

1998 Chisana Area Moose Survey, Wrangell-St. Elias National Park and Preserve, Alaska

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ABSTRACT: *We conducted a “no-strat” aerial survey for moose in the vicinity of Chisana, Alaska from 29-31 October 1998. Snow cover was less than optimal, with generally low snow depth and some bare ground showing. A total of 352.1 mi² in 28 plots was surveyed. We estimated sampling correction factors in 10 plots (35%). Observed SCF was 1.06 with very low variance. We used the GDRH program MOOSEPOP 2.0 to calculate a population of 295.8 (95% CI 282.8-308.7) moose. Moose density was estimated at .84 moose/mi² (.80-.87). Moose were concentrated above treeline up to 4500 feet. Overall bull:cow:calf ratios were 65:100:34.3. An estimated 20.8% (29.1) of cows observed were yearlings, bringing adjusted cow:calf ratios to 100:43.2.*

INTRODUCTION

Monitoring wildlife population characteristics, densities, and distribution is an integral part of sound wildlife management. These data provide the basis for evaluating ungulate and predator populations, harvest management, impacts assessment, and evaluation of National Park Service (NPS) efforts to meet the ANILCA mandate to provide “natural and healthy” populations.

Wrangell-St. Elias National Park and Preserve (WRST) began systematic moose population surveys in 1991. Prior to that time moose surveys were conducted by Alaska Department of Fish and Game (ADF&G) biologists (western portion of GMU 11), and by ADF&G or U.S. Fish and Wildlife Service (USFWS) biologists (GMU 12). Initially WRST chose to conduct trend surveys because of funding limitations and a desire to maintain consistency with previous survey efforts. In 1993, WRST conducted a more rigorous population estimate in western GMU 11 using techniques described by Gasaway *et al.* (1986). (This technique is often referred to as “Gasaway” or “GDRH” after it’s senior author or the combined initials of the authors surnames.) In 1994, a modification of the GDRH technique, called “no-strat” was developed and tested (Dale *et al.* 1994) at WRST. This technique was designed to eliminate the costly and time-consuming step of pre-survey plot stratification from the GDRH. It was found to provide similar population estimates at reduced cost (Dale *et al.* 1994). WRST biologists have used the no-strat technique since 1994.

STUDY AREA

WRST is located in south-central Alaska (Fig. 1). It comprises approximately 13.2 million acres, ranging in elevation from sea level to about 18,000 feet. A wide diversity of geological land forms, climatic zones, vegetation and habitat types are found within

the Park and Preserve. Approximately 1 million acres within the exterior boundaries are in non-federal ownership.

The study area is located in the northeastern corner of the Park and Preserve (Fig. 1). Dominant vegetation below 2500 feet is black spruce (*Picea mariana*) in wet or poorly drained areas, with stands of white spruce (*P. glauca*) on drier or better drained sites. Small areas of aspen (*Populus tremuloides*) and balsam poplar (*P. balsamifera*) are also found, primarily along major streams or rivers. The area is interspersed with numerous streams, rivers, ponds and lakes. At higher elevations, taiga vegetation grades into tall shrub communities of alder (*Alnus* spp.) and/or willow (*Salix* spp.), or alpine tundra. Habitats surveyed include riparian areas, boreal forest, transition shrub zones and some tundra.

The subject survey took place between Stuver Creek, the U.S.-Canadian border, and the White River (Fig. 2), over approximately 352.1 mi².

METHODS

We selected the Chisana area because only trend counts were previously available, local outfitter concerns about moose and other wildlife populations, and because the Chisana area is (or soon will be) the focus of other intensive work on Dall's sheep and caribou. Moose density estimates and other population data will be useful in studying and evaluating population ecology of the ungulate community in that portion of the Park/Preserve.

The general area was divided into numerous small (9-14 mi²) sampling units. We also chose a random subset of 2 mi² areas within the larger sampling units to use to determine sightability correction factors (SCF). Survey units and intensive survey areas were drawn on 1:63,360 USGS topographic maps to use for reference and navigation in the field. The entire area was flown at an elevation of 150-300 feet AGL. Overall survey intensity was about 2 minutes for each square mile of the survey area. Intensive survey units were surveyed at 10-15 minutes per square mile.

All moose groups observed were given a sequential identification number, plotted on the reference map, and recorded on a standard GDRH data collection form (Gasaway *et al.* 1986). For each group, the total number of animals, number of each sex, number of bulls in each antler class (small, medium and large), and the number of calves with each cow was recorded. All data were summarized by sampling unit and intensive survey area.

ArcView is not available on the Wildlife Program computer yet, and area size calculations were made with an English Grid. Data were entered into MOOSEPOP 2.0 and density estimates and associated statistics calculated using that program.

RESULTS

The 1998 survey was conducted by Ranger/Pilot Jim Hannah and Wildlife Biologist Carl Mitchell on October 29,30 and 31. We spent a total of 17 hours and 5 minutes actually surveying. We covered 352.1 mi².

We counted a total of 277 moose in 106 groups. Mean group size was 2.61, with group sizes ranging from 1-11. Observed moose density was 0.78 moose/mi². The sightability correction factor was 1.06. Total estimated moose density was 0.84 (95% CI =0.80-0.87). Overall population estimate is 295.8 moose (95%CI = 282.8-308.7). The SCF variance was extremely low (Appendix 1).

Overall adult sex ratios are 65 bulls:100 cows (N=231). Of all bulls (N=91), 20.8% (19) were small (spike/fork antlers), 53.8% (49) were medium (<50 inch spread), and 25.2% (23) were large (≥ 50 inch spread). For cows (n=140), 52.6% (99) had no calves, 18% (34) had one calf, and 3.7% (7) had 2 calves. Assuming 20.8% (N=29) of cows observed were yearlings, and therefore probably not bred (Schwartz and Hundertmark 1993), only 111 of the cows observed were adults. Therefore, only 36.9% of the adult cows observed had at least one calf at heel. Thus the adjusted adult cow:calf ratio is 100: 43.2. Of 48 calves observed, 29% were twins and 71% were singles. We observed no lone calves or unclassified moose. Overall sex ratio was 65:100:34.3.

DISCUSSION

There are considerable trend count data for this region. ADF&G and Tetlin NWR trend survey data since 1987 are shown in Table 1.

Table 1. Moose trend count data for the Chisana area, Nutzotin Mountains, 1987-1998.

<u>Year</u>	<u>Total</u>	<u>Bull:Cow:Calf Ratios</u>	<u>Yearling:Cow Ratios</u>
1987	99	70:100:30	16:100
1988	135	109.4:100:43.4	49.1:100
1991	190	94:100:32.1	47.6:100
1995	179	68.5:100:26.1	8.6:100
1996	113	49.2:100:52.3	15.4:100
1997	124	68.3:100:38.3	30:100
1998 ¹	198	43.4:100:33	20.8:100

¹ data from NPS survey adjusted for the same area used in FWS trend counts.

The data are not directly comparable because of variation in areas covered, observers, survey conditions, or technique. However, no long term trend is indicated. It appears the declines observed in 1996 and 1997 may have been due to poor recruitment, as evidenced by yearling:cow ratios in 1995 and 1996. Some local Chisana residents have indicated that moose populations and the number of mature bulls has increased in recent years. That is not born out by the trend data in Table 1.

Generally, Game Management Unit 12 has low moose densities characteristic of interior Alaska and the Yukon (Gasaway *et al.* 1992). Overall, GMU 12 moose densities average about .4-.6 moose/mi² (Gardner 1996), with considerable variation between the northern and southern portions of the Unit. Densities for the Chisana area have been estimated as high as 2.3 moose/mi², while other areas contain >0.1 moose. Observed densities in any given area over the 1998 survey area range from 0.0 to 13.0/mi². The overall density estimate of .84 moose/mi² is well within the ranges observed for large areas during previous surveys.

Fall surveys are timed to coincide with snow cover and moose concentrations, in order maximize moose observations within a survey area. This results in density estimates that are not indicative of larger areas, where moose do not occur during this time period. It can also result in skewed (lower) bull:cow and cow:calf ratios (Peek 1998). We saw few moose and very little moose sign over large areas of lower elevation black spruce forest north of the Nutzotin Mountains and north of the White River. If more of these habitats had been included in the survey overall density estimates would have been much lower, and probably within the .4-.6 moose/mi² generally observed in GMU 12 (Gardner 1996), and elsewhere within WRST. Our sex and age ratios can also be considered conservative. Larger areas of lowland black spruce were not included in the 1998 survey because of limited time and funding available for moose surveys in WRST, and deteriorating weather conditions.

Moose densities, sex and age ratios are reasonable for populations in this region of Alaska. Moose populations in WRST appear to fit the “low density equilibria, predator limited” model of Ballard and van Ballenberghe (1998). Densities and cow:calf ratios are below what is possible to achieve under intensive management, but they are within expected limits for current environmental conditions and management regimes. Large portions of the Chisana survey area have relatively low harvest rates compared to other areas of GMU 12 (Gardner 1996, WRST files). Bear and wolf predation on calves and severe winters are probably responsible for between year variation in cow:calf ratios, and percentage of yearlings in the population. We have no data on browse utilization or other habitat characteristics for this area. We have too few specific data to go beyond these generalities. Overall, the population appears to be “natural” and “healthy”, as defined by Harris *et al.* (1998).

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Appendix 1. MOOSEPOP 2.0 Sample Data Summary for 1998 Chisana Moose Survey.

ESTIMATED POPULATION SIZE

sample data for moosepop wrst chisana 1998

PAR/STRAT		TOTAL
N	28	28
Tot area	352.10	352.10
n	28	28
Area sur	352.10	352.10
# seen	277	277
Density	0.7867	0.8400
T ₀	277.00	
V(T ₀)	0.00	
SCF ₀	1.067794	
V (SCF ₀)	0.0004281	
SCF df	9	
T ₀ df	27	

T_e= 295.8 V (T_e)= 32.85 df (T_e)= 9

80% CI around T_e = (287.9, 303.7) is ± 2.68%

90% CI around T_e = (285.3, 306.3) is ± 3.55%

95% CI around $T_e = (282.8, 308.7)$ is $\pm 4.38\%$