Simmons and his colleagues with the CWS. Their observations were compiled for this report and are included with observations collected from big-game hunting outfitters (discussed below and shown in Figure 4).To date, the only previously published estimate of mountain goats in the Mackenzie Mountains was 400+ for a review of the status of mountain goats in North America by jurisdiction (Johnson 1977). Johnson indicates this estimate was provided by Simmons based on limited work by Simmons and others in the late 1960's to mid-1970's. It was not based on any structured surveys for mountain goats.

Recent interest in the NWT goat population led us to do an informal survey of outfitters. The Association of Mackenzie Mountain Outfitters (AMMO) has 8 members who operate excusive hunting zones across the entire mountain ranges, except within Nahanni National Park Reserve (Figure 3). Some of the outfitters have been operating their zones for two and three decades – thus they have accumulated considerable knowledge about the distribution and numbers of wildlife, particularly big game species, in their zones. We decided that interviews with the

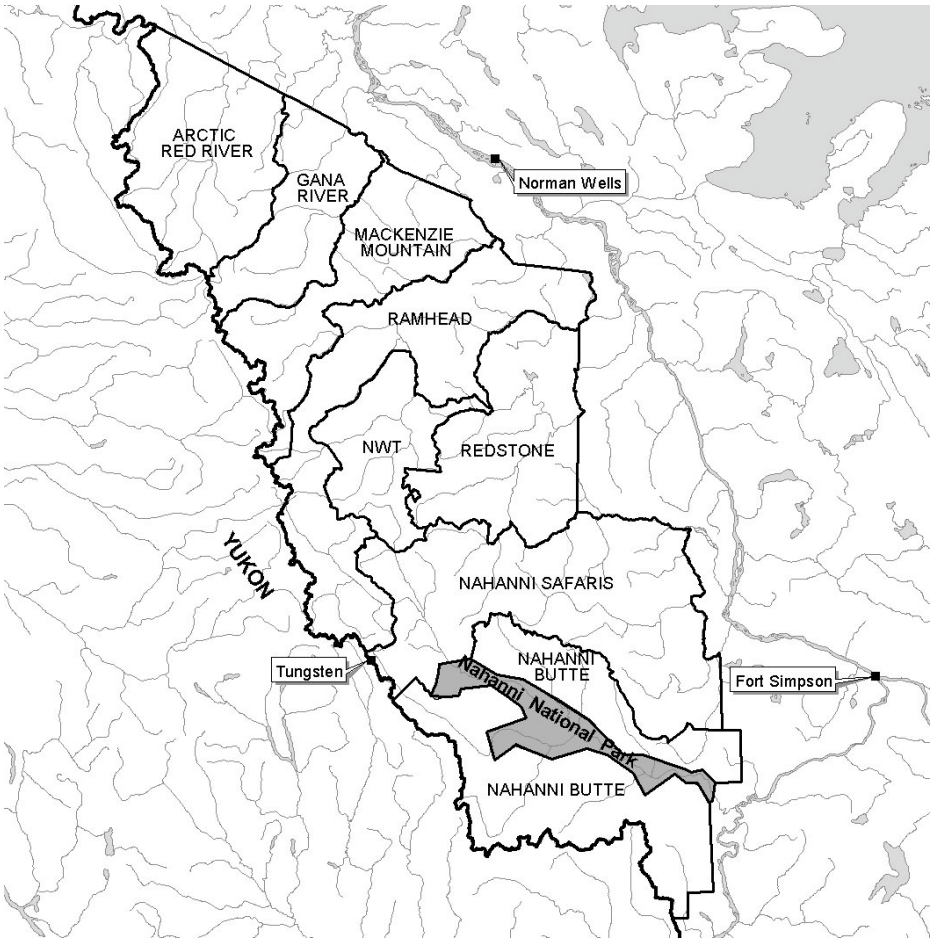

Figure 3. Licensed outfitting zones for non-resident big game hunting in the Mackenzie Mountains, Northwest Territories

outfitters about mountain goats presented a quick and inexpensive alternative to a formal population survey.

In January 2001, all 8 members of AMMO were interviewed by the senior author in Reno, Nevada at the Foundation for North American Wild Sheep's annual convention. Outfitters were asked to provide information on where in their zones mountain goats occur and to estimate numbers of goats within in each of those areas to provide a population estimate for their zone. Using GIS, we had prepared individual topographic maps for each outfitting zone on which all data were recorded.

Five outfitters confirmed having at least some mountain goats within their zones. The core area is from 61° 30' N to 63° 00' N and from 126° 30' W to the Yukon/NWT border (Figure 4). Areas around the headwaters of the South Nahanni River are of particular importance for mountain goats. The total area covered by mountain goats in the NWT is 12,414 km^2, which represents 9.5% of the total area of the Mackenzie Mountains in the NWT and only 1.1% of the total area of the territory (1,171,918 km^2). One outfitter

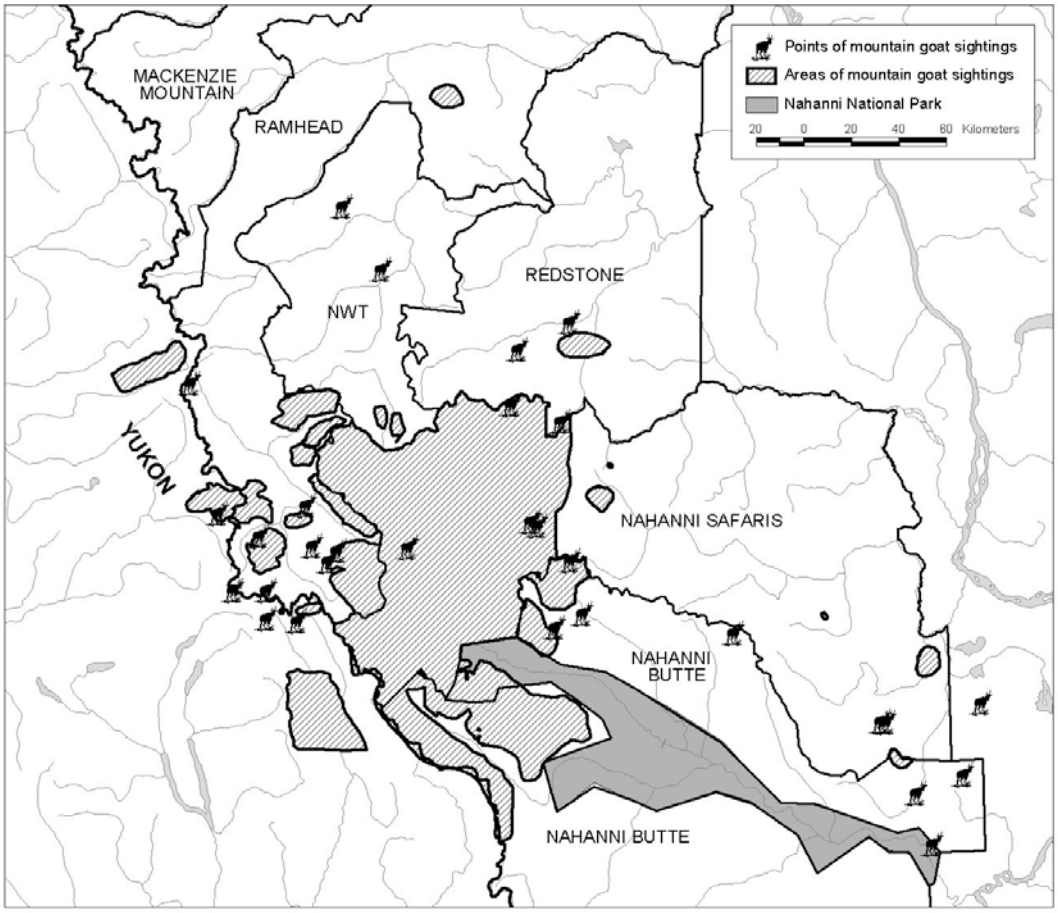

Figure 4. Known current and recent historical mountain goat distribution and sightings in the Mackenzie Mountains, Northwest Territories as recorded by biologists and members of the Association of Mackenzie Mountain Outfitters.

reported that there was a small and isolated group of mountain goats in his zone just north of 64^{o} 00' N from about 1980 to the late 1990's – this is the northernmost reported area with goats in the NWT (Stan Simpson, RamHead Outfitters, personal communication).

Distribution of goats in the Mackenzie Mountains, NWT is patchy, particularly in the north and east sides of the species range in the territory. Hoefs et al. (1977) noted similar distribution patterns in the Yukon and also mentioned that within that territory there were areas where goats had existed in small populations until 'recent history', but had subsequently disappeared.

The outfitters' information provided an estimate of 898 to 919 mountain goats within their operating zones, of which the highest population occurs in the southernmost zone, Nahanni Butte (Table 1). An additional 70 to 80 goats is estimated to occupy Nahanni National Park Reserve, to raise the total estimate for the NWT to 768 to 989 goats.

It is evident from Table 1 that mountain goat densities in the NWT are highly

Table 1. Population estimate and density of mountain goats in the Mackenzie Mountains, Northwest Territories.

Area	Area (km^2)	Area Occupied By Goats (km^2)	Estimated Goat Population	Goat Density (/100 km^2)
Nahanni Butte	21,936	2,243	351-424[a]	15.6-18.9
Nahanni Safaris	24,976	8,461	116-130[a]	1.4-1.5
RamHead	19,697	1,462	200-315[a]	13.7-21.5
Redstone	13,988	<100	1-10[a]	1.0-10.0
NWT	8,109	77	30[a]	39.0
Mackenzie Mountain	12,700	0	0[a]	0
Gana River	9,259	0	0[a]	0
Arctic Red River	14,727	0	0[a]	0
Nahanni National Park Reserve [b]	4,819	171	70-80[b]	40.9-46.8
Total	130,211	12,414	768-989	6.2-8.0

Data sources:
[a] Personal interview with license-holder January, 2001
[b] Comin, L, A. Cochrane, S. Cooper, C. Hammond, and T. Elliot. 1981.

variable. The highest density recorded is within the borders of Nahanni National Park Reserve with 41 to 47 goats/100 km^2; however, only a relatively small proportion of the park (3.5%) is occupied by mountain goats. Discussions and negotiations are underway between Parks Canada and the First Nations of the Deh Cho that may see a significant increase in the size of NNPR, with potential for much more of the NWT's best habitat for mountain goats to be put under protection.

HARVEST

The hunting license year in the NWT runs from 01 July to 30 June and those who wish to hunt big game within the territory must annually obtain a big game hunting license and be at least 16-years-old (GNWT 2001). There are four classes of licensed big game hunters in the NWT:

1) *General* – subsistence harvesters (primarily aboriginal people)
2) *Resident* - Canadian citizens or landed immigrants who have lived in the NWT for at least two consecutive years prior to application for the license;
3) *Non-resident* - Canadian citizens or landed immigrants who live outside the NWT, or have not lived within the NWT for two consecutive years prior to application for the license; and
4) *Non-resident Alien* - non-Canadian citizens or landed immigrants.

All non-residents and non-resident alien hunters must use the services of an outfitter and must be accompanied by a licensed guide at all times while hunting. For simplification, we will call both non-resident and non-resident alien hunting license holders 'non-residents' and combine their harvest statistics. The season for mountain goats for both resident and non-resident

hunters lasts from 15 July to 31 October and there is a bag limit of one goat per year (any age and sex). A tag for mountain goats costs ^{CAN}$10.00 for residents, ^{CAN}$20.00 for non-residents, and ^{CAN}$50.00 for non-resident aliens. All non-resident hunters must also pay a trophy fee of ^{CAN}$200.00 to the Government of the NWT upon harvest of a mountain goat; resident hunters are not required to pay a trophy fee.

Resident and non-resident hunters are allowed to hunt for mountain goats within all eight outfitting zones in the Mackenzie Mountains but are not allowed to hunt within the borders of Nahanni National Park Reserve (NNPR). However, holders of a General Hunting License are permitted to hunt within NNPR.

Annual harvest data for mountain goats are obtained by several different methods dependent on license class and jurisdiction. Within the Sahtu Settlement Area (Figure 2), monthly harvest by beneficiaries of the Sahtu Dene and Metis Comprehensive Land Claim (Government of Canada 1993), or those that provide for beneficiaries of that claim, are recorded by the Sahtu Settlement Harvest Study – a project run by the Sahtu Renewable Resources Board (Tulita, NT). Subsistence harvest data within the Deh Cho Region (Figure 2) are estimated by staff with the Department of Resources, Wildlife & Economic Development (DRWED) and within Nahanni National Park Reserve (Figure 2) subsistence harvests of mountain goats are estimated by park staff.

Resident hunter tag sales and harvest data are maintained by staff with DRWED in Yellowknife; harvest is recorded by a questionnaire mailed out at the end of each hunting season. Submission of this form to DRWED by resident hunters is voluntary; follow-up letters and duplicate forms are sent to non-respondents at 6 and 12 weeks after the initial mailing.

Outfitters are required to collect and submit non–resident harvest data to DRWED as a condition for their holding an outfitting license. Outfitters must submit a report to the GNWT for every client for whom they provide outfitting services whether the client harvests any animals or not. In addition, hunters with outfitters may submit a voluntary 'Wildlife Observation Report' to DRWED using a standard form prepared by DRWED staff and sent to the outfitters annually. These data are compiled in an annual summary report on hunting activities in the Mackenzie Mountains (e.g., Veitch and Simmons 2001).

Non-resident Hunter Harvest

The Mackenzie Mountains were designated as a Game Preserve in 1938 in order to protect the hunting grounds of Dene living in villages along the Mackenzie River (Simmons 1968). However, local use of the mountains for hunting and subsistence had declined substantially by the early 1950's and the Game Preserve status was removed in 1953. In 1965, the Mackenzie Mountains were opened to non-resident sport hunting and have remained open to this activity since then. Each outfitter is responsible for management of his area to ensure that hunting activity is spread out and localized over-harvest does not occur.

Dall's sheep and mountain-ecotype woodland caribou are by far the most popular species sought-after by outfitted hunters. For the 1999-2001 hunting seasons, 69% of license-holders purchased tags for Dall's sheep, 59% for woodland caribou, 20% for moose, 38% for wolf, 24% for wolverine, and only 3% for mountain goat.

Table 2. Non-resident harvest of mountain goats in the Mackenzie Mountains, NWT: 1967 to 2001.

Period	Tags Sold	Males	Females	Unknown	Total
1967-1971	No Data	17	12	6	35
1972-1976	No Data	6	5	19	30
1977-1981	No Data	8	4	4	16
1982-1986	No Data	3	1	3	7
1987-1991	No Data	4	5	12	21
1992-1996	113	10	12	7	29
1997-2001	83	7	2	2	11
Total		55	41	53	149

The low interest in mountain goat hunts may be attributed to the expense of accessing remote and rugged mountain goat territory and the fact that no mountain goat taken in the NWT has made it into the Boone and Crockett record book (Byers and Bettas 1999)

Although current levels of mountain goat hunting are low, this has not always been the case (Table 2). The highest recorded harvest by non-residents in one year was in 1972 when 11 mountain goats were taken. Conversely, in 1976, 1985, and 1987 no mountain goats harvests were recorded.

As there is little difference in the body shape and horn length of male and female mountain goats, it is difficult to differentiate sex of the animal from a distance (Rideout 1978). The difficulty hunters have in identifying sex is reflected in the statistics of harvested animals. For goats harvested and for which sex was known, 43% were female (Table 2).

Considerable fluctuation is evident between and within outfitting zones in terms of harvest pressure since 1967 (Table 3). Two outfitting zones – Nahanni Butte and Nahanni Safaris, account for 74% of all mountain goats harvested. For the three zones that have harvested virtually all of the goats taken by non-residents, it is apparent that there are considerable shifts in numbers of goats taken over the five-year intervals starting in 1967. The reason for these fluctuations is unknown.

Hunter harvest success was estimated by comparison of tag sales for mountain goats with actual harvest for the period 1991 to 2001. During this period, an annual mean of 18.7 $\pm$ 9.9 tags were purchased (range 6 to 35 tags) while the mean annual harvest has been 4.1 $\pm$ 2.5 goats (range 1 to 9 goats), which gives a success rate of approximately 22%.

Resident and Subsistence Hunter Harvest

Since access to mountain goat populations is both difficult and expensive, and as mountain goat meat has a rather poor reputation, hunters from the NWT are much less likely to hunt mountain goats than non-resident hunters.

We were unable to locate any records or personal accounts of mountain goats taken

Table 3. Non-resident harvest of mountain goats by outfitting zone in the Mackenzie Mountains, NWT: 1967 to 2001.

Period	Nahanni Butte	South Nahanni	RamHead	Redstone	Mackenzie Mountain
1967-1971	13	21	0	0	1
1972-1976	0	27	0	0	3
1977-1981	3	7	3	1	0
1982-1986	0	5	0	0	0
1987-1991	0	4	17	0	0
1992-1996	7	10	12	0	0
1997-2001	1	9	1	0	0
Total[a]	24	83	33	1	4

[a] an additional 4 goats were taken for which outfitting zone of harvest was unknown

Table 4. Tag sales and Resident Hunter Harvest of Mountain Goats in the Mackenzie Mountains, NWT: 1982 to 2001.

Year	No. Tags Sold	Reported Harvest	Estimated Total Harvest
1982	25	0	3
1983	21	5	7
1984	35	3	3
1985	35	3	4
1986	20	1	2
1987	10	0	0
1988	6	0	0
1989	20	0	0
1990-1995	55	0	5
1996-2001	15	0	1
Total	242	12	25

by subsistence hunters in the Deh Cho, Sahtu, or Gwich'in areas. Parks Canada officials are not aware of any harvest of mountain goats occurring within Nahanni National Park Reserve. The Sahtu Settlement Harvest Study recorded

subsistence harvest for Sahtu Dene and Metis beneficiaries from 1999 to 2001 – no mountain goats were reported as harvested by that study (Bayha and Snortland 2002; Bayha 2003).

Interest in hunting mountain goats by Resident hunters occurred primarily in the 1980's during which a mine was operated at the community of Tungsten on the Yukon-NWT border (Figure 2). The population of the town grew to 450 during the mine's operating peak, but was reduced to zero when the mine closed in 1987. Tungsten's residents would have had the closest access to mountain goat populations. The mine recently reopened; however, it is unlikely that any mine workers will qualify for Resident hunter status as the company uses rotational shift workers rather than re-opening the community (Paul Kraft, Superintendent – DRWED, Deh Cho Region, personal communication).

Mountain goats were removed from the Resident Hunter questionnaire in 1990 because the questionnaire is not structured in such a way as to provide unbiased estimation of those species for which harvest is sporadic and rare (Ray Case, Manger – Technical Support, DRWED, Yellowknife, personal communication). Because of the nature of the survey and of resident mountain goat hunting, the numbers of goats 'estimated' as being harvested (Table 4) is also likely to be biased (Ray Case, personal communication).

Hunter success by resident hunters has remained low since 1982, with an overall rate of 10.3%. This is the lowest estimated success rate for NWT Resident hunters recorded for any big game species.

In summary, for the 35-year period 1967 to 2001, we have records of at least 174 mountain goats harvested, of which 86% were taken by non-resident hunters.

Characteristics of Harvested Mountain Goats in the NWT

There has been limited information of age, sex, and measurements compiled for mountain goats in the Mackenzie Mountains. Outfitters record horn length of the goat following a kill by a non-resident hunter. No mountain goat harvested within the NWT is recorded in the top 500 mountain goat trophies in the record book of the Boone and Crockett Club (Byers and Bettas 1999).

Of 31 male mountain goats with right horn length measurements recorded, the mean is 20.3 $\pm$ 2.5 cm; 6 had horns $\geq$ 23.0 cm. For 28 female mountain goats with right horn length measurements recorded, the mean is 19.5 $\pm$ 2.5 cm; 2 had horns $\geq$23.0 cm (Table 5). Growth curves for Yukon mountain goats based on horn length found that females with horns that are 19.5 cm in length are between 4 to 5 years of age, whereas males with slightly larger horns (20.3 cm) are approximately 3 to 4 years of age (Hoefs et al. 1977).

Aging of mountain goats by tooth cementum was done on 17 of 18 mountain goats taken by non-resident hunters in 1972 and 1975. That study found males ranged in age from 3 to 7 years of age and females ranging in age from 2 to 12 (Murphy 1976). The mean age was 5.4 years (N = 11) and 5.0 years (N = 6) in 1972 and 1975, respectively.

ACKNOWLEDGEMENTS

We extend our appreciation to all members of the Association of Mackenzie Mountain Outfitters for their providing details about mountain goat distribution and numbers in each of their outfitting zones. Suzanne Carriere and Adrian d'Hont (Department of Resources, Wildlife &

Table 5. Horn length data for mountain goats harvested by non-resident hunters in the Mackenzie Mountains, NWT: 1967 to 2001.

Period	N	Length Right Horn (cm)	
		Mean	SD
1972-1976	16	19.5	2.4
1977-1981	12	20.2	1.9
1982-1986	4	19.7	2.4
1987-1991	17	20.7	17
1992-1996	19	21.1	2.5
1997-2001	11	19.4	4.2
Total	79	20.3	2.4

Economic Development, Yellowknife, NT) provided recent Resident hunter harvest data. We thank Janet Bayha and Jody Snortland (Sahtu Renewable Resources Board) for searching their records to determine subsistence harvest of mountain goats by beneficiaries of the Sahtu Dene and Metis Comprehensive Land Claim. Finally, we acknowledge Steve Cote whose enquiries about the status of mountain goats in the NWT initiated the process that ended with this paper.

LITERATURE CITED

BAYHA, J. AND J. SNORTLAND. 2002. Sahtu Settlement Harvest Study Data Report 1998 & 1999. Sahtu Renewable Resources Board, Tulita, NT. 59 pp.

BAYHA, J. 2003. Sahtu Settlement Harvest Study Update 1998-2001. Unpublished report. Sahtu Renewable Resources Board, Tulita, NT. 25 pp.

BYERS, C. R. AND G. A. BETTAS. 1999. Records of North American Big Game. 11th Edition. Boone and Crockett Club, Missoula, MT. 712 pp.

COMIN, L, A. COCHRANE, S. COOPER, C. HAMMOND, AND T. ELLIOT. 1981. Large mammal distribution and abundance in Nahanni National Park. Unpublished report, Parks Canada, Fort Simpson, NT. 59 pp.

DOWNIE, B. K. 2003. The Canol Heritage Trail and Dodo Canyon Territorial Park. Draft management plan (4th ed.) prepared for the Canol Territorial Park Management Committee, Norman Wells and Tulita, NT and amended by the Do e do Territorial Park Committee. 34 pp.

FRADKIN, P. L. 1977. The first and forgotten pipeline. Audobon 79: 58-79.

GOVERNMENT OF CANADA. 1993. Sahtu Dene and Metis comprehensive land claim agreement, volume 1. Indian Affairs and Northern Development, Ottawa, ON. 125 pp, 4 appendices.

GOVERNMENT OF THE NORTHWEST TERRITORIES. 1996. Northwest Territories by the numbers. Bureau of Statistics, Yellowknife, NT. 27 pp.

GOVERNMENT OF THE NORTHWEST TERRITORIES. 2001. Summary of hunting regulations. Department of Resources, Wildlife and Economic Development, Yellowknife, NT. 24 pp.

HOEFS, M. 2001. Mule, *Odocoileus hemionus*, and white-tailed, *O. virginianus*, deer in the Yukon. Canadian Field-Naturalist 11: 296-300.

HOEFS, M., G. LORTIE, AND D. RUSSELL. 1977. Distribution, abundance, and management of mountain goats in the Yukon. Pp. 47-53 *in* Proceedings of 1st International Mountain Goat Symposium, Kalispell, MT. 19 Feb 1977, BC Fish and Wildlife Branch, Vancouver, BC. 243 pp.

HOWE, S. 1996. This is no picnic. pp. 64-70 and 106 *in* Backpacker, August 1996.

JOHNSON, R. L. 1977. Distribution, abundance and management status of mountain goats in North America. 1st International Mountain Goat Symposium. 11pp.

MURPHY, D. F. 1976. An assessment of non-resident sport hunting in the Mackenzie Mountains, Northwest Territories. M.S. Thesis. York University, Downsview, ON. 258 pp.

SIMMONS, N. M. 1968. Big game in the Mackenzie Mountains, Northwest Territories. pp. 35-40 *in* Transactions of 32nd Federal-Provincial Wildlife Conference, Whitehorse, YT

SIMMONS, N. 1982. Seasonal ranges of Dall's sheep, Mackenzie Mountains, Northwest Territories. Arctic. 35: 512-518.

SIMMONS, N. M., M. B. BAYER, AND L. O. SINKEY. 1984. Demography of Dall's sheep in the Mackenzie Mountains, Northwest Territories. Journal of Wildlife Management 48: 156-162.

VEITCH, A. M. AND E. SIMMONS. 2001. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary – 2000. Dept. of Resources, Wildlife, and Economic Development Manuscript Rep. No. 141, Norman Wells, NT. 37 pp.

VEITCH, A. M., E. SIMMONS, J. ADAMCZEWSKI, AND R. POPKO. 2000. Status, harvest, and co-management of Dall's sheep in the Mackenzie Mountains, NWT. Northern Wild Sheep and Goat Council 11: 134-153.

VEITCH, A. M. 1997. An aerial survey for muskoxen in the northern Sahtu Settlement Area, March 1997. Department of Resources, Wildlife and Economic Development Manuscript Report 103, Norman Wells, NT. 42 pp.

VEITCH, A. M. 1998. History of transplanting mountain goats and mountain sheep – Northwest Territories. Biennial Symposium of Northern Wild Sheep and Goat Council 10: 188-189.

VEITCH, A. M. 2001. An unusual record of a white-tailed deer, *Odocoileus virginianus*, in the Northwest Territories. Canadian Field-Naturalist 115: 172-175.