MACKENZIE MOUNTAIN NON-RESIDENT AND NON-RESIDENT ALIEN HUNTER HARVEST SUMMARY 2004

NICHOLAS C. LARTER AND DANNY G. ALLAIRE

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
GOVERNMENT OF THE NORTHWEST TERRITORIES
P.O. BOX 240
FORT SIMPSON, NT
X0E 0N0

2005

Manuscript Report No. 165

ABSTRACT

Each of the eight licensed outfitters and Renewable Resource Officers from the Sahtu and Dehcho Regions, with the Department of Environment and Natural Resources (ENR), collected data on big game harvest in the Mackenzie Mountains during the 2004 hunting season. Harvest data and observations of wildlife from non-resident and non-resident alien hunters (collectively called 'non-resident' for this report) were recorded. For 2004, non-resident licences were bought by 337 hunters. Hunters from outside Canada (non-resident aliens), primarily from the United States of America, comprised 87% of the outfitted hunters in the Mackenzie Mountains; Canadian hunters from outside the NT (non-residents) comprised 13%. Of the 337 non-resident licence holders, 330 came to the NT and most spent at least some time hunting. Of 237 tags purchased for Dall's sheep, 201 rams were harvested (including 10 by resident hunters in the Mackenzie Mountains). The average annual harvest of rams over the past 15 years has been 199. The average age of harvested rams was 9.95 $\pm$ 1.76 years; the 17th consecutive year the average age of harvested rams from the Mackenzie Mountains has been 9.5 years or older. Hunters reported seeing an average of 11.6 legal rams (horns at least ¾ curl) during their hunts and observed an estimated 53.4 lambs and 92.9 rams per 100 ewes, respectively. Of 243 tags purchased for woodland caribou,135 bull caribou were harvested. Hunters observed an estimated 41.5 caribou calves and 37.9 bulls per 100 adult female caribou, respectively. Of the 84 tags purchased for moose 55 bull moose were harvested. Hunters observed an estimated 30.0 moose calves and 101.0 bulls per 100 adult female moose, respectively. Of the 24 tags purchased for mountain goat, 6 billies were harvested. Hunters observed an estimated 57.1 goat kids and 77.1 billies per 100 adult nanny goats. Eighteen wolves were harvested from 166 tags purchased, no wolverines or black bears were harvested from 89 and 8 tags purchased, respectively. There has been no season for non-residents to hunt grizzly bears since 1982. The number of wolverines observed by hunters in 2004 was up substantially from the past 4 years. Hunters observed family groups of wolverines as well as the usual lone animals. Hunter satisfaction remains high, with 94% of respondents rating their experience as either excellent (84%) or very good (10%). Of 229 respondents, 59% indicated that they would like to return to the Mackenzie Mountains in future years and 27% were repeat clients, returning for their 2nd to 8th hunt in the Mackenzie Mountains.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

The 140 000 km^2 (54 000 mi^2; 34.6 million acres) area of the Mackenzie Mountains in the western Northwest Territories (NWT) were first opened to non-subsistence hunters in 1965 (Simmons 1968). Since then, the Mackenzies have become world-renowned for providing a high quality wilderness hunting experience, particularly for Dall's sheep (Veitch and Simmons 1999). In return, non-resident hunters and outfitters in the Mackenzie Mountains provide an estimated $1.8 million annually to individuals, businesses, and governments in the NWT (EXCELeration Corp. 2000). The outfitted hunting industry in the Mackenzie Mountains also provides employment for 100 to 120 outfitters, guides, pilots, camp cooks, camp helpers, and horse wranglers (Kelly Hougen, President, Association of Mackenzie Mountain Outfitters personal communication). Additionally, fresh meat from many of the harvested animals is provided to a number of local communities including Tulita, Fort Good Hope, and Norman Wells in the Sahtu and Nahanni Butte, Fort Liard and Fort Simpson in the Dehcho. This meat is distributed among local elders and residents and to health/long term care facilities.

Eight outfitters are currently licenced by the Government of the NWT (GNWT) to provide big game outfitting services within the Mackenzie Mountains, NWT (Fig. 1; Appendix 1). No hunting is permitted within the boundaries of Nahanni National Park Reserve in the southern half of the range, except for subsistence harvest by NWT General Hunting Licence holders. Under the terms of the NWT *Wildlife Act*, each licensed outfitter has the exclusive privilege to provide services within their zone, which enhances the outfitters' ability to practice sustainable harvest through annual allocation of the harvest effort.

The hunting licence year in the NWT runs from 01 July to 30 June and those who desire to hunt big game within the NWT must annually obtain a big game hunting licence and must be at least 16 years old (Department of Resources, Wildlife & Economic Development 2000). There are four classes of licenced 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 licence;

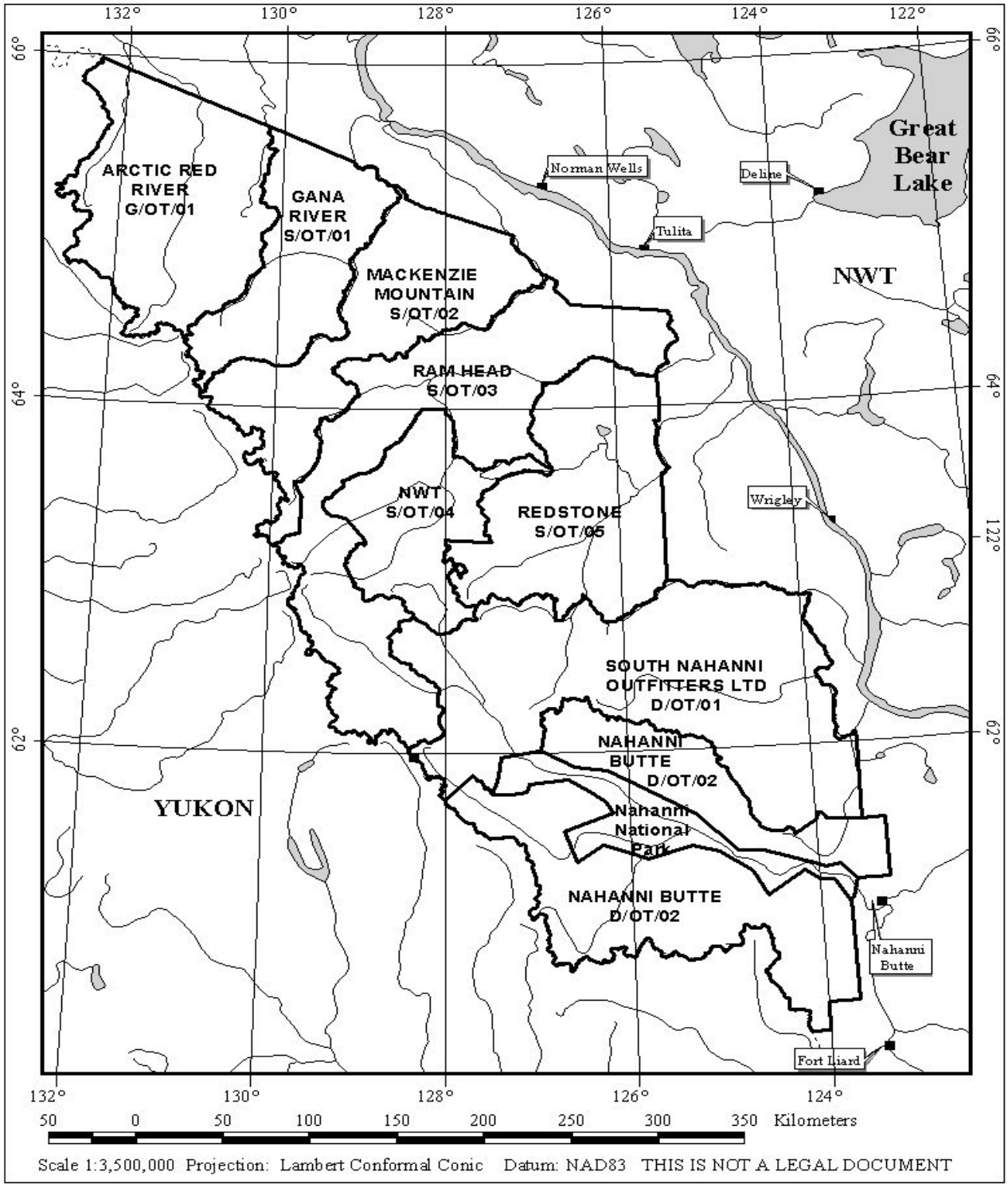


Figure 1. Outfitting zones in the Mackenzie Mountains, Northwest Territories – 2004.

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 licence; and
4) *Non-resident Alien* - non-Canadian citizens or non-landed immigrants.

Both non-residents and non-resident alien hunters must use the services of an outfitter and must be accompanied by a licenced guide at all times while hunting. For simplification in this report, we call both non-resident and non-resident alien hunting licence holders 'non-residents' and combine their harvest statistics. The data from 10 resident hunters, who harvested Dall's sheep in the Mackenzie Mountains, have been included in the number of sheep harvested and the age and horn length measurements in this report as noted.

Individual non-resident hunters are annually restricted to one each of the following big game species (Appendix 2): Dall's sheep (male with at least ¾ curl horns), woodland caribou (either sex), moose (either sex), mountain goat (either sex), wolf (either sex), wolverine (either sex), and black bear (adult not accompanied by a cub or cubs). Non-resident hunting for grizzly bears was closed in 1982 as a result of concerns about over-harvest (Miller et al. 1982; Latour and MacLean 1994). There are currently no restrictions on the total number of each big game species that an outfitter can take within the zone for which they are licenced.

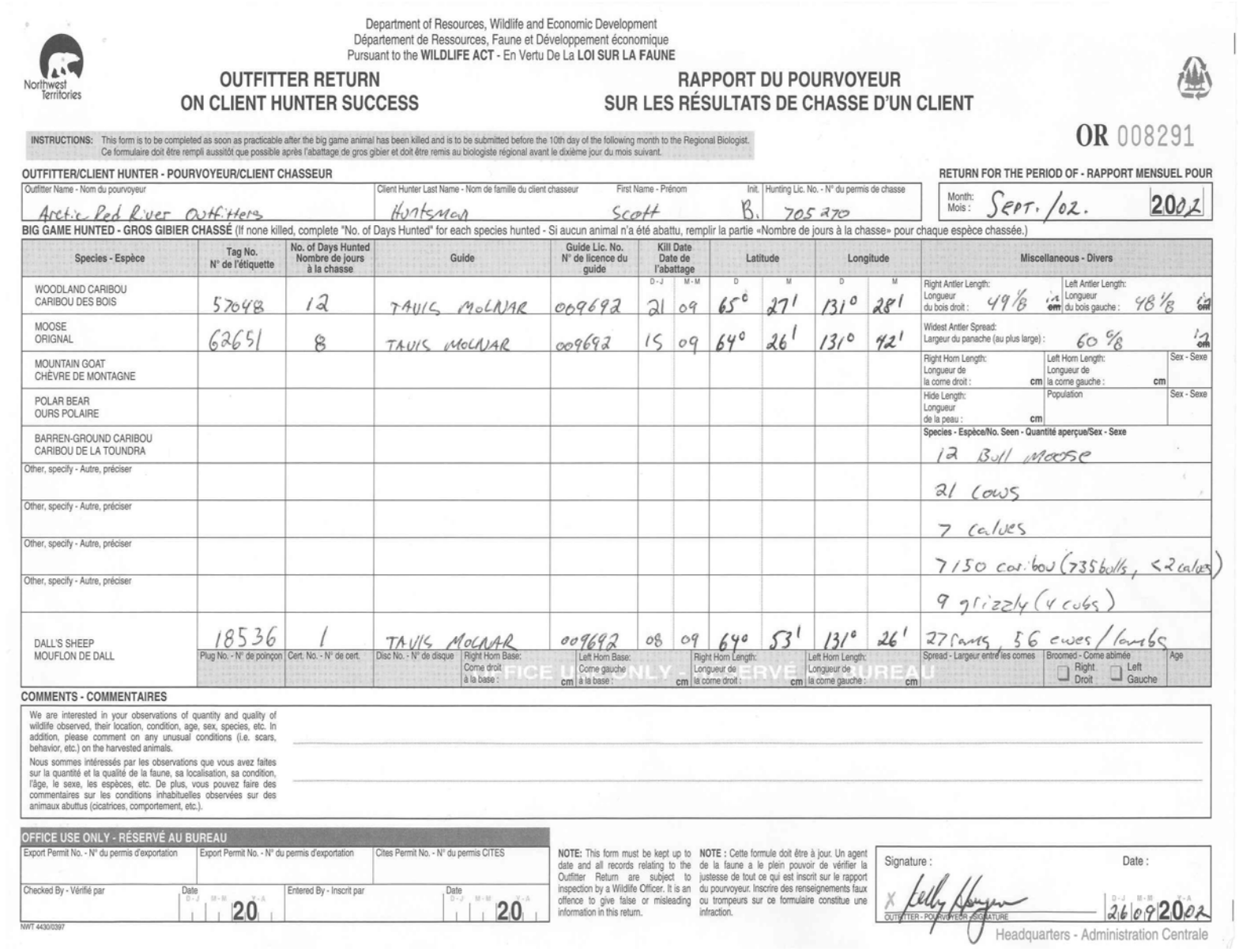
Wildlife management within the Mackenzie Mountains is the responsibility of a variety of government agencies and boards set up as a result of comprehensive land claim agreements. The Nahanni National Park Reserve (4766 km^2) in the south Mackenzie Mountains is managed by Parks Canada – an agency of the Canadian federal government. Under the terms of the Sahtu Dene and Metis Comprehensive Land Claim Agreement (signed in 1993) and the Gwich'in Comprehensive Land Claim Agreement (signed in 1992), primary responsibility for wildlife management within the two settlement areas lies with the Sahtu Renewable Resources Board (SRRB) and the Gwich'in Renewable Resource Board (GRRB), respectively. Approximately 68 000 km^2 of the central and northern Mackenzie Mountains are within the Sahtu Settlement Area and 8300 km^2 are within the Gwich'in Settlement Area, which encompasses the extreme north end of the range. However, the GNWT maintains ultimate jurisdiction for management of wildlife and wildlife habitat within each of the claim areas. The Department of Environment and Natural Resources (ENR), formerly the Department of Resources, Wildlife & Economic

Development (DRWED) of the GNWT is responsible for licencing outfitters, guides, and hunters and for annually monitoring non-resident big game harvest in the Mackenzie Mountains. Under the terms of the Dehcho First Nations Interim Measures Agreement (signed in 2001), ENR has primary responsibility for wildlife management within the Dehcho region (approximately 59 000 km^2) of the southern half of the Mackenzie Mountains.

Each year ENR, under provisions in the GNWT's *Wildlife Business Regulations*, requires that outfitters submit an Outfitter Return on Client Hunter Success form for each person that purchased a NWT non-resident big game hunting licence (Fig. 2). These are known as outfitter return forms and they must be submitted whether or not a client actually hunted, and whether or not any game was harvested. The outfitter return forms allow us to quantify harvest by non-resident hunters to help biologists with the GRRB, SRRB, and ENR to ensure that the harvest of each species is within sustainable limits.

In 1995, DRWED requested that all non-resident hunters also fill out a voluntarily questionnaire. The questionnaire has changed and been revised through the years having included different questions pertaining to wildlife observations, the quality of the hunting experience, the quality of services related to hunter travel, and provided an opportunity for specific comments by the hunter. One key component of the questionnaire that has remained throughout pertained to reporting the different types and numbers of wildlife seen during their hunts. These data have been recorded and the questionnaire forms have been and will be referred to as hunter observation forms in this report.

This is the tenth consecutive year that a summary of the data collected by ENR on non-resident hunters in the Mackenzie Mountains has been made. In the text of this document, data for 1995 are found in Veitch and Popko (1996), for 1996 in Veitch and Popko (1997), for 1997 in Veitch and Simmons (1998), for 1998 in Veitch et al. 2000b, for 1999 and 2000 in Veitch and Simmons (2000a;b respectively), for 2001 by Veitch and Simmons (unpublished data), for 2002 and 2003 in Larter and Allaire (2003; 2004, respectively). Additionally, Latour and MacLean (1994) summarized data for 1979 to 1990. This report compiles the harvest data collected during the 2004 hunting season and compares it with data collected since 1995.



Department of Resources, Wildlife and Economic Development
Département de Ressources, Faune et Développement économique
Pursuant to the **WILDLIFE ACT** - En Vertu De La **LOI SUR LA FAUNE**

Northwest Territories

OUTFITTER RETURN ON CLIENT HUNTER SUCCESS

RAPPORT DU POURVOYEUR SUR LES RÉSULTATS DE CHASSE D'UN CLIENT

OR 008291

INSTRUCTIONS: This form is to be completed as soon as practicable after the big game animal has been killed and is to be submitted before the 10th day of the following month to the Regional Biologist.
Ce formulaire doit être rempli aussitôt que possible après l'abattage de gros gibier et doit être remis au biologiste régional avant le dixième jour du mois suivant.

OUTFITTER/CLIENT HUNTER - POURVOYEUR/CLIENT CHASSEUR

Outfitter Name - Nom du pourvoyeur	Client Hunter Last Name - Nom de famille du client chasseur	First Name - Prénom	Init.	Hunting Lic. No. - N° du permis de chasse
Arctic Red River Outfitters	Huntsman	Scott	B.	705 270

RETURN FOR THE PERIOD OF - RAPPORT MENSUEL POUR

Month: Mois : Sept. /02. 2002

BIG GAME HUNTED - GROS GIBIER CHASSÉ (If none killed, complete "No. of Days Hunted" for each species hunted - Si aucun animal n'a été abattu, remplir la partie «Nombre de jours à la chasse» pour chaque espèce chassée.)

Species - Espèce	Tag No. N° de l'étiquette	No. of Days Hunted Nombre de jours à la chasse	Guide	Guide Lic. No. N° de licence du guide	Kill Date Date de l'abattage D-J	Kill Date M-M	Latitude D	Latitude M	Longitude D	Longitude M	Miscellaneous - Divers
WOODLAND CARIBOU CARIBOU DES BOIS	57048	12	TAVIS MOLNAR	009692	21	09	65°	27'	131°	28'	Right Antler Length: Longueur du bois droit : 49 1/8 in/cm; Left Antler Length: Longueur du bois gauche : 48 1/8 in/cm
MOOSE ORIGNAL	62651	8	TAVIS MOLNAR	009692	15	09	64°	26'	131°	42'	Widest Antler Spread: Largeur du panache (au plus large) : 60 5/8 in/cm
MOUNTAIN GOAT CHÈVRE DE MONTAGNE											Right Horn Length: Longueur de la corne droit : cm; Left Horn Length: Longueur de la corne gauche : cm; Sex - Sexe
POLAR BEAR OURS POLAIRE											Hide Length: Longueur de la peau : cm; Population; Sex - Sexe
BARREN-GROUND CARIBOU CARIBOU DE LA TOUNDRA											Species - Espèce/No. Seen - Quantité aperçue/Sex - Sexe: 12 Bull Moose
Other, specify - Autre, préciser											21 cows
Other, specify - Autre, préciser											7 calves
Other, specify - Autre, préciser											7150 caribou (735 bulls, <2 calves)
Other, specify - Autre, préciser											9 grizzly (4 cubs)
DALL'S SHEEP MOUFLON DE DALL	18536	1	TAVIS MOLNAR	009692	08	09	64°	53'	131°	26'	27 rams, 56 ewes/lambs

Plug No. - N° de poinçon	Cert. No. - N° de cert.	Disc No. - N° de disque	Right Horn Base: Corne droit à la base : cm	Left Horn Base: Corne gauche à la base : cm	Right Horn Length: Longueur de la corne droit : cm	Left Horn Length: Longueur de la corne gauche : cm	Spread - Largeur entre les cornes	Broomed - Corne abîmée Right Droit / Left Gauche	Age

OFFICE USE ONLY - RÉSERVÉ AU BUREAU

COMMENTS - COMMENTAIRES

We are interested in your observations of quantity and quality of wildlife observed, their location, condition, age, sex, species, etc. In addition, please comment on any unusual conditions (i.e. scars, behavior, etc.) on the harvested animals.

Nous sommes intéressés par les observations que vous avez faites sur la quantité et la qualité de la faune, sa localisation, sa condition, l'âge, le sexe, les espèces, etc. De plus, vous pouvez faire des commentaires sur les conditions inhabituelles observées sur des animaux abattus (cicatrices, comportement, etc.).

Export Permit No. - N° du permis d'exportation	Export Permit No. - N° du permis d'exportation	Cites Permit No. - N° du permis CITES

Checked By - Vérifié par	Date D-J M-M 20 A	Entered By - Inscrit par	Date D-J M-M 20 A

NWT 4430/0397

NOTE: This form must be kept up to date and all records relating to the Outfitter Return are subject to inspection by a Wildlife Officer. It is an offence to give false or misleading information in this return.

NOTE : Cette formule doit être à jour. Un agent de la faune a le plein pouvoir de vérifier la justesse de tout ce qui est inscrit sur le rapport du pourvoyeur. Inscrire des renseignements faux ou trompeurs sur ce formulaire constitue une infraction.

Signature : X Kelly Hougen — OUTFITTER - POURVOYEUR SIGNATURE

Date : 26/09/2002

Headquarters - Administration Centrale

Figure 2. 2004 Mackenzie Mountain Outfitter Hunt Report Form.

METHODS

Prior to the start of the 2004 hunting season, each outfitter in the Mackenzie Mountains received sufficient copies of the outfitter return and hunter observation forms for all their clients for the year. The *Wildlife Business Regulations* require outfitter returns to be returned by the tenth day of the month following the month of the hunt – e.g., for a hunter that was in the field in July, a form must be submitted by the 10th of August. Those forms were submitted to the senior biologist in either the Sahtu or the Dehcho whether or not a client actually hunted and whether or not harvest occurred. In co-operation with ENR Renewable Resource Officers and the outfitters, persistent attempts were made to obtain outfitter return forms for every non-resident that held a big game hunting licence through a Mackenzie Mountain outfitter in 2004.

Data from both the outfitter return forms and hunter observation forms were entered into *Excel 2000* (Microsoft Corporation, Seattle, WA) spreadsheets. Data were cross-checked with the records of sequentially numbered, unique identifier plugs inserted in the horns of legally harvested rams (maintained by ENR offices across the western NWT), and with the GNWT wildlife *Export Permit* forms to ensure that all data were verified and that the spreadsheets contained all appropriate available data required for the analyses.

We distributed new hunter observation forms in 2004 for consistency and we recorded all observations directly from these hunter observation forms. If we did not receive a hunter observation form but there were wildlife observation data recorded on the outfitter return form, we entered these wildlife observation data. If we received observation information that differed between the hunter observation form and the outfitter return form for the same client we used the data from the hunter observation form. Occasionally we received identical observation data from forms of different hunters. These hunters had had the same guides and lengths of hunts and obviously had hunted together. We recorded that forms with data had been provided, but for the wildlife observation analyses only one set of observation data were used because these data represented one set of wildlife observations.

All descriptive statistical analyses were performed using *Excel 2000* (Microsoft Corporation, Seattle, WA). We present means ± standard deviation. Some statistical analyses were performed using Minitab 7.2 software (Minitab Inc, 1989).

RESULTS AND DISCUSSION

Hunters

Big game hunting licences for the Mackenzie Mountains were bought by 337 non-resident hunters in 2004 (Table 1). Of those, 330 came to the NWT and spent some time hunting; 7 either cancelled their hunts, decided not to hunt for themselves but participated with other hunters they knew, or decided not to hunt due to unforeseen complications after arriving in the NWT. In 2004, licence sales to non-resident Canadians decreased to 13% from 19% in 2003 and were similar to sales in 2002 (14%). In 2004 the Canadian dollar was not surging upwards as it was in 2003 and this may have influenced license sales to non-resident Canadians as guided hunt costs are in American dollars. The number of foreign non-resident hunters in 2004 was higher than in 2003 (294 vs 281). Much of this increase is a result of a noticeable increase in the number of hunters from countries other than the United States; 29 in 2004 versus 10 in 2003 (Table 1). There was a change in ownership of South Nahanni Outfitters (D/OT/01) between 2003 and 2004 and a majority of the new owner's clients were from foreign countries other than the United States. The American dollar was slumping against foreign countries in 2004 which may have made hunts more attractive to foreign clients.

We received mandatory Outfitter Return forms for 332 (99%) of the 337 people that purchased non-resident licences. Most missing forms resulted from the rushed departure of clients due to inclement weather late in the season. Voluntary Hunter Observation Report forms were received from 244 (74%) of the 330 that did at least some hunting in 2004 (Table 2). This is a substantial increase from previous years being comparable to the return rates for the first 2 years of the program. During the March 2003 annual general meeting of the Association of Mackenzie Mountain Outfitters there was consensus to increase the number of Voluntary Hunter Observation Forms returned. There was negligible improvement in 2003 but there was noticeable improvement in 2004. The rate of return generally increased from all outfitting zones which is encouraging, however it is unfortunate that one of the zones (S/OT/03) with a fairly large clientele continues to have poor returns; only 12% of 51 forms were submitted in 2004. In order to be able to generalize the observations we receive over the entire Mackenzie Mountains it is vital that we have good representation from all outfitting zones.

Table 1. Province of country of origin for the 337 non-residents who purchased licences for hunting in the Mackenzie Mountains, 2004.

Canada		United States		Europe		Other	
Yukon	1	Eastern States[1]	144	Spain	5	Mexico	5
British Columbia	14			Germany	8	Philippines	3
Alberta	22	Western States[2]	121	Austria	3		
Saskatchewan	1			Belgium	1		
Manitoba	0			Netherlands	1		
Ontario/ Quebec	3			Norway	1		
Atlantic Provinces	2			Switzerland	2		
Total	43		265		21		8

[1] AL, AR, CT, DE, DC, FL, GA, IL, IN, IA, KY, LA, ME, MD, MA, MI, MN, MS, MO, NH, NJ, NY, NC, OH, PA, RI, SC, TN, VT, VA, WV, WI

[2] AK, AZ, CA, CO, HI, ID, KS, MT, NE, NV, NM, ND, OK, OR, SD, TX, UT, WA, WY

Table 2. Percent of Mackenzie Mountain outfitter and non-resident hunter forms submitted, 1995-2004.

Form Type	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995
Outfitter Return (mandatory)	99	98	95	92	96	96	97	98	100	98
Hunter Observation (voluntary)	74	60	59	57	53	51	60	50	71	80

It is obvious that non-residents immensely enjoy their hunting experience in the Mackenzie Mountains (Table 3) – in 2004, 94% of respondents rated their experience as either excellent (84%) or very good (10%). It was the first time hunting in the Mackenzie Mountains for 166 of 229 (72%) respondents. The 61 repeat hunters had hunted from 1-8 times previously. Of 148 respondents regarding their plans to return to the Mackenzies to hunt in the future, 91% indicated they would like to return. This represents a minimum because we received some older forms, which should have been taken out of circulation, and this section was missing from these forms. We are making every effort to ensure that only the updated voluntary hunter observation forms are provided to outfitters and their hunters in future.

Hunter comments about high wolf numbers had not been mentioned prior to 2000 when 12% of responding hunters reported high wolf numbers. In 2004, 4% of respondents reported high wolf numbers, as was the case in 2003. Most reports about wolves were from zones G/OT/01, S/OT/02 and S/OT/05. Since providing voluntary hunter observation forms we have had comments about grizzly bears in the Mackenzie Mountains. Many comments have reflected a general dissatisfaction at the inability to hunt grizzly bears and about problems encountered with bears in and around camps. This year was no different (Appendices 3 and 4).

Table 3. Satisfaction ratings for non-resident hunters in the Mackenzie Mountains, 1996-2004.

Rating	2004	2003	2002	2001	2000	1999	1998	1997	1996
Number of Hunters Reporting	229	191	193	191	158	157	202	144	224
Excellent	84%	82%	82%	75%	76%	73%	80%	78%	77%
Very Good	10%	15%	15%	16%	17%	20%	17%	17%	17%
Good	5%	3%	3%	6%	6%	5%	2%	3%	2%
Fair	0%	0%	0%	1%	0%	1%	1%	1%	3%
Poor	1%	0%	0%	1%	1%	2%	0%	1%	1%

This year saw a 50% increase in the number of Association of Mackenzie Mountain Outfitters meat forms voluntarily submitted to ENR by the outfitters, 97 forms in all. These forms record the amount of meat (sheep, caribou, moose, and goat) taken from harvested animals and how the meat was utilized/distributed. Recently there has been heated local debate related to the use and distribution of wild meat by outfitters. The provision of these meat forms allows us to better document local benefits from animals harvested by outfitting operations. ENR continues to encourage the voluntary provision of these forms.

Generally the majority of meat from harvested Dall's sheep and mountain goats is utilized in the outfitter camps. Nonetheless, at least 361 kg (795 pounds) from 64 harvested Dall's sheep and 52 kg (115 pounds) from 3 harvested mountain goats, was distributed locally. Mountain caribou and moose meat is also utilized in the camps, however the majority of the harvested mountain caribou and moose meat was distributed locally: at least 1315 kg (2894 pounds) from 32 mountain caribou and at least 2845 kg (6260 pounds) from 18 moose. Conservatively, the purchase of approximately 4575 kg (10 065 pounds) of meat at retail outlets in local communities would cost a minimum of $91 500.

Dall's Sheep (*Ovis dalli dalli*)

Dall's sheep is one of the most desired species sought by non-resident hunters in the Mackenzie Mountains. Tags to hunt Dall's sheep were purchased by 68% of non-resident hunters in 2004, down slightly from 2003 but similar to the 10 year average (Table 4). At least 84% of sheep tag holders pursued Dall's sheep and harvested 201 rams (including 10 resident hunters). The 2004 harvest was slightly lower than in 2003 but similar to the 15 year average of sheep harvested in the Mackenzie Mountains (Fig. 3; Appendices 5 and 6). Fewer hunters and more inclement weather and smoke haze from forest fires in the Yukon occurred in 2004 than 2003 which likely explains the smaller harvest. The average length of a sheep hunt in 2004 was 4.02 $\pm$ 3.52, up from 3.75 in 2003, less than most previous years: 4.3 days in 1997, 4.4 days in 1998, 4.7 days in 1999, 4.5 days in 2000, and considerably less than the 5.3 day average from 1979-1990 (Latour and MacLean 1994). Outfitted hunts in the Mackenzie Mountains are generally booked for 10 days; when hunters fill their sheep tag, any remaining time on the hunt is typically spent in pursuit of other big game species for which tags are held, or in hunting small game.

Table 4. Tags for big game species purchased by non-resident hunters with outfitters in the Mackenzie Mountains, 1995-2004.

Species	2004 337 hunters		2003 347 hunters		2002 329 hunters		2001 339 hunters		2000 332 hunters		1999 321 hunters		1998 345 hunters		1997 352 hunters		1996 387 hunters		1995 343 hunters	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Dall's Sheep	229	68	257	74	218	66	220	65	231	70	227	71	246	71	252	72	252	65	218	64
Woodland Caribou	243	72	247	71	229	69	201	59	206	62	181	56	223	65	260	74	274	71	233	68
Moose	84	25	85	24	68	21	65	19	69	21	63	20	69	20	73	21	74	18	70	20
Mountain Goat	24	7	18	5	18	5	12	4	12	4	6	2	23	7	30	8	14	4	16	5
Wolf	166	49	207	60	159	48	137	40	155	47	89	28	165	48	209	59	193	50	72	21
Wolverine	89	26	141	40	97	29	83	25	85	26	65	20	99	29	135	38	114	30	35	10
Black Bear	8	2	9	3	3	1	0	0	6	2	2	<1	2	<1	8	2	0	0	0	0

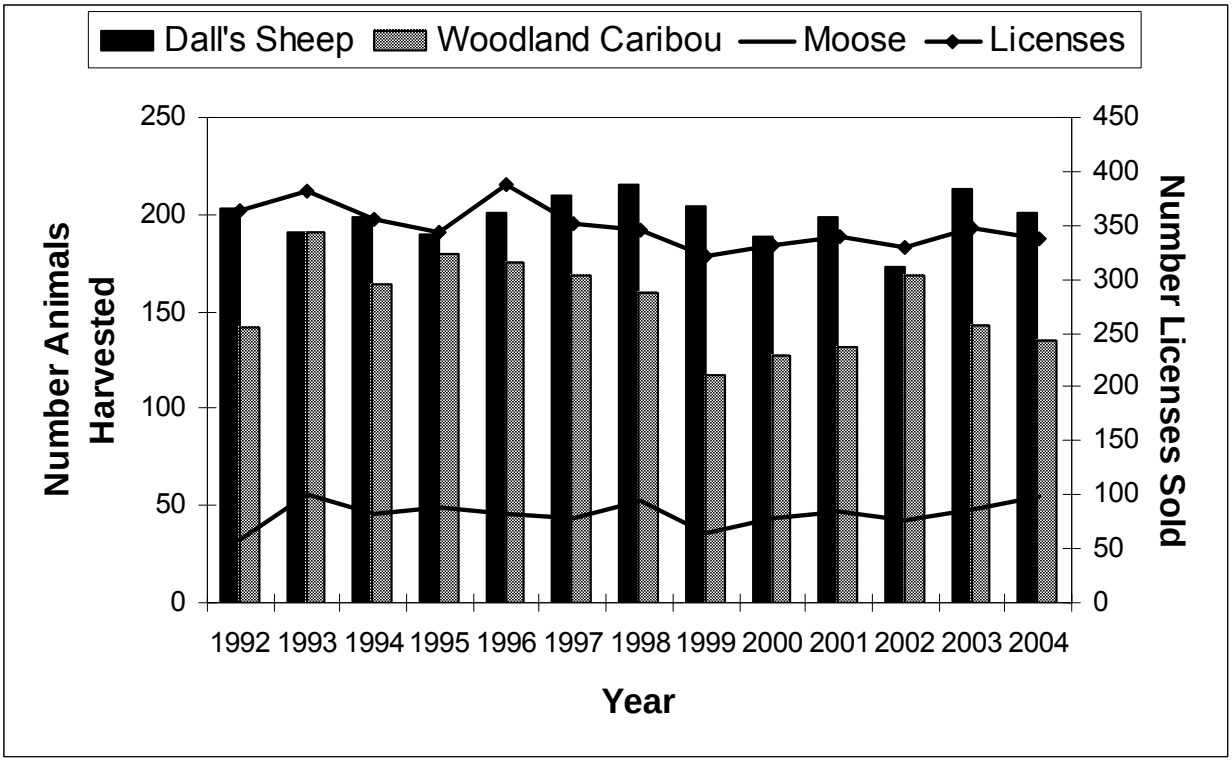


Figure 3. The number of Dall's sheep, woodland caribou, and moose harvested in the Mackenzie Mountains by non-resident hunters, and the number of non-resident licences sold during 1992-2004.

Harvest by non-residents comprises at least 90% of the total annual harvest of Dall's sheep in the Mackenzie Mountains and takes only 0.8 to 1.5% of the estimated 14 000 to 26 000 Dall's sheep in the Mackenzie Mountains (Veitch et al. 2000a). Therefore, the current non-resident harvest level appears well within sustainable limits, provided that hunting pressure is geographically distributed across each of the zones. In the Yukon Territory - where harvest is managed by a full curl rule - thinhorn sheep managers have set the sustainable harvest at 4% of the non-lamb population (Yukon Renewable Resources 1996). In those areas of the Yukon where the management objective is to increase population size, harvest is limited to 2% of the total population.

There has been remarkable consistency from 1979 to 2004 in the mean outside contour length of the right horns from rams harvested by non-residents (Appendix 5; Table 5), which is

surprising given the increase in average age during that same period. We expected to see more broomed, or broken, horn tips on older animals, since horn breakage generally occurs as a result of fights between rival males (Geist 1993).

In 2004, brooming was noted on 36% of left and 33% of right horns from plugged trophies. This is slightly more than the average of 31% and 32% reported over the past 10 years. Ninety-two (46%) of 201 harvested rams were at least 10-years-old with the average age being 9.95 ± 1.74 years (range 5.5 to 14.5 years; Table 6). This is the seventeenth consecutive year where the reported average age of harvested rams has been 9.7 years or older (Appendix 5).

From hunters' classifications of sheep observed during their hunts in 2004 we calculated an estimated 53.4 lambs per 100 ewes. This is similar to the mean of 55 lambs per 100 ewes reported over the past 10 years (Table 7; Appendix 6). For the Richardson Mountains of the northern Yukon and NWT, Nagy and Carey (1991) suggest an August ratio of 43 lambs per 100 ewes would have allowed for their observed 10.5% average annual rate of increase from 1986 to 1991. Subsequent to a decline in this unhunted population from 1997-2003, Nagy et al. (in preparation) reported 28 lambs per 100 'nursery sheep' in August 2003. Jorgenson (1992) summarized 17 years of lamb:ewe classification data for a population of bighorn sheep in west-central Alberta and found a mean of 43 lambs per 100 ewes in September (range 25 to 54).

Differences in adult sex ratios among populations may result from differences in hunting pressure, differences in survival of males and females from birth to adulthood, or both (Nichols and Bunnell 1999). However, since the ratio of rams to ewes is almost never equal in wild

Table 5. Horn measurements of Dall's sheep rams harvested in the Mackenzie Mountains, 2004.

	Left Horn Contour Length		Right Horn Contour Length		Left Horn Base Circumference		Right Horn Base Circumference		Tip to Tip Spread	
	cm	in	cm	In	cm	in	cm	in	cm	In
Mean	89.48	35.23	89.25	35.14	33.2	13.1	33.2	13.1	59.3	23.3
Standard Deviation	7.75	3.05	7.48	2.94	2.10	0.83	2.04	0.80	7.32	2.88
Maximum	112.0	44.1	110.0	43.3	38.5	15.2	38.5	15.2	83.5	32.9
Minimum	60.0	23.6	66.0	26.0	26.0	10.2	27.0	10.6	42.0	16.5

Table 6. Age-structure of Dall's sheep rams harvested by non-resident hunters in the Mackenzie Mountains, 1995-2004.

	2004		2003		2002		2001		2000		1999		1998		1997		1996		1995	
Age	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
3.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0
4.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5.5	1	0.5	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0	1	0.5	1	0.5
6.5	3	1.5	8	3.8	2	1.2	4	2.2	3	1.6	1	0.5	4	2.0	1	0.5	5	2.5	4	2.1
7.5	14	7.0	12	5.7	6	3.6	15	8.2	16	8.5	13	7.1	9	4.3	12	5.8	21	10.5	16	8.5
8.5	41	20.0	43	20.5	44	26.5	33	18.0	39	20.8	23	12.6	39	18.8	39	18.8	47	23.5	49	25.9
9.5	49	24.5	72	34.3	43	25.9	41	22.4	40	21.2	49	26.8	45	21.7	52	25.1	56	28.0	51	27.0
10.5	43	21.5	45	21.4	39	23.5	45	24.6	41	21.8	47	25.7	63	30.4	58	28.0	36	18.0	34	18.0
11.5	27	13.2	11	5.2	16	9.6	29	15.9	28	14.9	29	15.8	30	14.5	24	11.6	26	13.0	14	7.4
12.5	16	7.8	12	5.7	9	5.4	11	6.0	14	7.5	15	8.2	12	5.8	15	7.2	6	3.0	14	7.4
13.5	3	1.5	2	1.0	6	3.6	10	5.5	3	1.6	6	3.3	2	1.0	4	1.9	1	0.5	5	2.6
14.5	3	1.5	3	1.4	1	0.6	0	0.0	3	1.6	0	0.0	1	0.5	2	1.0	0	0.0	1	0.5
15.5	0	0.0	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0	1	0.5	0	0.0	0	0.0	0	0.0
16.5	0	0.0	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
>10y	92		74		71		95		90		97		109		102		69		68	
%>10	46.0		35.2		42.7		51.0		47.9		53.0		52.6		49.5		34.5		36.0	
>12y	22		18		16		21		21		21		16		21		7		20	
%>12	11.0		8.6		9.6		11.2		11.2		11.4		7.7		10.1		3.5		10.6	

populations of mountain sheep, even where they are unhunted, it is clear that there is a different natural mortality rate for the two sexes. Geist (1971) suggested that this difference is a result of injuries and stress accumulated by males during the breeding season. The 92.9:100 ram to ewe ratio (ram:ewe) estimated from hunters' observations in 2004 is higher than that reported for previous years (Appendix 6). There were more rams with <¾ curl than rams with >¾ curl observed this year, and the lamb:100 ewes recorded in 2002 was high in the southern Mackenzie Mountains (Larter and Allaire in press). A strong cohort of juvenile rams may have been a factor in the higher ram:ewe ratio.

In the Yukon, mid to late June annual aerial surveys to count and classify sheep from 1973 to 1998 produced an average of 48 rams (range 28 to 74) per 100 'nursery sheep' (Jean Carey, Yukon Dept. of Renewable Resources unpublished data). For the unhunted Richardson Mountains herd (Yukon-Northwest Territories), Nagy et al. (in preparation) reported 41 rams per 100 'nursery sheep' in 2003 following a decline from peak population size in 1997. In Alaska, ram:ewe for two unhunted herds in Denali and Gates of the Arctic national parks typically averaged 60-67:100 (Nichols and Bunnell 1999). In more heavily hunted Alaskan herds, ram:ewe range from 33:100 (heavily hunted) to 87:100 (lightly hunted). Therefore, the mean ram:ewe of 83:100 calculated from hunters' observations since 1995 (Appendix 6) suggests that the harvest of rams in the Mackenzie Mountains is sustainable at current levels.

In 2004, hunters observed more rams (4507) than in previous years (Tables 7, 8). They observed slightly fewer legal (>¾ curl) rams (n=2185) than rams with <¾ curl (n=2324) during their hunts. The mean number of legal rams classified/hunt was 11.6 (Table 8).

Table 7. Dall's sheep observations reported by non-resident hunters in the Mackenzie Mountains, 2004.

	Number of Hunters Reporting	Number Observed	Mean Number Observed/hunter	Percent of Sheep Classified
Rams	188	4445	23.6	37.7
Ewes[1]	167	4777	28.6	40.6
Lambs	160	2554	16.1	21.7

[1] includes females >1-yr-old, yearlings, and younger rams. Also called 'nursery sheep'.

Table 8. Classification of Dall's sheep rams observed by non-resident hunters in the Mackenzie Mountains, 1995 to 2004.

Ram Class	2004		2003		2002		2001		2000		1999	
	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl
Number of hunters Reporting	188	183	127	121	148	133	186	174	151	147	144	138
Number of rams Classified	2185	2324	1662	1654	1720	1720	1812	1765	1351	1717	1579	1756
Percent of rams classified	48.5	51.5	50.1	49.9	50.0	50.0	50.7	49.3	44.0	56.0	47.3	52.7
Mean number of rams observed/hunt	11.6	12.7	11.9	11.9	11.6	12.9	9.7	10.1	8.9	11.7	11.0	12.7

Ram Class	1999		1998		1997		1996		1995	
	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl	Horn >¾ curl	Horn <¾ curl
Number of hunters Reporting	144	138	177	177	205	205	172	174	181	180
Number of rams Classified	1579	1756	1848	1924	1538	1586	1713	1699	2070	1645
Percent of rams classified	47.3	52.7	49.0	51.0	49.2	50.8	50.2	49.8	55.7	44.3
Mean number of rams observed/hunt	11.0	12.7	10.4	11.3	7.5	7.7	10.0	9.8	11.4	9.1

Woodland (Mountain) Caribou (*Rangifer tarandus caribou*)

Mountain woodland caribou are another of the more desired species sought by non-resident hunters. Tags were purchased by 72% of non-resident hunters (Table 4), and at least 56% of tag holders hunted caribou harvesting 135 bulls. The number of bulls harvested in 2004 was considerably lower than the mean annual harvest of 157 bulls during the past 10 years (Fig. 3; Appendix 7). The average length of a woodland caribou hunt, determined from the 120 reports where hunters spent at least 1 day hunting, was 4.9 ± 3.9 days (range 1-34 days). This is longer than during the previous 4 years (Table 9).

Table 9. The length of the average caribou hunt, and the range (in days) of caribou hunts where at least one day was spent hunting from 2000-2004.

	2004	2003	2002	2001	2000
Number hunter reports	120	172	181	178	141
Average hunt length (days)	4.9±3.9	3.8±2.8	3.6±2.7	4.3±3.2	4.0±2.7
Range (days)	1-34	1-14	1-12	1-15	1-12

Reported antler lengths (n=79) from harvested caribou showed substantial variation, 94.0-151.0 cm, with a mean of *ca*. 120.4±25.0 cm. The maximum left and right antler lengths reported were 151.0 and 151.0 cm respectively (Table 10). The maximum antler length recorded by Boone and Crockett for mountain caribou in North America is 158.5 cm (62.4 in) for a caribou taken from the Mackenzie Mountains in 1978 (Byers and Bettas 1999). Thirteen of the top 50 mountain caribou recorded in the 11th edition of the Boone and Crockett Club record book are from the Mackenzie Mountains, with the highest scoring antlers holding 6th place (Byers and Bettas 1999).

From hunters' classifications of woodland caribou observed during their hunts, we calculated ratios of 41.5 calves and 37.9 bulls per 100 adult females (cows); bulls comprised 21.1% of all caribou classified (Table 11). The ratios of both calves and bulls:100 cows is similar to the averages reported over the past 10 years, of 43 calves and 36 bulls per 100 adult

Table 10. Antler measurements of woodland caribou bulls harvested by non-resident hunters in the Mackenzie Mountains, 2004.

	Contour Length	
	Left Antler	Right Antler
Number Measured	79	79
Mean (cm)	120.4	120.7
Mean (in)	47.4	47.5
Standard Deviation (cm)	25.0	25.3
Standard Deviation (in)	9.8	10.0
Maximum (cm)	151.0	151.0
Maximum (in)	59.4	59.4
Minimum (cm)	94.0	96.0
Minimum (in)	37.0	37.8

Table 11. Woodland caribou observations reported by non-resident hunters in the Mackenzie Mountains, 2004.

Sex/Age Class	Number of Hunters Reporting	Number Observed	Mean Number Observed/hunter	Percent of Total Classified
Bulls	169	3675	21.8	21.1
Cows	156	9693	62.1	55.8
Calves	140	4018	28.7	23.1

females (Appendix 6). Bulls comprised 21.1% of all caribou classified in 2004, similar to that reported in 2003 (20.9%), but less than the 27% and 22% reported for 2001 and 2000 respectively. Bergerud (1978) summarized data for eight North American caribou populations that were either non-hunted or hunted non-selectively (i.e., both males and females included in the harvest) and documented a cumulative average bull component of 39%. Veitch et al.

(2000c) classified 2659 of an estimated 5000 caribou in the central Mackenzie Mountains in August 1999 and reported only 25% of those animals were classified as males ≥1-year-old. Therefore, further investigation is warranted to determine the reason for the consistently lower bull:cow ratios reported for the Mackenzie Mountains. Caribou in the Mackenzie Mountains are estimated to number between 13 000 and 18 000 from at least 3 separate herds shared between the Yukon and Northwest Territories: Bonnet Plume herd (5000 estimated), the greater Redstone herd (5-10 000 estimated), and the greater Nahanni herd (2-3000 estimated) (Yukon Renewable Resources 1996; J. Adamczewski personal communication; M. O'Donoghue personal communication). They are subjected to an annual bull-selective non-resident harvest averaging only 156 animals per year (1991-2004). The resident harvest of woodland caribou in the Mackenzie Mountains also tends to be bull-selective (but not restricted to bulls) and is generally light (i.e., 30 animals/year); subsistence harvest includes both males and females, with the proportion of each dependent on the time of year that animals are harvested (J. Snortland unpublished data; K. Davidge personal communication).

Studies on mountain caribou have recently been initiated. In March 2002, 10 female caribou from the Redstone caribou herd were equipped with satellite radio collars as part of a study of caribou in the central and north-central Mackenzie Mountains initiated by the Sahtu Renewable Resources Board (Olsen 2000; 2001; Olsen et al. 2001). In October 2004, 18 female caribou were equipped with satellite collars along the Yukon-Northwest Territories border. These caribou were believed to be from the greater Nahanni herds This is a co-operative study between the Yukon Territorial Government, Parks Canada (Nahanni National Park) and the Wildlife Conservation Society.

Alaska-Yukon Moose (*Alces alces gigas*)

Moose in the Mackenzie Mountains belong to the Alaska-Yukon subspecies of moose (also known as tundra moose) that occur across Alaska, the Yukon, extreme northern British Columbia, and the Mackenzie Mountains, with the Mackenzies representing the eastern limit of the subspecies' range. This is the largest of the four subspecies of moose that occur in North America (Bubenik 1997). Tags to hunt moose were purchased by 25% of non-resident hunters in 2004. The number of moose hunters in 2004 was similar to 2003 but higher than in previous years (Table 4). At least 71% of tag holders hunted moose and harvested 55 bulls, the greatest

harvest since 1993 and above the mean annual harvest of 46 (1991-2004) (Fig. 3; Appendix 7). The average length of a moose hunt, determined from the 49 reports where hunters spent at least 1 day hunting, was 4.9 ± 3.9 days (range 1-12 days). The average hunt tended to be longer in 2004 than the previous 3 years (Table 12).

Table 12. The length of the average moose hunt, and the range (in days) of moose hunts where at least one day was spent hunting from 2000-2004.

	2004	2003	2002	2001	2000
Number hunter reports	49	60	46	42	48
Average hunt length (days)	4.8±3.3	3.9±2.8	3.6±2.6	3.7±2.9	4.4±2.7
Range (days)	1-12	1-14	1-12	1-12	1-12

The mean tip-to-tip spread of 38 measured antlers from bull moose harvested by non-residents in 2004 was 150.3 ± 10.4 cm (59.2 ± 4.1 in). This was similar to that reported in 2003 (150.0 cm), and somewhat higher than in previous years: 149.3 cm, 144.3 cm, 147.0 cm, and 144.2 cm for 2002, 2001, 2000, and 1999, respectively. This year's maximum recorded moose antler spread was 174.0 cm (68.5 in), 14 cm narrower than the maximum recorded antler spread (188.0 cm) for an Alaska-Yukon moose taken in the NWT in 1995. Two moose taken from the Mackenzie Mountains are in the top 20 Alaska-Yukon moose recorded in the record book of the Boone and Crockett Club and hold places 11 and 15 (Byers and Bettas 1999); the rest of the top 20 were all taken in Alaska. The maximum antler spread recorded from across the subspecies' range is 210 cm (82.7 in; Bubenik 1997), with a new record currently pending.

From hunters' observations of moose seen during hunts we calculated ratios of 30.0 calves:100 adult females (cows) and 101.0 bulls:100 cows (Table 13). This is the tenth consecutive year in which moose calf:cow ratios have not been greater than 30:100. This is considerably lower than the 40-60:100 that is generally documented during early to mid-winter

Table 13. Moose observations reported by non-resident hunters in the Mackenzie Mountains, 2004.

Age/Sex class	Number of Hunters Reporting	Number Observed	Mean Number Observed/Hunter	Percent of Total Classified
Bulls	112	497	4.44	43.7
Cows	108	492	4.56	43.2
Calves	65	148	2.28	13.1

aerial surveys for northwestern moose (*Alces alces andersoni*) along the Mackenzie River in the vicinity of the communities of Fort Good Hope (MacLean 1994a), Norman Wells (Veitch et al. 1996), and Tulita (MacLean 1994b) (Appendix 6). No research has been done on moose in the Mackenzie Mountains; therefore, we have no explanation for the apparent discrepancy in calf production, survival, or both between the mountains and the river valley. A survey of moose in the Norman Wells study area in January 2001 estimated a calf:cow ratio of 18:100 (ENR, Norman Wells unpublished data), and an aerial survey of the Mackenzie River Valley and vicinity in the Dehcho Region south from the Blackwater River to Jean Marie River conducted in November 2003 estimated 32:100 (N. Larter unpublished data), indicating that low calf:cow ratios may no longer be restricted to the Mackenzie Mountains and that more study is required to determine the cause(s). A program has recently been established in the Mackenzie and Liard River Valleys of the Dehcho to document calf:cow ratios annually in November (ENR, Fort Simpson unpublished data).

The 2004 bull:cow ratio matched the average ratio over the past 10 years, range 75-129:100 (Appendix 6). Ratios from the Mackenzie Mountains are higher than the range of 27-105:100 reported in the Yukon (R. Ward cited in Schwartz 1997) and from heavily harvested populations in Alaska of 16:100 (Schwartz et al. 1992) and Norway of average 46:100, range (25-69:100) (Solberg et al. 2002). There has been concern that low bull:cow ratios could influence conception dates, pregnancy rates and newborn sex ratios (Bishop and Rausch 1974; Crête et al. 1981; Solberg et al. 2002) and that management strategies should maintain a high bull:cow ratio (Bubenik 1972). Studies on tundra moose in Alaska have not found evidence that

moose populations with low bull:cow ratios have reduced reproductive rates (Schwartz et al 1992); populations with a more skewed sex ratio had a relative rate of population increase greater than populations without a skewed sex ratio (Van Ballenberghe 1983). However, a recent study of 8 heavily harvested moose populations in Norway indicated a relationship between declining recruitment rate and skewed adult sex ratio (Solberg et al. 2002). Based upon hunter observations since 1995, there is no indication of any decreasing trend in the bull:cow ratio of moose in the Mackenzie Mountains hence the adult sex ratios are not a factor in the low calf:cow ratios reported. The reported sex ratios may have an inherent bias towards a greater number of bulls if harvesters consistently spend more time searching for moose in areas frequented more by large males than females.

Mountain Goat (*Oreamnos americanus*)

Tags to hunt mountain goats were purchased by 7% (n=24) of non-resident hunters in 2004 (Table 4). Sales of mountain goat tags show more annual fluctuation than for any other ungulate species harvested by non-resident hunters in the Mackenzie Mountains, range 6-30 since 1995 (Table 4). Annual harvest since 1995 has ranged from 1-9 (Appendix 7). In 2004, at least 8 tag holders hunted mountain goats and 6 billies were harvested. The average length of a goat hunt, determined from the 8 reports where hunters spent at least 1 day hunting, was 3.9 $\pm$ 1.6 days (range 2-6 days). The average hunt tended to be longer in 2004 than the previous 4 years (Table 14).

Table 14. The length of the average goat hunt, and the range (in days) of goat hunts where at least one day was spent hunting from 2000-2004.

	2004	2003	2002	2001	2000
Number hunter reports	8	6	4	2	1
Average hunt length (days)	3.9±1.6	3.0±2.6	2.8±1.9	1.5±0.7	3.0
Range (days)	2-6	1-8	1-5	1-2	3

Mountain goats are known to occur in 5 of the 8 outfitting zones in the Mackenzie Mountains, occurring almost exclusively below 63^{o} 00’ N (Veitch et al. 2002). They are most

numerous in high relief terrain along the Yukon-Northwest Territories border between 61° 00' and 62° 00' N. However since 1995, we have received hunter observations or harvest reports of goats from 4 of those outfitter zones - D/OT/01, D/OT/02, S/OT/03, and S/OT/04 (see Fig. 1). In 2004, observations of mountain goats by hunters came from just 2 of those zones D/OT/01 (n=23), and D/OT/02 (n=61). There is some evidence that goat numbers and distribution have been increasing in outfitter zone D/OT/02 in the southern Mackenzie Mountains (Larter 2004; Cam and Clay Lancaster personal communication). We estimated 57.1 kids and 77.1 billies per 100 nannies based upon this year's hunter observations. The number of goats observed and the ratios were higher in outfitter zone D/OT/02 (73.9 kids and 108.7 billies:100 nannies, respectively. These ratios are similar to those reported from this zone in 2003 (61.5 kids and 70.5 billies:100 nannies, 181 classified animals), and from an aerial survey of part of the zone conducted in September 2004 (71.4 kids and 111 billies:100 nannies, 86 classified animals; Larter 2004).

The largest horns from a mountain goat taken in 2004 were 22.5 cm (right) and 22.2 cm (left). No mountain goats from the NWT are listed in the 11th edition of the Boone and Crockett Club record book (Byers and Bettas 1999).

Wolf (*Canis lupus*)

Wolf tags were purchased by 49% of non-resident hunters in 2004 (Table 4) and 18 wolves were harvested (Appendix 7). In 2004, more hunters observed at least one wolf than in most previous years. The number of wolves observed in 2004 (n=317) was substantially higher than in the previous 10 years (Table 15). Even though more wolves were observed in 2004 only 2% of responding hunters indicated that they believed wolf numbers were high; down from the 8 and 12% respectively for 2000 and 2002. 2000 was the first year that hunters had commented on wolf numbers in the wildlife observation forms.

The number of hunters reporting since 2001 has been consistently higher than in previous years. This we attribute to change in how we defined hunter reporting. For data collected after 2001, we assumed that all returned observation forms where there was a blank, a zero, or a dash in the box indicating the number of wolves observed was a report of no wolves being observed. When looking at the forms this seemed like a reasonable assumption. This assumption may well be invalid for previous years' data and would bias the post 2001 values to

be higher than the previous years. We plan on using the same assumption for future harvest reports.

Table 15. Wolf observations reported by non-resident hunters in the Mackenzie Mountains, 1995-2004.

	2004[1]	2003[1]	2002[1]	2001	2000	1999	1998	1997	1996	1995
Number hunters reporting	215	203	197	142	116	103	148	141	76	119
Number wolves observed	317	200	249	215	228	142	148	200	186	269
Mean observed/hunter	3.9	1.0	1.3	1.5	2.0	1.4	1.0	1.4	2.4	2.3
Number hunters seeing ≥1	81	74	69	65	61	40	57	76	26	26

[1] Change in reporting since 2002 may have resulted in the number of hunters reporting for 1995-2001 being artificially low, see text.

Wolverine (*Gulo gulo*)

Wolverine tags were purchased by 26% (n=89) of non-resident hunters (Table 4). At least 12% (n=40) of tag holders actively hunted wolverines, but none were harvested in 2004. Hunters reported spending from 1-34 days actively hunting wolverine (average 6.5±5.2 days). A total of 30 wolverines were reported observed by hunters this year, with observations being reported from all but one of the outfitter zones (Fig. 4). For that zone, S/OT/03, only 6% of hunters submitted forms. The number of animals observed this year is substantially greater than that observed from 2000-2003, and has returned to levels reported from 1995-1999 (Table 16; Fig. 4). Part of the increase in wolverines observed in 2004 may be explained by the fact that 3

Table 16. The number of reported observations of wolverine, the number of wolverine harvested, the number of hunters with wolverine tags, the percentage of total hunters with wolverine tags, and the total number of hunting tags purchased for 1995-2004.

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Reported Observed	21	34	36	34	30	11	9	9	12	30
Number Harvested	1	4	1	0	3	0	2	1	0	0
No. Wolverine Tags	35	114	135	99	65	78	83	97	141	89
% Wolverine Tags	11	29	38	29	20	23	26	29	40	26
Total Hunting Tags	333	387	352	345	321	332	344	338	347	337

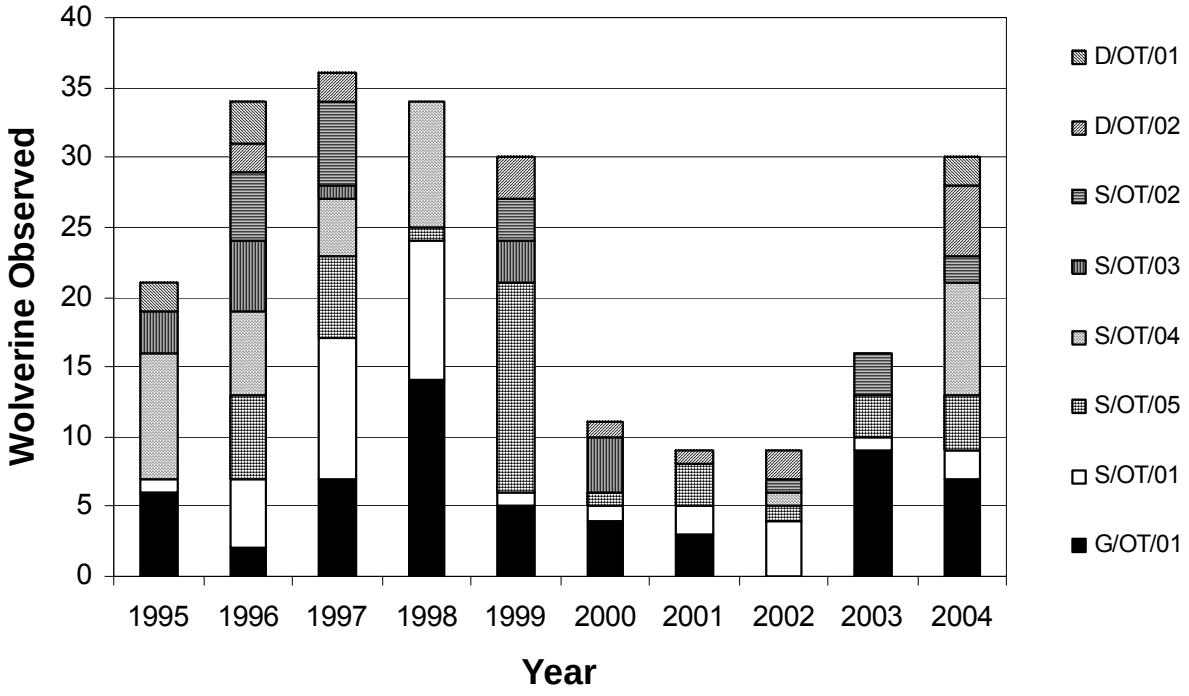


Figure 4. The number of wolverines observed by hunters from 1995-2004, and the outfitter zones where the observations occurred. Data are based upon voluntary hunter observation forms.

family groups of 4 individuals each were observed, each in a different outfitter zone. Historically, observed wolverines are generally solitary animals. There are no relationships between the number of wolverines observed/year and annual harvest or tags purchased/year that explain the differences in the number of wolverines observed (Table 16). Wolverines occur throughout the Mackenzie Mountains, but sightings are generally rare. Most wolverine observations are made in hunting zones G/OT/01, S/OT/01, S/OT/04, and S/OT/05, as was the case this year.

Black Bear (*Ursus americanus*)

Non-resident hunters purchased 8 black bear tags in 2004, but none were harvested as in the previous 9 years. Black bears are relatively rarely seen in the Mackenzie Mountains and in most years are reported only from south of 63^{o} 00 N. In 2004, a total of 24 black bears (23 adults and 1 cub) were observed based upon returned (n=229) voluntary observation forms. Bears were observed in outfitter zone D/OT/02 (16 adults and 1 cub), S/OT/01 (3 adults), S/OT/04 (1 adult) and S/OT/05 (3 adults) (Table 17). As with the other post 2001 carnivore data, we assumed that all returned observation forms where blanks, zeroes, or dashes occurred in the boxes indicating the number of carnivores observed was a report of no carnivores being observed. This assumption is likely invalid for previous years' data and likely inflates the 2002 and 2003 values relative to previous years. We plan on using this assumption for future harvest reports.

Grizzly Bear (*Ursus arctos*)

The Mackenzie Mountains have been closed to non-residents for hunting grizzly bears since 1982 and resident hunters have been restricted to one bear per lifetime since the same year (Veitch 1999). It is clear from the comments made by hunters on voluntary observation forms that, despite the lack of hunting opportunities, grizzly bears remain a subject of considerable interest for non-resident hunters and their guides in the Mackenzie Mountains (Appendices 3 and 4). Consistent with the past 6 years, this year hunters reported loss of meat, capes, food, and equipment to grizzly bears, a perception that there were too many grizzly bears, and several implicated grizzly bears as the principal reason for low numbers of moose and caribou calves.

Table 17. Black bear observations reported by non-resident hunters in the Mackenzie Mountains, 1995-2004.

	2004[1]		2003[1]		2002[1]		2001		2000		1999		1998		1997		1996		1995[2]
	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	All Bears
Total # Observed	1	23	3	34	3	17	0	7	2	15	4	7	0	15	2	3	1	10	11
% of Total Observed	4	96	8	92	15	85	0	100	12	88	36	64	0	100	40	60	9	99	nil
No. Hunters Reporting	229	229	191	191	199	199	127	130	88	93	87	89	121	124	96	96	6	14	44
No. Hunters Saw at Least 1	1	19	2	21	2	14	1	7	1	10	2	6	0	8	2	3	1	9	9
Maximum # Observed	1	3	2	7	2	3	0	1	2	3	2	2	0	3	1	1	1	2	2

[1] Change in reporting for 2002 may have resulted in artificially lower numbers of hunters reporting for 1995-2001, see text.

[2] All bears not separated out by cubs and adults.

A frequent comment suggested that bears have lost their fear of humans because of a lack of hunting and a concern that this was a human safety issue. However, since the closure of the non-resident season there have been no documented injuries from grizzly bears in the Mackenzie Mountains (Veitch 1999). At least 30 grizzly bears have been killed in defence of life and property in the Mackenzie Mountains since 1993-94 (ENR, Norman Wells unpublished data). Only 2 have occurred in outfitting zones in the Dehcho Region, both in 2004 (K. Davidge personal communication).

While the mean number of adult grizzly bears observed by hunters has remained relatively stable from 1996-2004 (mean=301), the cub to adult ratio calculated from the hunter observations peaked in 2000 with cubs comprising 29% of all bears observed, and declined since). The 2004 observations indicate an upswing in the proportion of cubs observed (Fig. 5; Table 18). Because cub grizzlies in the Mackenzie Mountains tend to stay with their mothers for 3 years (Miller et al. 1982), reported observations of 'cubs' refers to cubs-of-the-year, yearlings, and 2-year-old bears. Miller et al. (1982) documented a low reproductive rate for female grizzly bears in Mackenzie Mountains, with no sows less than 8-years-old producing cubs, an average inter-litter interval of 3.8 years, and a mean litter size of 1.8. The percent 'cubs' determined from reported hunter observations during 1996-2004 continues to indicate an inter-litter interval of 4 years (Fig. 5), similar to what was reported during 1973-1977 when there was non-resident hunting of grizzly bears. We estimated the mean litter size from 1996-2004 hunter observation reports by analyzing just those observations of groups of grizzly bears where cubs were present with only 1 adult present. The estimated mean litter size was 1.85 (range 1.4-1.9) from 1996-2004, similar to that reported by Miller et al (1982). There appears to have been little change in those demographic parameters estimated during 1996-2004 compared to those reported during 1973-1977 by Miller at al. (1982).

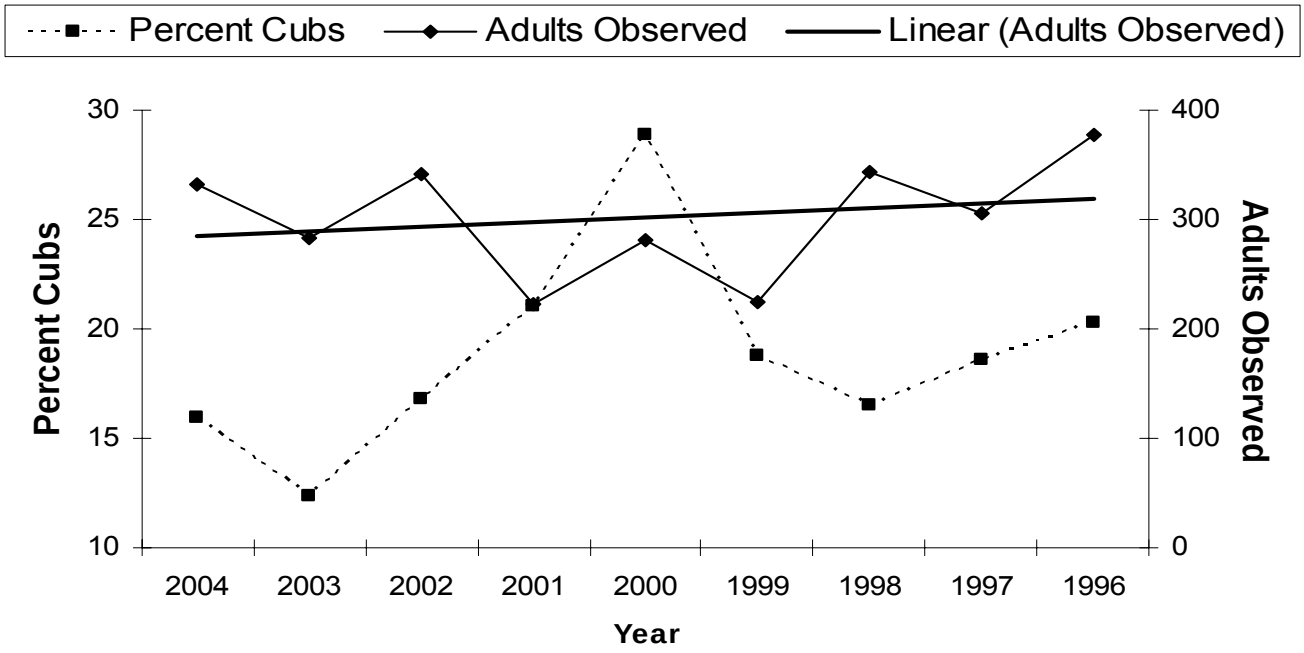


Figure 5. The percent of 'cubs' and the total number of adult grizzly bears observed by hunters from 1996-2004. Data are based upon voluntary hunter observation forms. The linear trend of total adult bears observed during the same time period is indicated

Table 18. Grizzly bear observations reported by non-resident hunters in the Mackenzie Mountains, 1995 – 2004; total number of bears observed, percent of cubs/adults, number of hunters reporting grizzly observations, number of hunters seeing at least one cub/adult, the mean and maximum number of cub/adults observed.

	2004		2003		2002		2001		2000		1999		1998		1997		1996		1995
	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	Cub	Adult	All Bears [1]
Total # Observed	63	333	40	283	69	341	59	222	113	281	52	225	68	343	70	306	96	377	389
% of Total #	16	84	12	88	17	83	21	79	29	71	19	81	17	83	19	81	20	80	nil
# Hunters reporting	34	131	19	120	34	128	136	171	108	131	98	117	139	177	110	170	49	132	138
# Hunters saw ≥1	15	57	9	53	11	48	28	104	51	97	28	81	31	105	32	129	46	129	123
Mean # Observed	1.9	2.5	2.1	2.4	2	2.7	0.4	1.3	1.1	2.1	0.5	1.9	0.5	1.9	0.6	1.8	2.0	2.9	2.8
Max. # Observed	4	15	12	7	8	20	5	10	8	12	4	12	6	16	12	17	5	15	16

[1] All bears were not separated out by cubs and adults.

ACKNOWLEDGEMENTS

Co-operation from the outfitters operating in the Mackenzie Mountains in 2004 was again very good and we thank them for the extra efforts they made in completing, signing, and sending us their harvest report and meat distribution forms. We thank Renewable Resources Officers and clerks with ENR in Norman Wells, Fort Simpson, and Fort Liard for collecting and organizing data from non-resident hunters in their respective offices.

We also greatly appreciate the efforts, interest, and co-operation shown by our visiting hunters and the more than 80 guides that completed the forms, reported observations of animals seen, and did the various antler and horn measurements. In addition, we would like to particularly thank those hunters that took the time to write comments about their hunting experience.

We would like to thank Richard Popko, Alasdair Veitch, and Keith Hickling for ensuring that all data received by the Sahtu ENR office was forwarded to the Fort Simpson ENR office, and for stimulating conversation on the report contents. Lana Robinson (Sahtu GIS Project, Norman Wells) prepared the map of outfitting zones. John Nagy provided unpublished data from his work in the Richardson Mountains.

PERSONAL COMMUNICATIONS

Jan Adamczewski, Liard Regional Biologist, Fish and Wildlife Branch Yukon Environment, Watson Lake, YT.

Kelly Hougen, President, Association of Mackenzie Mountain Outfitters, Whitehorse, YT.

Ken Davidge, Renewable Resources Officer, Department of Environment and Natural Resources, Ft. Simpson, NT.

Cam and Clay Lancaster, Nahanni Butte Outfitters, Hudson Hope, BC

Mark O'Donoghue, Northern Tutchone Regional Biologist, Fish and Wildlife Branch, Yukon Environment, Mayo, YT.

LITERATURE CITED

Bergerud. A.T. 1978. Caribou. pp. 83-102 *in* Schmidt, J.L. and Gilbert, D.L. (eds.) Big game of North America: ecology and management. Stackpole Books, Harrisburg, PA. 494 pp.

Bishop, R.H. and Raush, R.A. 1974. Moose population fluctuations in Alaska. 1950-1972. Naturaliste Canadien 101: 559-593.

Bubenik, A.B. 1972. North American moose management in light of European experiences. Proceedings of the North American Moose Conference Workshop 8: 279-295.

Bubenik, A.B. 1997. Evolution, taxonomy, and morphophysiology. pp. 77-123 *in* Franzmann, A.W. and Schwartz, C.C. (eds.) Ecology and management of the North American moose. Smithsonian Institution Press, Washington, DC. 733 pp.

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

Crête, M., Taylor, R.J., and Jordan, P.J. 1981. Optimization of moose harvest in southwestern Quebec. Journal of Wildlife Management 45: 598-611.

Department of Resources, Wildlife & Economic Development 2000. Northwest Territories summary of hunting regulations 2000-2001. Department of Resources, Wildlife & Economic Development, Yellowknife, NT. 24 pp.

EXCELeration corp. 2000. Benefits of outfitted hunting in the NWT Mackenzie Mountains. Final report prepared for the Association of Mackenzie Mountain Outfitters in co-operation with the town of Norman Wells and the Department of Resources, Wildlife & Economic Development. Calgary, AB. 45 pp.

Geist, V. 1971. Mountain sheep: a study in behaviour and evolution. University of Chicago Press, Chicago, IL. 383 pp.

Geist, V. 1993. Wild sheep country. NorthWord Press, Minocqua, WI. 173 pp.

Jorgenson, J.T. 1992. Seasonal changes in lamb:ewe ratios. Northern Wild Sheep and Goat Council 8: 219-226.

Larter, N.C. 2004. Mountain goat survey Flat River area, Western Mackenzie Mountains, September 2004. Manuscript Rep. No. 157, Dept. of Resources, Wildlife & Economic Development, Ft. Simpson, NT. 16pp.

Larter, N.C. and Allaire, D.G. 2003. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary 2002. Manuscript Rep. No. 152, Dept. of Resources, Wildlife & Economic Development, Ft. Simpson, NT. 46pp.

Larter, N.C. and Allaire, D.G. 2004. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary 2003. Manuscript Rep. No. 154, Dept. of Resources, Wildlife & Economic Development, Ft. Simpson, NT. 46pp.

Larter, N.C. an Allaire, D.G. in press. Sheep surveys of the Liard Range, Nahanni Range, and Ram Plateau in the Mackenzie Mountians, August 2003. Manuscript Rep., Dept. Environment and Natural Resources, F. Simpson, NT.

Latour, P. and MacLean, N. 1994. An analysis of data returned by outfitted hunters from the Mackenzie Mountains, NWT, 1979-1990. File Rep. No 110, Dept. of Renewable Resources, Norman Wells, NT. 41 pp.

MacLean, N. 1994*a*. Population size and composition of moose in the Tulita area, NWT, November 1993. Manuscript Rep. No. 78, Dept. of Renewable Resources, Yellowknife, NT. 18 pp.

MacLean, N. 1994*b*. Population size and composition of moose in the Fort Norman area, NWT, November 1993. Manuscript Rep. No. 80, Dept. of Renewable Resources, Yellowknife, NT. 17 pp.

Miller, S.J., Barichello, N. and Tait, D. 1982. The grizzly bears of the Mackenzie Mountains, Northwest Territories. N.W.T. Wildl. Serv. Compl. Rep. No. 3, Yellowknife, NT. 118 pp.

Minitab Inc. 1989. Minitab version 7.2 (computer program). State College, PA : Minitab Inc.

Nagy, J. and Carey, J. 1991. Dall sheep survey in the Richardson Mountains, 1991. Unpublished survey report manuscript, Dept. of Resources, Wildlife, and Economic Development, Inuvik, NT. 8 pp.

Nagy, J.A., Auriat, D. and Cooley, D. in preparation. Richardson Mountains Dall's Sheep population survey, August 2003.

Nichols, L. and Bunnell, F. 1999. Natural history of thinhorn sheep. pp. 23-77 *in* Valdez, R. and Krausman, P.R. (eds.). Mountain sheep of North America. University of Arizona Press, Tucson, AZ. 353 pp.

Olsen, B. 2000. Fall distribution and population composition of woodland caribou in the central Mackenzie Mountains, October 2000. Manuscript Report No. 1 (draft), Sahtu Renewable Resources Board, Tulita, NT. 15 pp.

Olsen, B. 2001. Caribou studies in the Redstone River watershed: research proposal 2001. Unpublished research proposal submitted to Sahtu Renewable Resources Board, Tulita, NT. 5 pp.

Olsen, B., MacDonald, M., and Zimmer, A. 2001. Co-management of woodland caribou in the Sahtu Settlement Area: Workshop on Research, Traditional Knowledge, Conservation and Cumulative Impacts. Special Publication No. 1, Sahtu Renewable Resources Board, Tulita, NT. 22 pp.

Schwartz, C.C. 1997. Reproduction, natality, and growth. pp. 141-171 *in* Franzmann, A.W. and Schwartz, C.C. (eds.) Ecology and management of the North American moose. Smithsonian Institution Press, Washington, DC. 733 pp.

Schwartz, C.C., Regelin, W.L., and Franzmann, A.W. 1992. Male moose successfully breed as yearlings. Journal of Mammalogy 63: 334-335.

Simmons, N.M. 1968. Big game in the Mackenzie Mountains, Northwest Territories. Proceedings of the Federal-Provincial Wildlife Conference. 32: 35-42.

Solberg, E.J., Loison, A., Ringsby, T.H., Saether, B.E., and Heim, M. 2002. Biased adult sex ratio can affect fecundity in primiparous moose *Alces alces*. Wildlife Biology 8: 117-128.

Van Ballenberghe, V. 1983. The rate of increase in moose populations. Alces 25: 25-30.

Veitch, A.M. 1999. Status of grizzly bears in the Mackenzie Mountains, NWT. Unpublished report, Department of Resources, Wildlife & Economic Development, Norman Wells, NT. 28 pp.

Veitch, A.M. and Popko, R.A. 1996. 1995 Mackenzie Mountain non-resident hunter harvest summary. Manuscript Rep. No. 90, Dept. of Renewable Resources, Norman Wells, NT. 22 pp.

Veitch, A.M. and Popko, R.A. 1997. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary, 1996. Manuscript Report No. 97, Dept. of Resources, Wildlife & Economic Development, Norman Wells, NT. 37 pp.

Veitch, A.M., Popko, R.A., and N. McDonald. 1996. Size, composition, and harvest of the Norman Wells area moose population, November 1995. Manuscript Rep. No. 93, Dept. of Renewable Resources, Norman Wells, NT. 32 pp.

Veitch, A.M. and Simmons, E.N. 1998. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary, 1997. Manuscript Report No. 106, Dept. of Resources, Wildlife & Economic Development, Norman Wells, NT. 28 pp.

Veitch, A.M. and Simmons, N. 1999. Dall's sheep – Northwest Territories. pp. 54-58 *in* Toweill, D.E. and Geist, V. (eds.) Return of royalty: wild sheep of North America. Boone and Crockett Club and Foundation for North American Wild Sheep, Missoula, MT. 214 pp.

Veitch, A. and Simmons, E. 2000a. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary, 1999. Manuscript Report No. 121, Dept. of Resources, Wildlife & Economic Development, Norman Wells, NT. 29 pp.

Veitch, A. and Simmons, E. 2000b. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary, 2000. Manuscript Report No. 121, Dept. of Resources, Wildlife & Economic Development, Norman Wells, NT. 40 pp.

Veitch, A.M., Simmons, E., Adamczewski, J., and Popko, R. 2000a. 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., Simmons E., and Whiteman, N. 2000b. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary, 1998. Manuscript Report No. 120, Dept. of Resources, Wildlife & Economic Development, Norman Wells, NT. 31 pp.

Veitch, A.,Popko, R. and Whiteman, N. 2000c. Classification of woodland caribou in the central Mackenzie Mountains, Northwest Territories, August 1999. Dept. of Resources, Wildlife & Economic Development Manuscript Rep. No. 122, Norman Wells, NT. 13 pp.

Veitch, A, Simmons, E., Promislow, M., Tate, D., Swallow, M, and Popko, R. 2002. The status of mountain goats in Canada's Northwest Territories. Northern Wild Sheep and Goat Council 13: 49-62.

Yukon Renewable Resources. 1996. Sheep management guidelines. Dept. of Renewable Resources, Yukon Territorial Government, Whitehorse, YT. 10 pp.

Appendix 1. Outfitters licenced to provide services to non-resident hunters in the Mackenzie Mountains, NWT – 2004

D/OT/01 – *SOUTH NAHANNI OUTFITTERS LTD.*

Werner Aschbacher and Sunny Petersen
PO Box 31119
Whitehorse, YT Y1A 5P7
Ph: (867)-399-3194
Fx: (867)-399-3194
e-mail: info@huntnahanni.com
website: www.huntnahanni.com

D/OT/02 – *NAHANNI BUTTE OUTFITTERS*

Cam and Clay Lancaster
PO Box 653
Hudson Hope, BC VOC 1VO
Ph: (250)-783-9197
Fx: (403)-380-6126
email: claykris@pris.bc.ca
website: www.lancasterfontana.com

G/OT/01 – *ARCTIC RED RIVER OUTFITTERS*

Kelly and Heather Hougen
P.O. Box 5988
Whitehorse, YT Y1A 5L7
Ph: (867)-633-4934
Fx: (867)-633-4934
email: info@arcticred-nwt.com
website: www.arcticred-nwt.com

S/OT/01 – *GANA RIVER OUTFITTERS*

Bill and Carol McKenzie
P.O. Box 4659
Quesnel, BC V2J 3J8
Ph: (250)-992-8639
Fx: (250)-992-8639

S/OT/02-*MACKENZIE MOUNTAIN OUTFITTERS*

Stan and Helen Stevens
P.O. Box 5
Tomslake, BC V0C 2L0
Ph: (250)-786-5118
Fx: (250)-786-5118
email: stevens.mmo@pris.bc.ca
website: www.mmo-stanstevens.com

S/OT/03 – *RAM HEAD OUTFITTERS*

Stan and Debra Simpson
P.O. Box 89
Warburg, AB T0C 2T0
Ph: (780)-848-7578
Fx: (780)-848-7550
website: www.ramheadoutfitters.com

S/OT/04 - *NWT OUTFITTERS*

Eric Mikkelson
PO Box 106
Lazo, BC V9N 8Z8
Ph: (888)-293-2299
Fx: (250)-897-0054
email: huntnwt@shaw.ca
website: www.wildsheep.org/nwtoutfitters

S/OT/05 - *REDSTONE TROPHY HUNTS LTD.*

P.O. Box 18
Pink Mountain, BC
VOC 2BO
Ph: (250)-772-5992
Fx: (250)-261-9962
website: www.redstonehunts.com

Appendix 2. Summary of fees, bag limits, and seasons for big game species available to non-resident in the Mackenzie Mountains, NWT 2004. [Note: all prices are in Canadian funds.]

Species	Status	Tag Fee	Trophy Fee	Bag Limit	Season
Black Bear	Non-resident	$20.00	$100.00	1 adult bear not accompanied by a cub	15 Aug - 31 Oct
	Non-resident alien	$50.00	$100.00		
Woodland Caribou	Non-resident	$20.00	$200.00	1	25 Jul - 31 Oct
	Non-resident alien	$50.00	$200.00		
Mountain Goat	Non-resident	$20.00	$200.00	1	15 Jul - 31 Oct
	Non-resident alien	$50.00	$200.00		
Moose	Non-resident	$20.00	$200.00	1	1 Sep - 31 Oct
	Non-resident alien	$50.00	$200.00		
Dall's Sheep	Non-resident	$20.00	$200.00	1 adult male with min. ¾ curl	15 Jul - 31 Oct
	Non-resident alien	$50.00	$200.00		
Wolf	Non-resident	$20.00	$100.00	1	15 Aug - 31 May
	Non-resident alien	$50.00	$100.00		25 Jul - 10 Oct
Wolverine	Non-resident	$20.00	$100.00	1	15 Aug - 31 Oct
	Non-resident alien	$50.00	$100.00		25 July - 31 Oct

Source: Department of Resources, Wildlife & Economic Development. 2004. Northwest Territories Summary of Hunting Regulations. Department of Resources, Wildlife & Economic Development, Yellowknife, NT. 24 pp.

Appendix 3. Comments provided from non-resident hunters in the Mackenzie Mountains, NWT on voluntary Hunter Wildlife Observation Report forms, 2004. We have not printed actual names of outfitters or their personnel (XXX).

Ram had lumpy jaw
Camp + Staff+ Guide = Excellent Trophies population = fair
No kill. Accompanied her husband on his hunt Excellent camp, crew and guide
Small bodied with apparent lump jaw
Unrecoverable fell into cliffs where it was hung up and we could not get to it.
Client left after sheep hunt due to weather
Heard a pack of wolves but did not see them
Filled out by XXX hunter forgot, thought the hunt was excellent just because he was very happy.
Wounded no recovery ended hunt. Bow hunter
Bow hunt lost over half hunt to weather
Bow hunter, no harvest lots of opportunity missed four shots.
Client did not hunt due to poor weather
No harvest bad weather client sick decided to go home early total tit and suck will never let him hunt with us again.
No kill client was hunting weather was bad
Weathered out
This hunt was one of the most rewarding experiences in my life, both with the great people, the mountains and the animals.
11 yr. old ram excellent shape. Sheep down low too dry in the high country.
Should issue grizzly bear tags. Ram was 9 yr. old and in good shape.
One of the last uninhabited mountain ranges in North America with abundant game animals. Please continue to preserve it.
XXX runs a very professional outfit. Their guides in the bush were very observant about the animals numbers, habit and sex ratios. It was easy to see why this is such a quality area. This is one of the best hunting experiences I've had.
Old ram in good condition. Great horn growth.
XXX outfit is top notch. He is an extremely valuable asset to Northwest Territories. Old ram 11yrs. Good shape. Good ewe:lamb ratio.
10 yr old ram was in very good shape. Good ewe to lamb ratio.
10 or 11 year old
Outstanding experience!
Great hunt in excellent country with lots of quality game animals. Grizzly hunting would be a bonus if allowed.
Ram in good shape/ good ewe:lamb ratio.
10 yr old ram good shape.
Some trouble with grizzly bears in camp. Lots of sheep and great weather. 9 yr old ram in good shape but body was a little small.
Ram was in good condition, very healthy looking. Ewe and lamb ratio was low.
Ram and caribou in good shape
12 yr old ram was getting thin and in poor condition
9 yr old ram in excellent condition
The ram was 9yr old and in great shape
Best hunting in all of the north country I have ever experienced; best, professional outfit I know.
I would strongly urge you to consider the issuance of a limited number of grizzly bear tags. I would venture the data from defence killed bears and hunter observation reports indicate a very healthy population of grizzly.
This harvest would most likely lower defence kills. Ram 8 yr old good shape - big body Caribou good shape.
Canada is awesome! I will return every year as long as I can. I have been to NWT (Mackenzie Mountains) twice and would like to have a chance someday for a mountain grizzly bear. Has the issue ever been discussed?
Just an observation from a hunters view.
Lots of bears around, you should allow hunting them. You should mail this years harvest report to every one who filled this report.

Hunting with XXX and his guides is one of the greatest hunting experiences I ever had.
Thank you!
Add a grizzly tag to the hunt
Many sheep, lots of caribou, a lot of grizzly bears. Bears came into camp. Weather was good.
Unusually large ram in body size as well as horn growth.
Excellent hunting adventure, with lots of game. Both sheep and caribou were in excellent condition.
Overall excellent experience. Both animals taken were in excellent condition. We saw good numbers and good quality of game.
Great hunt, well organized, professional outfitter. A hunter could not pick a better outfitter to hunt this area.
Old ram in good shape. Good teeth.
XXX 1st class all the way, Don't change anything.
XXX was a top of the line outfit. I will be back for sure.
Great experience - will remember forever. Awesome outfitter! (wolves were heard by hunter, not seen)
Our outfitter was excellent in every way and we loved our hunt! (wolves were heard by hunter, not seen)
Bull was in good shape lots of fat, good cow:calf ratio.
Caribou was in good shape (had two front teeth missing), good cow:calf ratio.
Caribou was good shape, good cow:calf ratio.
This was my first hunt in the NWT, Mackenzie Mountains. I was impressed by the number of wildlife seen and the quality of the rams and caribou bulls.
Hunter went home after 3 days as he was not in shape to hunt.
Hunter had a sheep tag but chose not to hunt a sheep. Only there to accompany her husband XXX.
Hunter was along to accompany his wife XXX on her moose hunt.
This hunter went along with XXX and did not want to shoot a ram. Guide did not record his numbers.
This sheep hunter did not get a ram and left before his guide got his license/ tag numbers.
Did not arrive for hunt due to injury , license attached.
Everything about the hunt was excellent, all areas were looked after, (no surprises). Guide knew area and animals (top notch). Base camp was great, the food and lodging excellent. I would recommend this camp to anybody. Hope to be back soon, thanks XXX.
Excellent Ram Country Great guide and outfitter
Have a grizzly bear season
Fantastic place ! XXX is outstanding operation.
One of the best wilderness hunting experiences in the world, don't change anything.
Wonderful hunt and overall experience, would recommend XXX to anyone seeking a top quality hunt.
Excellent Outfitter, Great Guides, Wranglers + Cook. Lots of 6.5 and 7.5 year old rams
Very high population of 7 year old rams constituting the majority of the "3/4 curl or better" category
Outfitter and guides gave 100% area is beautiful and clean. Guide very knowledgeable about age of animals and judging trophy quality.
Outfitter and guide are excellent!!
Very nice time
Best base camp in the business, best run outfit I've been with, best guide I've been with
Mackenzie Mountains are even spectacular than I expected. I was backpack hunting and loved every minute.
Air Service by XXX was very friendly. XXX was friendly and professional. Please preserve the wilderness experience by keeping it pristine and wild. Too much "eco-tourism" would not be a good thing.
Had great trip excellent hunting great outfitters.
Great country
Excellent hunt/enjoyable company/ great country
Too many grizzlies - obviously affecting moose numbers. Something I said 3 years ago. Nothing has changed.
Amazed by the amount of game seen
Great hunt
Had a great time. Will hunt again.
To me the Northwest Territories is one of the last frontiers left in the world. It's been a pleasure to see it unspoiled and well managed. I wish the US still had such wild country. XXX did a superb job of representing

Canadian wildlife management.

Excellent hunt →a great outfitter who knows his area and runs a first class - "non nonsense" type of camp

I'm 74 years old and last hunt. Outstanding outfitter and guide. A memorable trip in beautiful settings and good people.

Good long hunt Teriaki is old!!

Had great hunting experience will be back in two years.

I hope to return to hunt moose and mountain caribou in the future. It's really nice to see a total wilderness area like this with very little impact from modern man.

Outstanding guide, outfitter, accommodations great trip.

Excellent sheep area - Great outfitter beautiful remote area.

Superb Organization, Excellent professional guides. Beautiful country.

I had a great hunt with XXX - he said I would see all kinds of animals and I did. This was a great experience and I hope to bring my son up to the NWT some day to experience the beauty.

Excellent experience! It would appear that management hunting of Grizzly Bear would be appropriate. (Biologically, I don't know about politically) A twenty five year old study, granted expensive, could bear review, no pun intended. Sounds like a PHD study. PS. my undergrad degree is in Zoology.

Excellent hunt, Great adventure. You really need to look at grizzly control and hunting of same.

Wolf is also a problem and needs to have numbers reduced

Best hunt ever

Excellent trip again

Please open up grizzly bear hunts

This was truly a trip of a lifetime

XXX is the very best.

Caribou movement extremely low, poor selection of mature caribou bulls. Looks great for mature moose bulls.

I can not imagine why there is not a grizzly hunting quota for non-residents. There are more bears than you can shake a stick at. You need more new decision makers. Your data is flawed for not having a bear season.

It seems there are plenty of bears in the surrounding mountains. I would think there should be a non-resident bear season.

I think you should open up a grizzly season?

A unbelievable experience. Natural - untouched nature. Excellent hunting environment - Excellent service

Beautiful – Beautiful

XXX does an excellent job!!! Fell off mountain broke horns ruined 99% of meat

Beautiful country, nature at its best.

Caribou sick and injured

Great hunt- great service-couldn't be better.

Many grizzlies noticed by activities and sign. I feel that the bear season in NWT should be opened and expanded to both residents and non-residents.

Large numbers of grizzly bears (by sign and activity) makes hunt safety an issue, it also complicates camping, game harvest stoppage, etc difficult. I believe that bear permits should be allowed for non-residents on sheep and caribou hunts (with proper game management).

Great hunt

XXX runs an excellent, professional camp with very professional, ethical guides and staff.

Most pristine beautiful place I have been. Great outfitter organization and people.

My outfitter does a wonderful job of managing the resource and being a steward of the game.

NWT/Canada has an outstanding resource.

Pristine wilderness area will definitely be back. Please consider legalizing grizzly hunting.

Totally enjoyed hunting the mountains, saw some beautiful remote rugged country with good populations of game.

A season on grizzly bear should be taken into consideration.

XXX provide a top class hunting experience. They are extremely professional and we enjoyed safe memorable and successful hunts with them. I would do it again and recommend highly to other hunters.

Very great outdoors, great variety of wildlife and a well managed company does the difference congratulations!

One grizzly bear attacked my moose. Had we actually been on the moose at the time we probably would have been killed. We observed the attack from a bluff.

Great time- Great Outfitter Thanks.

Sheep numbers have been improving, lamb crop should be higher, but there was a lot of predator sign on every mountain. Caribou numbers were low at the start of the season due to smoke from the Yukon, calving grounds numbers were not as high, but there was an influx of caribou during the migration at the end of the season. A lot of moose in velvet (more than ever before) at the buck brush-willow timberline. 15 different grizzly bears were observed during the summer. A grizzly bear charged our camp, after shooting a warning shot the grizzly stood on hind legs, checked us out, got down on all fours and walked away. Another grizzly managed to get into our riverboat and chew up the seats and the side of our boat, we were 500 yards away and left the boat for only 4 hours. Fantastic area and guides, the owner needs to improve on his people skills and not have such a negative attitude toward the hunters and employee's. It's not a good atmosphere.

The best sheep hunting I had in Canada. I hunted in BC three times.

I'm very impressed with all the signs of bears in the area, specifically when I saw what they do to the camp buildings. The quality of the sheep I saw was excellent and all the rams we got were very old.

We saw quantity and quality of game. Lots of sheep (old ones), caribou. Too many bears around camps (dangerous). It should be a hunting season to harvest old bears.

Excellent hunt, highly recommend.

Excellent amount of game and quality

There were lots of sheep including several full curl rams. Very few caribou. Only one respectable bull on the way back to XXX.

Good area - Good employees - worst hunt I had in a long time - bad vibes.

Nous avons été agréablement surpris du nombre de femelles (Mouflons de Dall) et agneaux trouvies, ce qui parle bien du future de la chasse dans cette zone. Les grandes troupeaux de caribous ne sont pas encore presents mais nous avons comme meme vux une bonne qualititie d'animaux Beaucoup de loups. (We were pleasantly surprised by the numbers of ewes and lambs, that would indicate a bright future for hunting in this zone. The great herds of Caribou were not present at the time, but we saw numerous wildlife. A lot of wolves.)

I enjoyed the hunt a wide variety of animals. I have never seen so many wolves. Glad I finally got one.

Saw lots of grizzly bear sign and lots of caribou cows and calves.

Sheep - bears - wolves readily available - caribou behind schedule on migration - we were told - would love to return to NWT. Scenery was phenomenal - game was easily found - please have agent/officer contact me for further details! (330-638-9507)

very good hunt, excellent outfitter. beautiful mountains. Do like my hunt, excellent outfitter - and beautiful mountains.

Great people and outfit can't get any better, everything was great. The scenery and most of all, all the game that we saw. Thanks XXX and XXX for your hospitality. Great outfitter lots of game and very nice scenery, the accommodations and food were excellent. Very good guides with lots of experience.

Animals appear in excellent condition and harvested animals reflected this situation. Enjoyable time and good guides and animals.

see 3 bear

Grizzly hunts would be good for outfitter(s) and possibly animal population/location.

Quality of game excellent, quantity of game less than expected found the NWT majestic and pristine.

Didn't see as many caribou as expected. Migration didn't seem to be in full swing.

My first hunt the North America, to difficult to have a good opinion. I think it was good.

Spectacular countryside, very well serviced.

Seen lots of game, everything was in excellent condition, enjoyed it very much.

Did not harvest! Seen a lot of grizzly and sign of grizzly - should look into giving a limited amount of grizzly tags.

Open up grizzly for hunting

Appendix 4. A summary of the 2004 voluntary hunter comments broken down into specific topics.

No. of hunters reporting	No. of hunters mentioning good quality hunts	No. of hunters mentioning abundance of animals	No of hunters mentioning grizzlies	No. of hunters mentioning wolves	No. of hunters mentioning bad weather
146	10	7	29	7	6

Appendix 5. Number, age, and horn length measurements of Dall's sheep rams harvested by non-resident hunters in the Mackenzie Mountains, 1967-2004.

Year	Number of Sheep Harvested	Age (Years)		Length of Right Horn	
		Mean	Sample Size	Mean (cm)	Sample Size
1967-1968	223	8.4	Unknown	86.4	168
1969	110	-	-	-	-
1970	94	-	-	-	-
1971	88	-	-	-	-
1972	110	8.5	96	86.2	90
1973	89	8.9	86	84.4	88
1974	93	9.2	85	88.6	91
1975	129	7.6	67	84.6	127
1976	144	7.8	46	88.0	144
1977	132	5.7	69	86.8	132
1978	187	8.5	115	88.9	165
1979	200	8.7	108	90.7	154
1980	180	-	-	89.9	127
1981	187	8.1	101	93.7	157
1982	126	8.7	98	89.7	124
1983	100	9.0	80	90.9	94
1984	102	8.4	98	91.2	99
1985	123	8.1	115	89.7	112
1986	154	8.8	132	88.4	153
1987	148	8.9	148	89.4	148
1988	177	9.8	166	91.7	161
1989	207	9.9	199	90.4	203
1990	219	9.8	200	90.2	218
1991	170	9.7	161	89.1	170
1992	203	9.7	199	88.0	202

Appendix 5 (cont.) - Number, age, and horn length measurements of Dall's sheep rams harvested by non-resident hunters in the Mackenzie Mountains, 1967-2004. [1] Number harvested includes 10 harvested by resident hunters.

Year	Number of Sheep Harvested	Age (Years)		Length of Right Horn	
		Mean	Sample Size	Mean	Sample Size
1993	191	9.7	181	87.6	190
1994	199	9.5	191	89.8	196
1995	190	9.7	189	89.3	189
1996	201	9.5	200	88.7	201
1997	210	10.0	206	89.9	203
1998	215	10.0	207	90.0	209
1999	204	10.2	183	88.8	184
2000	189	10.0	189	89.5	189
2001	199	10.0	188	87.7	189
2002	173	9.9	166	89.2	166
2003	213	9.7	210	89.8	212
2004	201[1]	10.0	199	89.3	200

Appendix 6. Summary of age and sex ratios calculated from non-resident hunter observation reports in the Mackenzie Mountains, 1995-2004.

Year	Dall's Sheep		Woodland Caribou		Moose	
	Lambs: 100 Ewes	Rams: 100 Ewes	Calves: 100 Cows	Bulls: 100 Cows	Calves: 100 Cows	Bulls: 100 Cows
1995	67	82	36	34	30	95
1996	44	82	45	40	26	76
1997	57	55	36	21	30	107
1998	60	84	36	34	30	95
1999	58	90	43	25	20	100
2000	47	90	41	39	26	89
2001	59	89	56	61	28	120
2002	58	89	59	31	29	96
2003	50	83	39	36	25	129
2004	53	93	42	38	30	101
Mean 1995-2004	55	84	43	36	27	101

Appendix 7. Outfitted non-resident hunter harvests in the Mackenzie Mountains, 1991-2004.

[1] Includes 10 harvested by resident hunters.

Year	Number of Licences Sold	Number of Animals Harvested					
		Dall's Sheep	Woodland Caribou	Moose	Mountain Goat	Wolf	Wolverine
1991	354	170	179	40	6	14	3
1992	364	203	142	32	4	7	0
1993	382	191	191	56	9	7	3
1994	356	199	164	46	5	15	2
1995	344	190	180	49	6	14	1
1996	387	201	175	46	4	11	4
1997	352	210	168	44	2	17	1
1998	345	215	160	52	5	9	0
1999	321	204	117	36	1	11	3
2000	332	189	127	44	1	14	0
2001	339	199	132	47	2	15	2
2002	329	173	168	42	5	11	1
2003	347	213	143	48	6	12	0
2004	337	201[1]	135	55	6	18	0
Mean 1991-2004	349	197	156	46	4	13	1