

STATUS, HARVEST, AND CO-MANAGEMENT OF DALL'S SHEEP IN THE MACKENZIE MOUNTAINS, NORTHWEST TERRITORIES

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Abstract: the Mackenzie Mountains of the western Northwest Territories (NWT) cover an area of approximately 140,000 km² between the Mackenzie River and the Yukon-NWT border. The mountain range is uninhabited and has no roads, which make the Mackenzies one of North America's most pristine wilderness areas. Ten aerial and ground surveys to count and classify Dall's sheep (*Ovis dalli dalli*) have been done since 1966. We estimate that there are currently 14,000 to 26,000 sheep in the NWT portion of the Mackenzie Mountains. The Government of the NWT (GNWT) opened the Mackenzie Mountains to non-resident hunting in 1965 and Dall's sheep quickly became the principal trophy species sought by sport hunters. Non-residents must hunt with one of eight licenced outfitters, each of whom has the exclusive privilege of providing outfitting services in their designated zone. Licenced non-resident hunters are permitted to take one adult male sheep per year, with minimum ¾ curl horns during a season that lasts from 15 July to 31 October. From 1991 to 1996 an annual mean of 194 rams were harvested by non-residents. In 1997 the mean age and right horn length of harvested rams were 10.0 years and 89.9 cm, respectively; the average age of harvested rams has increased 1.5 years since 1980. Resident hunters generally take 10-20 rams per year. Subsistence harvest is unrestricted by season, numbers, age, or sex, but only 10-30 sheep are estimated to be taken annually. The current total annual harvest removes 0.8 to 1.6% of the population and appears to be sustainable. Some areas nearer communities receive heavier hunting pressure and local management concerns exists. Through the co-management process we have developed a program of ground surveys for sheep in four mountain blocks. Sahtu Dene and Metis land claim participants have been trained in data collection and are actively involved in obtaining needed data on sheep population dynamics.

Key words: Dall's sheep, *Ovis dalli*, Northwest Territories, Mackenzie Mountains, status, harvest, management, co-management

INTRODUCTION

The Mackenzie Mountains straddle the Yukon-NWT border in northwestern Canada. The NWT portion of the range covers approximately 140,000 km² between the Mackenzie River on the east and the Yukon-NWT border on the west (Figure 1). Dall's sheep are the only species of mountain sheep that occur in the NWT and occupy the Mackenzie Mountains (Figure 2) and the more northerly Richardson Mountains west of the Mackenzie River delta. All mountain sheep populations in the NWT are native - no sheep have been transplanted to, from, or within either the Mackenzie or Richardson Mountains (Veitch 1998).

The Mackenzie Mountains are a system of irregular mountain masses resulting primarily from deformation and uplift (Simmons 1968). Since the Mackenzies are comprised primarily of limestone, dolomite, and shale they are easily eroded, which has produced unstable rubble slopes over large areas (Simmons 1982a) and many spectacular canyons, ravines, and rock outcrops. Along the Yukon-NWT border some peaks reach 2700 m and a few active glaciers occur, whereas along the eastern front range the topography is more gentle (1000-2000 m) and considerable high quality Dall's sheep summer range is provided on alpine meadows. 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, woodland caribou (*Rangifer tarandus caribou*), moose (*Alces alces gigas*), grizzly bear (*Ursus arctos*), wolf (*Canis lupus*), and wolverine (*Gulo gulo*). Mountain goats (*Oreamnos americanus*) occupy high country in the southwest along the Yukon-NWT border and black bears (*U. americanus*) occur at very low density in the southern half of the range (Simmons 1968; Veitch and Popko 1997). During the 1997 hunting season 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 this species in the Mackenzies, but musk ox numbers and range are expanding east of the Mackenzie River (Veitch 1997). Reports of mule deer (*Odocoileus hemionus*) have been received in the Nahanni Butte area at the south end of the mountain range (Simmons 1968).

There are no active roads in the Mackenzie Mountains of the NWT. In 1943-44, the Canol Road (Figure 2) 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 its 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 are being developed to make the trail a territorial park (Downie 1997). 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 reaches the Yukon-NWT border at the abandoned mining community of Tungsten west of Nahanni National Park (Figure 2).



Figure 1. Mackenzie Mountains, NWT.

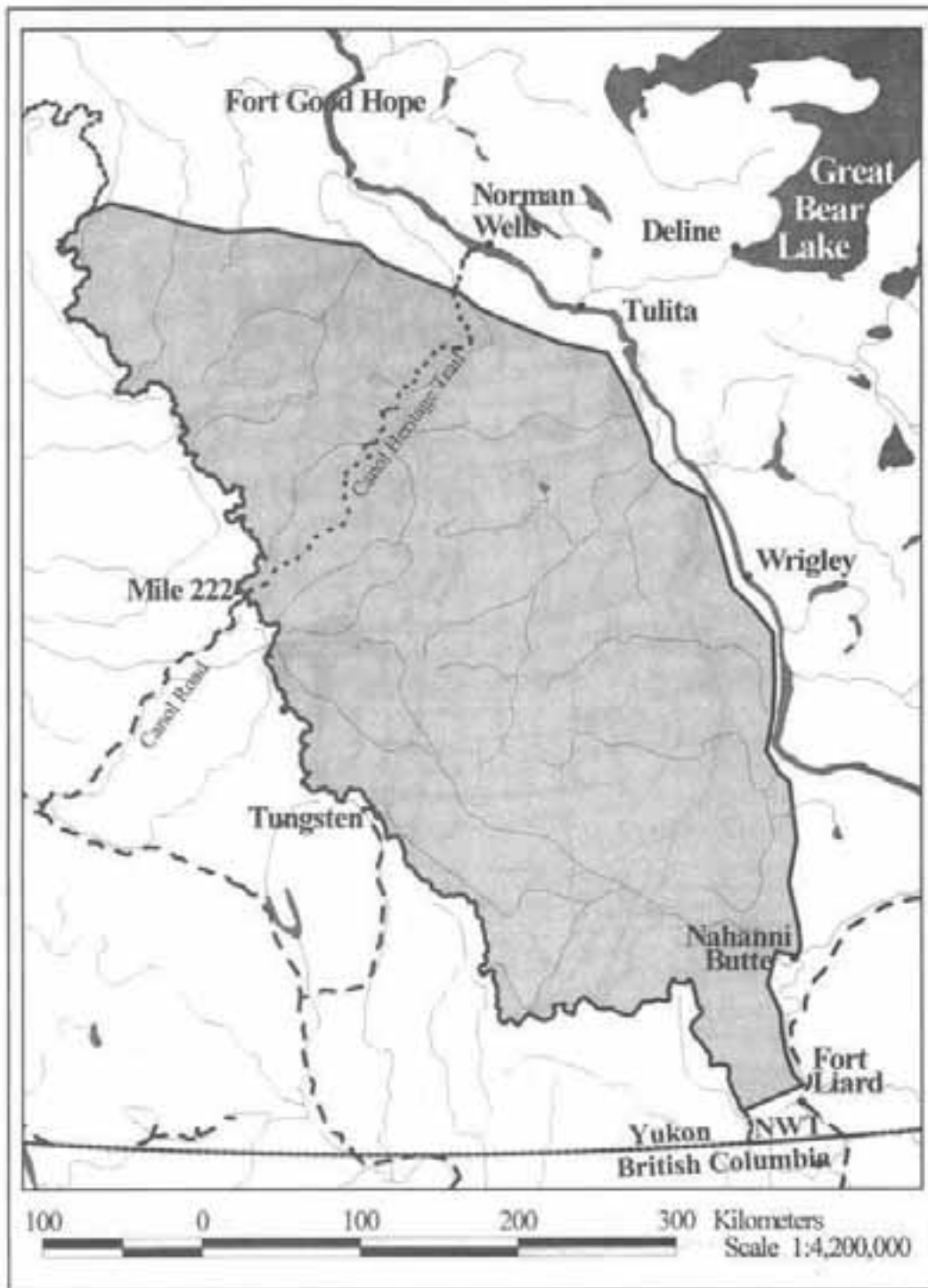


Figure 2. Range of Dall's sheep in the Mackenzie Mountains, NWT

Five communities along the Mackenzie River, with a combined population of 1913 (GNWT 1996; range 75 to 798), are located within 50 km of the Mackenzie Mountains in the NWT (Figure 2). In 1991, 63% of the residents of those communities identified themselves as aboriginal, primarily Dene and Metis (GNWT 1996).

With the closure of mines at Tungsten and Mile 222 on the Canol Road there are no ongoing industrial activities within the mountains. The primary human activities that occur in the mountains are hunting, fishing, hiking, sightseeing, 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 jet boats are used primarily by subsistence hunters to access the mountains through some of the larger rivers. 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 a domestic sheep or goat industry in the NWT (John Colford, Fish/Agriculture Coordinator, GNWT, personal communication).

POPULATION STATUS

No surveys have been done to estimate numbers of Dall's sheep across the entire Mackenzie Mountains; however, 10 aerial and ground surveys to count and classify sheep have been done within several study areas from the mid-1960's to 1997 (Table 1; Figure 3). We can use those to derive a crude population estimate.

We have surveyed 10,202 km² (7.3% of the mountain range) and estimated densities have ranged from 19 to 53 sheep per 100 km² (Table 1). The 1988 survey in E1-1 over a 4956 km² area included unusable to prime sheep habitats and resulted in an average density of 19 sheep per 100 km² (Latour 1992). Applying this density to the 140,000 km² total area of the Mackenzie Mountains in the NWT gives an estimate of 26,600 Dall's sheep.

Most surveys focus on areas of good sheep summer habitat. If we assume that about 25% of the Mackenzie Mountains is good summer habitat (cf. Simmons 1982a) then we can calculate another population estimate. The mean density of the 10 surveys on summer range is 39 ± 12 sheep per 100 km², which gives an estimate of 13,650 Dall's sheep on 35,000 km² of summer range.

Because of the assumptions and limitations of both these procedures we suggest there are between 14,000 and 26,000 sheep in the Mackenzie Mountains, NWT. We have no measure of population trend. In future, once LANDSAT Thematic Mapper digital satellite images for the Mackenzie Mountains have been classified, we will be able to refine our estimates of suitable sheep habitat. The combination of quantified habitat information with detailed population survey data will produce more accurate and precise estimates of Dall's sheep within the Mackenzie Mountains of the NWT.

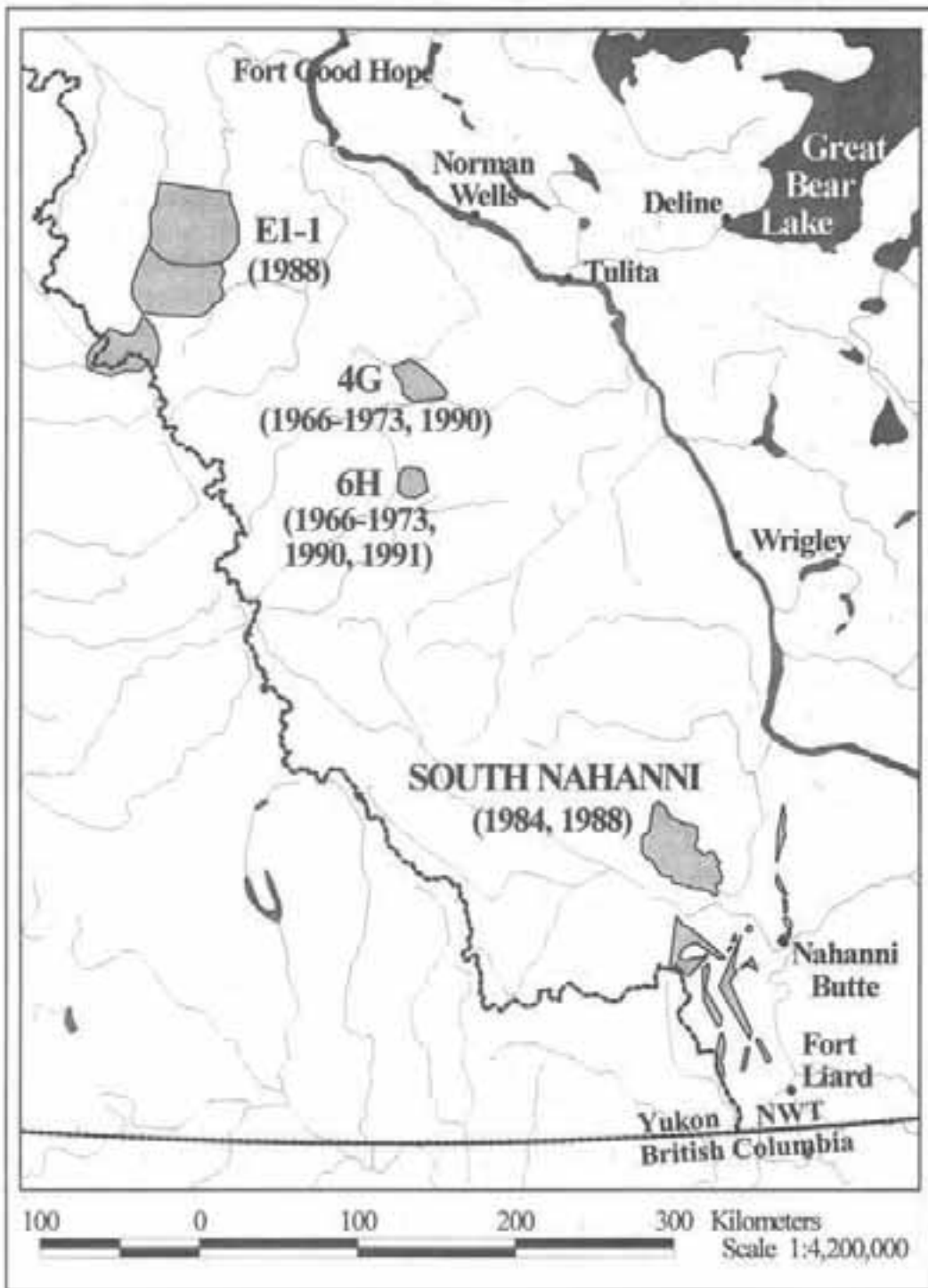


Figure 3. Dall's sheep study areas in the Mackenzie Mountains, NWT: 1966 - 1991.

Table 1. Dall's sheep surveys in the Mackenzie Mountains, Northwest Territories: 1966 to 1997.

Location	Year(s)	Month	Survey Type	Total Area (km ²)	Density (sheep/km ²)	Reference
Unit 4G	1966 to 1973	Feb & Jul	Fixed-wing	236	0.47	Simmons et al. 1984
Unit 6H	1966 to 1973	Feb & Jul	Fixed-wing	196	0.51	Simmons et al. 1984
South Nahanni	1984	Jun	Helicopter	1100	0.51	Ferguson et al. 1987
South Nahanni	1984 to 1988	Jun	Helicopter	2900	0.30	Case 1989
Zone E1-1	1988	Jun	Helicopter	4956	0.19	Latour 1992
Unit 4G	1990	Jun	Helicopter	236	0.25	Shank et al. 1993
Unit 6H	1990	Jun	Helicopter	196	0.43	Shank et al. 1993
Unit 6H	1991	Jun	Helicopter	196	0.41	Shank et al. 1993
Katherine Ck.	1997	Apr	Ground	423	0.31	R. Popko, unpubl. Data
Palmer Lake	1997	Sep	Ground	391	0.53	R. Popko, unpubl. Data

Our density estimates from our 10 aerial and ground surveys are comparable with aerial survey results for Dall's sheep from Alaska's Western Brooks Range (19-53 sheep/ 100 km²; Hicks 1996), Gates of the Arctic National Park (29 sheep/ 100 km²; Hicks 1996), Wrangell-St. Elias National Park (41-43 sheep/100 km²; Strickland et al. 1992), and Kenai National Wildlife Refuge (64 sheep/ 100 km²; Strickland 1994), and from the Richardson Mountains of the northern Yukon and NWT (29 sheep/ 100 km²; Barichello et al. 1987).

HARVEST

Regulations

There are four classes of big game hunting licences in the NWT (GNWT 1998):

- 1) General - holders are not restricted by season, by number of animals they may take, or by age/sex classes. These are primarily aboriginal people, but some long-term non-aboriginal residents also have these licences. This is the subsistence harvest.

- 2) Resident - Canadian citizens or landed immigrants to Canada that have resided in the NWT for at least 2 consecutive years before applying for a licence;
- 3) Non-resident - those who have not lived in the NWT for at least 2 consecutive years before applying for a licence, and who are either Canadian citizens or landed immigrants to Canada;
- 4) Non-resident Alien - those who are not either Canadian citizens or landed immigrants to Canada.

The Mackenzie Mountains were first opened to non-residents and non-resident aliens for hunting big game in 1965 (Simmons 1968). Applicants for resident, non-resident, and non-resident alien hunting licences must be at least 16-years-old when they apply. Non-resident and non-resident alien hunters must use the services of a licensed outfitter, and must be accompanied by a licensed guide during their hunt. Outfitter and guide licences are issued by the GNWT. There are eight licensed outfitters for Dall's sheep in the Mackenzie Mountains and each has the exclusive privilege to provide outfitting services within their zone (Figure 4). Resident hunters do not require the services of either an outfitter or guide.

The season for Dall's sheep for resident, non-resident, and non-resident alien hunters lasts from 15 July to 31 October and each tag holder is allowed to take one adult male Dall's sheep with minimum $\frac{3}{4}$ curl horns per year. General hunting licence holders are not restricted in numbers of sheep they may take, by season, or by age or sex class. There is no quota for the total number of sheep that can be taken annually by outfitted hunters or by residents. Hunting by non-residents, non-resident aliens, and residents is not permitted within Nahanni National Park (Figure 5), but aboriginal general hunting licence holders have the right to harvest in the park for subsistence purposes (S. Catto, Director of Warden Services, Nahanni National Park, personal communication).

Harvest data from non-resident and non-resident alien hunters has been collected since 1965 (Latour and MacLean 1994; Veitch and Popko 1996a, 1997). Since 1996, as a condition of their licence, outfitters are required to submit a report to the GNWT for every client for whom they provide outfitting services whether the client harvests or not. Resident hunters receive a mailed questionnaire from the GNWT at the end of each hunting season; letters and duplicate forms are sent to non-respondents at 6 and 12 weeks after the initial mailing. In the past, subsistence harvest has been estimated by GNWT officers in communities along the Mackenzie River valley. Currently, detailed 5-year harvest studies to document total subsistence harvest of all big and small game are being done in the Sahtu and Gwich'in land claim settlement areas (Figure 5). Completion of these studies will refine our subsistence harvest data.

Hunting Pressure

Non-residents and non-resident aliens purchased an annual mean of 363 Mackenzie Mountain big game hunting licenses from 1991 to 1997 (Table 2). Dall's sheep have continued to be the most sought after trophy by sport hunters since the inception of hunting in 1965 (Table 2). In



Figure 4. Outfitter zones for non-resident and non-resident alien Dall's sheep hunting, Mackenzie Mountains, NWT.

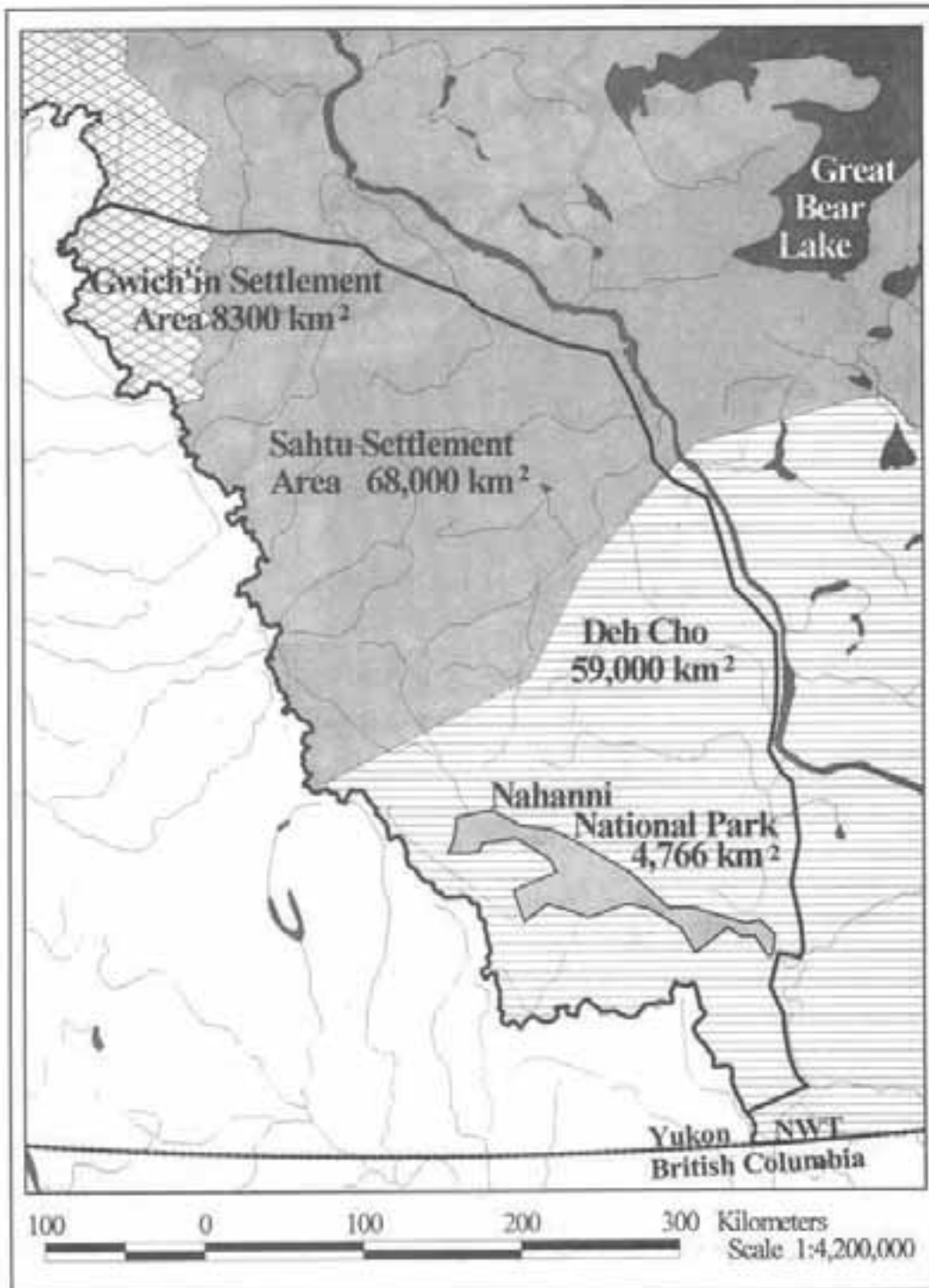


Figure 5. Administrative areas of the Mackenzie Mountains, NWT.

1996, tags to hunt Dall's sheep were purchased by 65% ($n = 252$) of 387 non-resident and non-resident alien licence holders (Veitch and Popko 1997). At least 230 (91%) of those spent some time sheep hunting and they harvested 201 rams for an 87% success rate. The average length of a guided sheep hunt in 1996 was 5.0 ± 3.0 days (range 1 to 13 days).

Table 2. Outfitted non-resident and non-resident alien hunter harvests in the Mackenzie Mountains, Northwest Territories: 1991-1997

Year	Licensed Hunters	Dall's Sheep Harvest	Woodland Caribou Harvest	Moose Harvest
1991	354	170	175	40
1992	364	203	142	32
1993	382	191	189	56
1994	355	195	164	46
1995	344	190	180	49
1996	387	201	172	47
1997	352	209	168	44
Mean	363	194	170	45

Over the last seven years the average annual harvest by outfitted hunters was 194 rams (Table 1). The consistency in annual harvest (range 170 to 209) is maintained primarily by the logistical constraints imposed in the number of hunters outfitters can get into the field (K. Hougen, personal communication). It is this limitation that has made the imposition of quotas on outfitters unnecessary. Due to the exclusive licence given to outfitters for provision of outfitting services within their zones, each outfitter is responsible for management of his area to ensure that hunting activity is spread out and localized overharvest does not occur.

From 1982 to 1992 an average of 26 resident hunters per year hunted Dall's sheep in the Mackenzie Mountains and they harvested a mean of 13 ± 7.6 (SD; range 1-29) rams (Table 2). Sixty-four resident licence holders bought sheep tags in 1996, 32 hunted sheep, and 7 (22%) harvested rams (A. Veitch, unpublished data).

Because of the relative inaccessibility of the mountains without the use of aircraft, Dall's sheep hunting is not a common activity among subsistence harvesters in the NWT. The annual harvest is estimated to be 10 to 30 animals (Case 1990), of which no more than 5 are taken within Nahanni National Park (S. Catto, personal communication). The subsistence harvest includes an unknown number of adult females and juveniles in addition to adult males. Subsistence harvest tends to be concentrated near lakes and navigable rivers along the eastern front range. It does not appear that locations or numbers of sheep taken by subsistence harvesters have changed

appreciably since the mid-1960's. For the 1964-65 and 1965-66 hunting seasons 12 and 4 sheep were taken, respectively (Simmons 1968); hunters did 88% of the harvest from Tulita, with the remainder by hunters from Nahanni Butte.

Characteristics of Harvested Rams

Since 1965 a minimum of 3192 rams has been harvested by non-resident and non-resident alien hunters in the Mackenzie Mountains (Table 3). The majority of these have been aged and measured by government biologists, technicians, and officers when hunters had a legal identification plug inserted in the horns and paperwork was done for export. Age was determined from counts of horn annuli (1965-1997) and by counts of cementum annuli from incisors extracted from the lower jaw 1981-1988 (Latour and MacLean 1994). Ages determined by horn annuli did not differ from age determined by cementum annuli, so age is now determined from horn annuli alone. Total contour length (outer circumference) of both horns was measured using a cloth tape placed at the front and base of the horn and run along the top edge of the horn back to the tip. No significant difference has been found between the average length of the left and right horns (Latour and MacLean 1994; Veitch and Popko 1996, 1997).

The average length of horns has remained consistent while the average age has increased from a mean of 8.5 between 1981 and 1985 to 10.0 in 1997 (Table 4). Outfitters now encourage their hunters and guides to seek out older rams as opposed to just those with the longest horns (K. Hougen, personal communication), which helps explain the marked increase in the average age of harvested rams. However, studies in the Yukon have shown that 'cohort pulses' where large

Table 3. Resident hunter statistics for Dall's sheep, Mackenzie Mountains, Northwest Territories, 1982-1992 (source: Government of the Northwest Territories 1994).

Year	Number That Hunted	Harvest	Success Rate
1982	28	16	57
1983	53	29	55
1984	24	11	46
1985	30	13	43
1986	22	7	32
1987	26	14	54
1988	26	10	38
1989	34	20	59
1990	10	10	100

numbers of male lambs survive to recruitment during some remarkably good years also have a dramatic effect on changes in average age of harvested rams (Carey and Dehn **this volume**). Older animals are also more likely to have the horn tips broken, or broomed, which could explain the consistency in horn length in spite of the increase in average age.

Table 4. Numbers, mean age (yr), and horn measurements (cm) of Dall's sheep rams harvested in the Mackenzie Mountains, Northwest Territories by non-resident and non-resident alien hunters, 1965 to 1997.

Period/Year	Harvest	Mean Age	Mean Horn Length
1967-68	168	8.4	86.4
1981-1985	638	8.5	91.0
1986-1990	905	9.4	90.0
1991-1995	949	9.7	88.5
1996	201	9.5	88.8
1997	209	10.0	89.9

The NWT is the last jurisdiction where Dall's sheep are taken under a $\frac{3}{4}$ curl rule (W. Heimer, Fairbanks, AK, personal communication; J. Carey, Sheep and Goat Biologist, Yukon Territorial Government, personal communication). Most rams in the Mackenzie and Richardson Mountains become legal for harvest at 5 or 6 years and attain full curl at 7 years (Barichello et al. 1987, Latour and MacLean 1994). The age distribution of harvested rams indicates that at least 85% of the rams taken each year are full curl (Latour and MacLean 1994, Veitch unpublished data). There does not appear to be any necessity to change the current $\frac{3}{4}$ curl rule for resident or non-resident and non-resident alien harvest.

Total Harvest

We estimate that the current total annual harvest of Dall's sheep in the Mackenzie Mountains is 210 to 260, of which at least 95% are $\geq \frac{3}{4}$ curl rams. Assuming a total population of 14,000 to 26,000 sheep, this harvest removes 0.8% to 1.6% of the total population annually. This harvest rate appears sustainable, although some areas near communities receive relatively heavier hunting pressure and there may be some valid local management concerns. Latour and MacLean (1994) estimated that only 20% of the available full curl rams in study area E1-1 were harvested in 1988 and suggested the harvest level from 1979 to 1990 was "probably optimal for maintaining maximum productivity of sheep in the Mackenzie Mountains" (p. 35). This situation does not appear to have changed over the last seven years.

The Yukon Territorial Government (YTG) suggests harvest should be limited to $\leq 2\%$ of the total population where the management goal is to increase a thinhorn sheep population (YTG 1996). The YTG also assumes that average annual mortality of full curl rams fully involved in the rut is about 50%, therefore, a harvest that focuses on older rams should be at least partially compensatory by taking animals that likely would not survive the winter (YTG 1996). The average age of rams harvested by non-resident and non-resident alien hunters in the Mackenzie Mountains is strongly biased towards older animals, so it is likely that this harvest is also largely compensatory.

CO-MANAGEMENT

Agencies Involved in Co-management

Responsibility for wildlife and other resource management within the Mackenzie Mountains is shared by the governments of Canada and the NWT, and by a variety of agencies set up under settled land claim agreements (Figure 2). The federal government is responsible for administration of Nahanni National Park (4766 km²) in the southern end of the mountains while 56% of the remaining area is primarily under supervision of land claims. The Sahtu Dene and Metis Settlement Area (Government of Canada 1993) covers about 68,000 km² of the mountain range and the Gwich'in Settlement Area (Government of Canada 1992) covers 8,300 km². Within these settled land claim areas Renewable Resources Boards are the main instruments for co-management of forestry, fish, and wildlife while Land and Water Boards regulate land and water use. These and other boards set up under the land claims (e.g., Land Use Planning Boards and Environmental Impact Review Boards) feature representation from both the governments of Canada and the NWT with aboriginal participants in the agreements. The remaining 59,000 km² are within the Deh Cho Region where there is no land claim settlement and the governments of Canada and NWT maintain primary responsibility for resource management.

The Gwich'in and Sahtu Renewable Resources Boards have the following responsibilities regarding wildlife (Government of Canada 1992, 1993):

- Establish policies and propose regulations for wildlife harvest
- Approve wildlife management plans
- Change or remove selected special harvesting areas of participants of the land claims
- Permit or restrict commercial activity regarding wildlife
- Conduct research with other agencies or independently
- Carry out 5-year subsistence harvest studies (hunting, fishing, and trapping) with participants of the land claims. These studies quantify community minimum needs levels for every species harvested by each participating community
- Approve regulations proposed by the government

The Renewable Resources Boards each have six appointed members and a chairperson – three members are appointed to represent the governments of Canada and the NWT, and three to represent participants of the land claims.

Each community within the settled land claim areas also has a Renewable Resources Council that works with the Renewable Resources Boards and government departments to manage renewable resources. These councils have up to seven elected or appointed members whose primary responsibility is to encourage local involvement in wildlife conservation, harvest, research, and management issues. The Renewable Resources Councils within the Sahtu and Gwich'in Settlement Areas have the following responsibilities regarding wildlife (Government of Canada 1992, 1993):

- Manage the harvest rights for the community (methods, seasons, locations – within the law)
- Allocate community subsistence harvest needs levels among their members and allocate harvesting rights in national parks or protected areas among individual harvesters
- Advise the Renewable Resources Boards and government about issues of local concern
- Participate in collecting data about wildlife and wildlife habitat, including harvest

The fundamental feature of the co-management process is that it brings together government researchers and managers with the participants of the settled land claims to collectively develop recommendations and plans for management actions (Bailey et al. 1995). In co-management we seek consensus on management issues and actions, and the active involvement of participants in the land claim in any wildlife research and management that occurs within their settlement areas.

Population Monitoring 1997-98

Over the last three decades, due to the relatively low priority given to Dall's sheep by the GNWT, most management efforts for Dall's sheep in the Mackenzie Mountains have been passive (Poole and Graf 1985) and devoted to maintaining accurate harvest databases from the non-resident, non-resident alien, and resident harvests (Latour and MacLean 1994; Veitch and Popko 1996a; Veitch and Popko 1997). This has been periodically supplemented by aerial and ground surveys by Simmons (1967, 1969, 1970, 1982a, b), Simmons et al. (1984), Latour (1992), Shank et al. (1993), and Veitch and Popko (1996b).

Considerable effort was made by government biologists and officers each year to age and measure all horns from rams taken by non-resident and non-resident alien hunters on the premise that changes in sheep population numbers would be reflected in changes in the average age or horn length (Latour and MacLean 1994). However, recent work by sheep researchers in the Yukon has clearly shown the inability to detect underlying changes in population numbers from simply monitoring the average age of harvested animals on an annual basis (Carey and Dehn 1998).

Given this new information, the increased profile that outfitted sport hunting was receiving in the NWT, and greater access to secure funding by creation of the Sahtu Renewable Resources Board (SRRB) - we decided that a more active sheep management program was necessary. Over the course of the summer and fall of 1997 a joint project of the GNWT and the SRRB was established. We began ground-based Dall's sheep studies in three mountain blocks within the Sahtu portion of the north Mackenzie Mountains (Figure 6) chosen in consultation with the

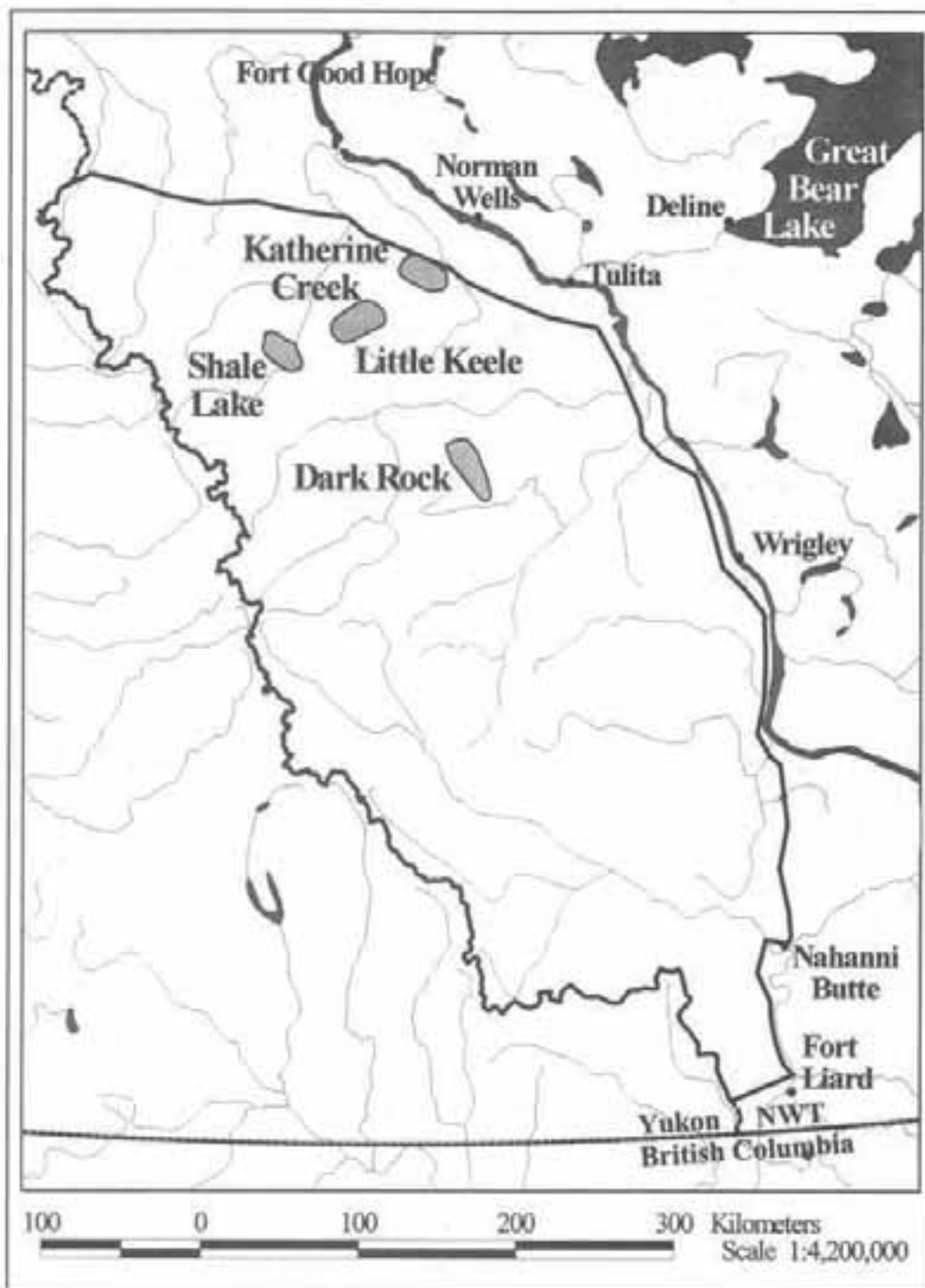


Figure 6. Dall sheep study areas in the Mackenzie Mountains, NWT: 1998.

Renewable Resource Councils in Tulita, Norman Wells, and Fort Good Hope. These blocks complement an existing ground-based sheep study (1994 to present) at Katherine Creek (Veitch and Popko 1996b). The mean size of the study areas is 483 km² (range 391-599 km²).

The primary objective of this project is to collect harvest data from each of the blocks and to collect information on numbers of sheep, productivity, recruitment, adult sex ratios, and the proportion of rams that are legally harvestable. We chose the ground-based approach instead of aerial survey because helicopter surveys have been shown to cause significant disturbance to sheep (Bleich et al. 1990, 1994), are expensive, inherently dangerous (Heimer 1994), and inaccurate when observers do not have extensive experience in an area (Shank et al. 1993). Harvest data will also be collected from each of the four study blocks.

In addition to providing needed data on the internal population dynamics of sheep within the study blocks, a complementary goal of the project has been to fully involve Sahtu Dene and Metis participants of the land claim in the communities of Norman Wells, Tulita, and Fort Good Hope. Therefore, the project has involved training for aboriginal residents of these communities in research logistics and methods, which was done during two training sessions with each two-member community team in the summer and fall of 1997. In June 1998 we plan to have crews in all four study areas simultaneously to allow meaningful comparisons among areas.

We hope that the studies established within the Sahtu Settlement Area will lead to additional ground-based sheep study areas in the Deh Cho region and Gwich'in Settlement Area. This would provide a clearer picture of the status and trend of sheep populations in the Mackenzie Mountain, more accurately define the role of harvest, involve more aboriginal people in data collection and population monitoring, and raise the profile of Dall's sheep within and outside the NWT.

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