1996 ALSEK MOOSE MANAGEMENT AREA - DEZADEASH MOUNTAINS

MOOSE CENSUS SURVEY

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SUMMARY

- We estimate there were 147 moose in the Dezadeash Mountains in November 1996.
- Density was 115 moose for every 1,000 km^2, below the Yukon average of 153 moose for every 1,000 km^2.
- Numbers had decreased since 1990, when there were 247 moose - for a density of 203 moose for every 1,000 km^2.
- The greatest drop was in the number of adult males, which fell from 44 bulls for every 100 cows in 1990 to 18 bulls for every 100 cows in 1996.
- The low number of bulls is a concern because more than 30 bulls for every 100 cows are needed to ensure there are enough bulls to breed with cows.
- The cause of the decline in adult bulls is unknown, but overharvest cannot be ruled out.
- Calf survival in 1996 was low at 19 calves for every 100 cows.
- Recruitment was very high at 61 yearlings for every 100 cows.

Background

The Alsek Moose Management Plan:

The Alsek Renewable Resources Council developed a management plan for the Alsek Moose Management Area (AMMA) and adjacent portions of British Columbia in 1996. Plan partners are Yukon Government Department of Renewable Resources, the Champagne-Aishihik First Nation, Kluane National Park, and British Columbia Ministry of Environment, Lands and Parks (Wildlife and Parks Branches). A key recommendation of the plan was to 'design a rotation of Supercub counts and composition counts' as an affordable means of monitoring changes in moose numbers (Alsek Renewable Resources Council 1996). This recommendation was in response to the concern that '*in some parts of the planning area, moose numbers may be low or declining*'.

Moose Counts (1996-2000):

The moose count in the Dezadeash Mountains was the first of five moose studies that Kluane Regional Management conducted in AMMA between 1996 and 2000. The other studies are:

1. Moose count in the Jo-Jo Lake area, November 1997 (Hayes and LaRocque 2001a)
2. Moose count in the AMMA, November 1998 (Hayes and LaRocque 2001b)
3. Late winter distribution of moose in the AMMA in 1999 (LaRocque and Hayes 2001)
4. Moose count in the AMMA, November 2000 (Hayes and LaRocque 2001c).

Earlier Moose Counts:

Moose in Game Management Zone (GMZ) 7 were counted in 1981 (Larsen 1982), 1982 (Johnston and McLeod 1983, Markel and Larsen 1983), 1983 (Johnston et al. 1984, Markel and Larsen 1984), 1984 (Markel and Larsen 1985), and 1990 (Larsen and Ward 1991). During the 1980s there was a decline in moose abundance in the western portion of GMZ 7, which includes the Dezadeash Mountains (Yukon Fish and Wildlife Branch 1990). By 1990 moose numbers had increased, following a wolf reduction in the area in the mid-1980s (Larsen and Ward 1991).

Study Area

The Dezadeash Mountains count area was 1,274 km^2, and included all of Game Management Subzones 7-01 to 7-03 (Fig. 1). The area is mainly the mountain slopes and plateaus of the Dezadeash Range and U-shaped lowland valleys of the Dezadeash River watershed. The Dezadeash River formed the northern, eastern and southern boundaries (Figure 1). The western boundary was the Haines Road extending along the boundary of Kluane National Park from Dezadeash Lake to the village of Haines Junction (population 800). More than half of the count area was above treeline (Johnston et al. 1984). The dominant vegetation was subalpine shrub and alpine tundra communities, which is where groups of moose concentrate in November after the rut.

Methods

Stratified Random Block Count:

Since 1981, all moose counts in the Dezadeash Mountains area have been done using the Stratified Random Block (SRB) method (Gasaway et al. 1986). For this method, the count area was divided into smaller irregular-shaped *blocks* of about 15-30 km^2 using topographical features such as creeks, lakeshores, and mountain ridges as borders. The count area was first over-flown in a fixed-wing aircraft in a *stratification flight* where observers classified blocks as probably having Low, Medium or High numbers of moose, based on the number of animals and fresh tracks seen.

Moose were then counted in a sample of each of the 3 classes of blocks. In some blocks, smaller portions were immediately re-flown at lower speeds to see if any moose were missed during the first count. A correction for missed moose (*Sightability Correction Factor or SCF*) was then calculated based on the proportion of animals missed in the first count. The SCF was used to give an estimate of the total number of moose in the area.

For the 1996 count, we did not do a stratification flight, but identified 11 High and 83 Low blocks based on what was seen in 1990 (Larsen and Ward 1991). We combined their High and Medium blocks into High blocks where we expected more than 5 moose to be present. If we

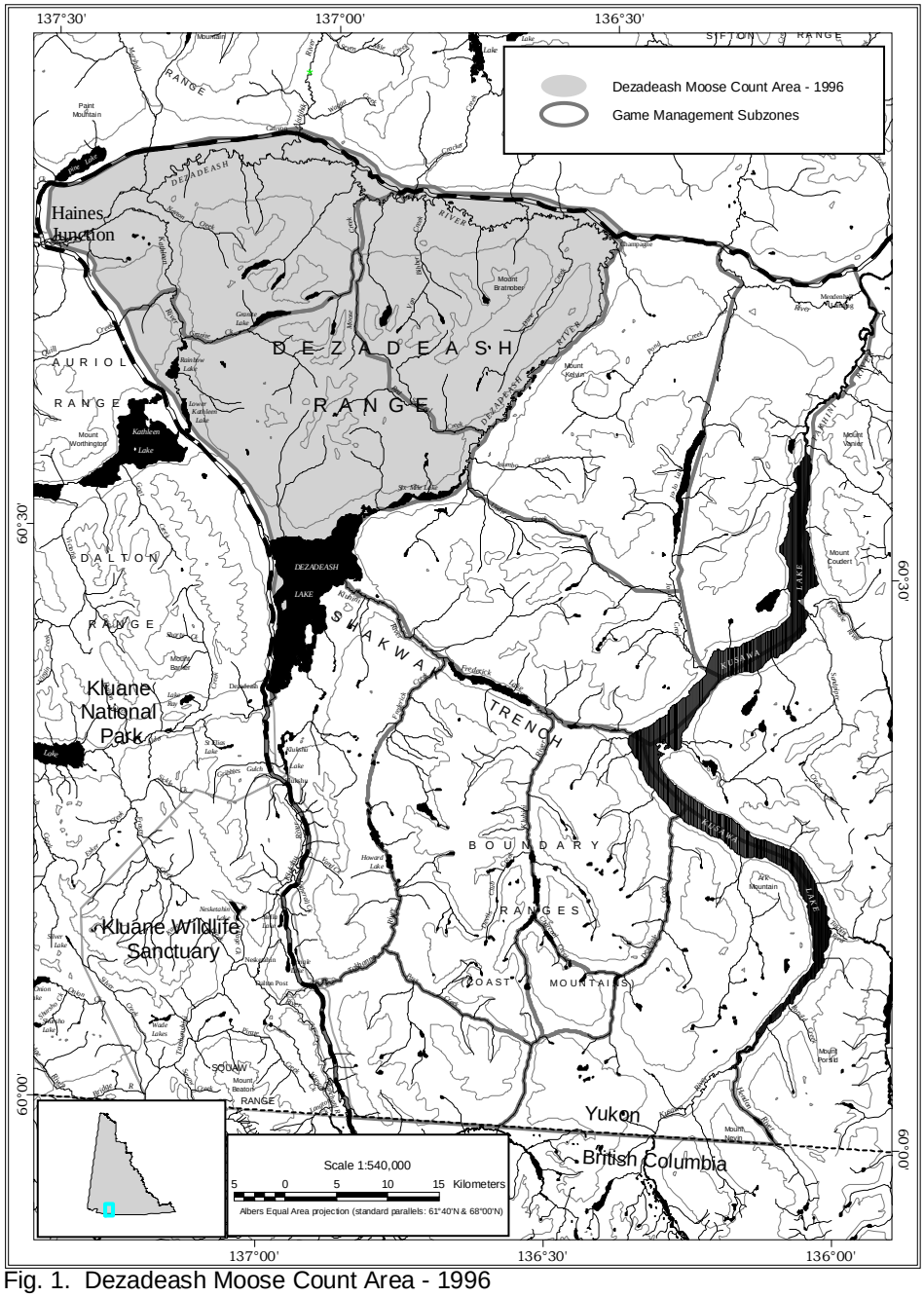

Fig. 1. Dezadeash Moose Count Area - 1996

expected to see fewer than five moose, we classified the block as a Low . We re-stratified a few blocks in the eastern portion, then reclassified 2 Low blocks to High, based on the moose activity we saw. Then, we randomly selected sample blocks from a list of High and Low blocks. We surveyed the blocks using two Supercub PA-18 aircraft with one observer and a pilot-observer. In 1990, the SRB count was done with helicopters.

We noted the location, elevation, and age and sex composition of each moose group we saw. We classified 4 kinds of moose: calf, spike-forked yearling bull, larger bull and cow. We estimated the *recruitment* rate of yearling animals becoming adults by doubling the number of yearling bulls (to estimate male and female yearlings) then dividing by the total number of cows minus yearling cows (to estimate the number of adult cows). This method assumed that there were as many yearling cows as there were yearling bulls in the moose population. It is not possible to tell if a cow is a yearling or an adult, so we had to rely on yearling bull counts to estimate the number of yearling cows in the population.

We analyzed our count results using the MOOSEPOP computer program for estimating moose numbers and composition (Gasaway et al. 1986).

Weather Conditions

Survey conditions were good on all days. Morning temperatures in Haines Junction were about –38° C, skies were clear and winds were light. At higher elevations the temperature was about –20° C with light to moderate easterly winds. Turbulence was light to moderate. Turbulence was greater in higher elevation areas with east or west aspects. Sunlight was bright and intense, and snow cover was old and complete (30 cm) with little vegetation showing. No new snow fell during our count period.

Results and Discussion

Coverage:

We counted moose in 391 km^2 or 31% of the Dezadeash Mountains count area. We searched for moose in 12 of 83 Low blocks (7%), and in all 11 High blocks (Table 1). Figure 2 shows the locations of all moose seen in the survey area. The field survey maps showing the searched blocks are on file with Kluane Regional Management, Haines Junction. A breakdown of the survey costs and other details are shown in the Appendix.

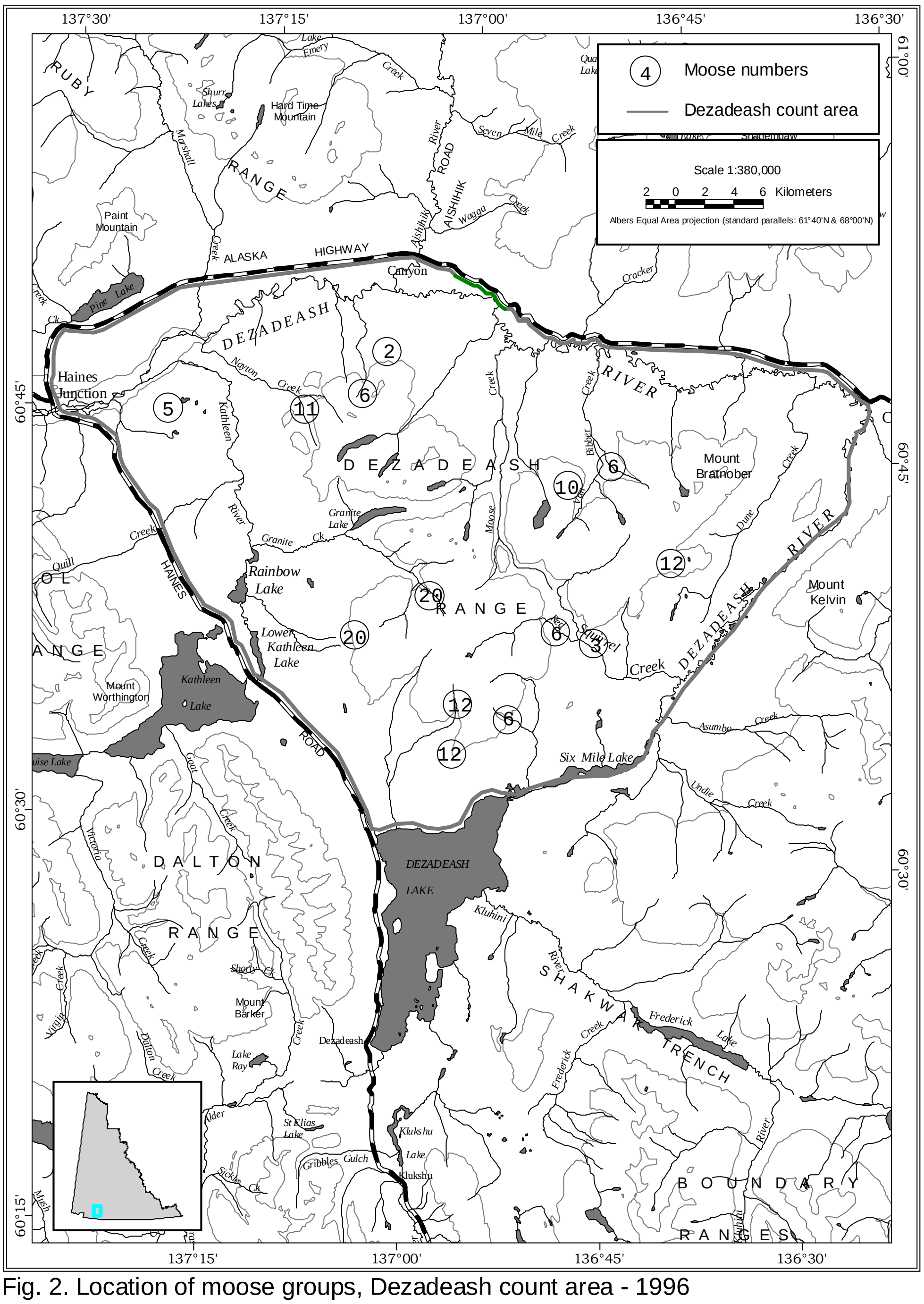

Fig. 2. Location of moose groups, Dezadeash count area - 1996

Table 1. Survey information for the Dezadeash Mountains Count Area, November 1996.

	Low blocks	High blocks	Total
Number of Survey Blocks	83	11	94
Total area (km^2)	1,058	215	1,274
Number of blocks counted	12	11	23
Total area counted (km^2)	176	215	391

Moose numbers and density:

We saw a total of 110 moose during the survey – 105 moose in High blocks and 5 in Low blocks. Because of the sampling errors that are a normal part of the SRB method, we cannot be sure of the total moose in the area. However, we are 90% confident there were between 103 and 190 moose, and our best estimate is 147 moose. Our estimate is originally 135 moose, then we correct for sightability adding 12 moose to the total (Table 2).

Overall density was 115 moose for every 1,000 km^2 (Table 2). This is somewhat lower than the Yukon average of about 153 moose for every 1,000 km^2. Adult density (excluding the calves) was 96 moose for every 1,000 km^2. The High blocks contained all of the calves and yearlings, 94% of the cows and 85% of the adult bulls in the study area.

Recruitment and Age and Sex Composition:

Table 2 shows the composition of moose in the Dezadeash Mountains count area. We estimated there were 19 calves for every 100 cows in the area. Yearling recruitment was 61 yearlings for every 100 cows. The adult sex ratio was 18 adult bulls (animals 2 years and older) for every 100 cows. Table 2 also shows the highest and lowest estimates for each ratio, based on the degree of confidence we had in our composition estimates.

Table 2. Number, sex and age ratios of moose in the Dezadeash Mountains area, November 1996.

Calves = **14**; Yrlings = (23*2) = **46** Mature Cows = (97-23) = **74** Mature Bulls = (36-23) = **13**		Lowest estimate	Highest estimate	90% Confidence Interval (±)
Total number of moose	147[a]	103	190	30%
Total number of calves	14	12	16	13%
Calves per 100 cows[b]	19	11	27	40%
Yearlings per 100 cows[c]	61	37	86	40%
Total number of cows	97	63	130	35%
Total number of bulls	36	24	48	34%
Bulls (2 years and older) per 100 cows	18	7	29	63%

[a]135 moose times 1.086 sightability correction factor
[b]total calves/(total cows-yearling bulls)
[c](yearling bulls + yearling bulls)/(total cows - yearling bulls)

Trends in Moose Numbers and Composition 1990-1996:

We estimated 147 moose were in the Dezadeash Mountains count area – 40% fewer than the 247 moose counted in the same area in 1990 (R. Ward unpublished data). Compared to the 1990 count, there were more yearlings but fewer calves and adult bulls in 1996 (Table 3). Ratios of greater than 25 calves for every 100 females are needed to keep northern moose numbers stable (Bergerud and Elliot 1998, Hayes et al. unpublished data). Calf survival in 1996 was probably too low to maintain stable moose numbers. However, yearling recruitment was probably high enough to offset the natural mortality of adults in 1996-1997.

Adult bull numbers dropped substantially in the 1996 count (Table 3), and numbers were so low that we were concerned that there were not enough bulls to breed all of the cows. There was other evidence that moose numbers had declined since 1990. In 1990 the average group size of moose was about 19 animals compared to 10 animals in 1996. However, this difference was not statistically significant (Table 4). Differences in group size could also be due to different observers estimating if animals were part of a group, depending on distances between animals.

Table 3. Density, sex and age composition, and sightability of moose in the Dezadeash Mountains, 1990 and 1996. The 90% confidence intervals are shown as ± a number.

	1990	1996
Density	203 ± 40	115 ± 34
Calves for every 100 cows	32 ± 7	19 ± 8
Yearlings for every 100 cows	12 ± 3	61 ± 24
Adult bulls for every 100 cows	45 ± 9	18 ± 11
Sightability	1.000[a]	1.086[b]

[a]assumes no moose were missed

[b]assumes 8.6 moose were missed for every 100 moose seen

Table 4. A comparison of average group size in 1990 and 1996 counts of the Dezadeash Mountains area.

Year	Average group size	Standard Error	
1990	19.2	4.2	Student's *t* test unequal
1996	10.3	1.6	variances, *P*=0.07

Harvest patterns:

We examined the distribution of reported harvest in the AMMA since 1990 to determine if harvest could have contributed to the decline in moose numbers (Table 5). Only eight moose were killed by resident permit hunters between 1990 and 1995. Non-resident permit hunters killed no moose in the Dezadeash Mountains. There was no harvest information available from First Nation hunters.

In 1981 a mining road was built into Granite Creek, the most important early-wintering area for moose in the Dezadeash Mountains. This road was upgraded throughout the 1990s and there is local information that First Nation hunters used this area. Because First Nations hunters did not report their harvest of wildlife, we cannot determine the effects of hunting on the moose population. However, over-harvest cannot be ruled out as the potential cause of the decline in moose numbers in the area between 1990 and 1996.

Table 5. Resident harvest of moose in the Dezadeash Count area, 1990-1995.

	Game Management Subzones			
Year	7-01	7-02	7-03	Total
1990	0	0	0	0
1991	0	0	0	0
1992	0	0	0	0
1993	1	0	1	2
1994	1	0	2	3
1995	1	0	2	3
Total	3	0	5	8

CONCLUSIONS AND RECOMMENDATIONS

- Moose numbers declined by about 40% in the Dezadeash Mountains count area from 1990 to 1996. The largest decline was in the number of adult bulls, which fell to very low levels.
- We recommend continued annual monitoring of moose through composition surveys to document trends in calf, yearling and adult survival in the Dezadeash Mountains.
- We also recommend that permits for resident and non-resident hunters be distributed more evenly throughout the AMMA to ensure that moose hunting is not concentrated in easily accessible areas in the Dezadeash Mountains.

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Appendix. Costs and other survey details, Dezadeash Mountains Count Area, 1996.

Activity	Blocks sampled	Area sampled (km^2)	Sampling flight time	Survey Intensity ($\bar{x}$ Minutes/ Unit)	Total flight time	Aircraft cost	Fuel	Lodging /food	Total Cost
Survey	23	391	31 hrs	4.75	45 hrs	$9,000	$1,000	0	$10,000