SALMON RIVER MOOSE CENSUS-NOVEMBER 1995

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INTRODUCTION

Moose management in Unit 23 has been a high priority issue for land managers since Unit 23 moose populations declined following two consecutive severe winters in 1990 and 1991. The area within Kobuk Valley National Park (KVNP) is closed to sport hunting. Most local harvest occurs close to local villages such as Kiana, Noorvik, and Ambler or along the Kobuk River corridor via boat and snow machine access. At any rate, harvest is assumed to play a minor role in limiting moose abundance in this area. With this in mind, monitoring this population will provide data that serve as a comparison for more heavily harvested drainages within northwestern Alaska such as the Noatak, Squirrel, and Tagagawik Rivers. The latter areas have been delineated into long-term quantitative monitoring sites for moose abundance. Since only trend counts had been conducted in the Middle Kobuk River valley, a census area was delineated subjectively to meet the objectives of a logistically feasible and cost effective census area that could be surveyed every 2-3 years to obtain statistically valid composition and abundance estimates. We chose a survey area encompassing the eastern side of the Kallarichuk Hills, Salmon River, Tutuksuk River, and Kobuk River (Fig. 1).

As with the western portion of the middle Noatak River census area, we selected an area small enough to complete a census using local agency personnel, agency aircraft/pilots, and local charter operators within the constraints of limited fall daylight and favorable weather.

METHODS

Initially, we planned to conduct a stratified random sample survey using the methods of Gasaway et al. (1986); however, a stratification plane was not available until the latter part of the census. Therefore we delineated the area into sample units and randomly sampled units to survey prior to the stratification. We subsequently stratified the census area, but did not use the information for the abundance or composition estimates. We stratified the census area using a Cessna 206 (Charter) with 3 observers. Sample units were surveyed using 3 PA-18 Super Cubs (1-ADF&G, 2-Charter). Population parameters were estimated using the computer program MOOSEPOP with one stratum specified (DeLong and Reed, no date).

RESULTS

We conducted the census between 12 November and 15 November 1995. We stratified

the census area on 13 and 15 November in 10.7 flight hours. Weather conditions were optimal for the survey (ie. clear sky, light wind, and complete snow cover). Sample units were surveyed between 12 and 14 November in approximately 34 flight hours. Participants in the survey were local agency personnel with prior moose survey experience.

Stratification and Sample Units

We surveyed 17 of 70 units (24%; area=233 mi^2 (603 km^2)) and completed intensive surveys for sightability correction factors in 15 of 17 units (Table 1). The mean standard search intensity was 4.2 min/mi^2(1.6 min/km^2)(Range 2.8-5.9 min, SD=0.91 min). The sightability estimate was 62%. The 891 mi^2 (2,309 km^2) census area was subsequently stratified as 35 low (50%), 22 medium (31%), and 13 (19%) high density units.

Population Estimation and Composition

MOOSEPOP population estimates and composition estimates are summarized in Tables 2-7. The population estimate of 780 moose (80% CI ± 32%) results in a density estimate of 0.9 moose/mi^2 (0.34 moose/km^2)(Table 2). We counted 147 moose classified as 49 bulls, 63 cows, and 35 calves. Bull, cow, and calf estimates were 260, 334, and 186 respectively (Tables 3, 4, and 5). The estimated bull:cow ratio was 78:100 (80% CI ± 24%), and the estimated calf:cow ratio was 56:100 (80% CI ± 16%)(Tables 6 and 7). Bull antler size classes were estimated to be 22% small, 35% medium, and 43% large. Cows were estimated to comprise 43% of the population.

DISCUSSION

Overall precision of this survey was poor, and was compromised by the low number of moose actually counted and the low sightability estimate. During the intensive search in sample unit 7, a group of 5 moose (3 cows and 2 calves), missed during the standard search, was seen. Heavy ice and frost covering tall riparian willow near open water areas along the river easily compromised sightability in some units. In addition, a consequence of random sampling prior to the stratification was that a high proportion (i.e. 59%) of low density sample units were surveyed. The stratification resulted in half of the sample units being classified as low density. Thus, very few moose were counted and the precision of estimates was affected. In the future, a stratified sample using any knowledge of winter moose distribution would be preferable to a random sample so that the number of moose counted could be optimized to give confidence to the resulting estimates of population and composition.

The results of this survey raise some interesting questions when compared to the middle Noatak census results. Although precision is poor, the Kobuk census area has bull:cow and calf:cow ratios that are twice those of the middle Noatak. While the bull:cow ratio may be explained simply by comparatively heavy harvest pressure in the middle Noatak; the calf:cow ratio is more perplexing. In the Kobuk area, 52% of the cows counted had calves whereas only 19% of cows in the middle Noatak area had calves. Only productivity, neonatal survival rates,

or a combination of both would explain these differences. Future surveys throughout Unit 23 will provide the foundation with which to make comparisons between these geographically separate moose populations to answer questions about variation in productivity and survivorship.

In summary, we recommend that the Salmon River census area be surveyed every 3 years to serve as a comparative example of a lightly harvested moose population. The cost of this survey (i.e. ~$7,000) was comparable to the cost of the western middle Noatak survey area.

LITERATURE CITED

DELONG, R.A. and D.J. REED. No date. MOOSEPOP: Moose Population Estimation Survey Software Documentation and Instructions, Version 2.0. Alas. Dept. of Fish and Game, Fairbanks Ak. 36 pp.

GASAWAY, W.C., S.D. DUBOIS, D. REED, and S.J. HARBO. 1986. Estimating moose population parameters from aerial surveys. Biol. Paper No. 22, Univ. of Alas., Fairbanks, Ak. 108 pp.

Table 1. Sample unit data for the Salmon River moose census, November 1995.

		Time	Area	Bull[a]			Cow[b]					SCF[c]	
Unit	Stratum	(min)	(mi^2)	S	M	L	0	1	2	Calf	Total	S	I
58	Low	40	14.10	0	0	0	0	0	0	0	0		
14	Low	50	15.00	0	0	0	0	0	0	0	0	0	1
26	Low	60	14.90	0	0	4	3	0	0	0	7	3	3
12	Low	78	14.80	4	1	1	1	4	0	0	15	0	0
7	High	45	12.50	0	0	0	0	2	1	0	7	5	10
6	Low	36	11.60	0	1	0	1	2	0	0	6	6	6
37	Low	69	13.80	0	1	0	1	1	0	0	4	1	1
57	High	61	10.30	3	1	3	7	11	0	0	36	7	9
41	Low	45	13.40	1	1	2	3	0	0	0	7	0	0
16	Low	71	14.10	0	1	1	1	1	0	0	5	0	0
3	High	40	11.90	3	3	0	1	1	0	0	9	0	0
11	Low	51	12.90	0	2	2	1	2	0	0	9	3	5
62	Medium	84	16.10	0	1	5	4	1	0	0	12	0	0
51	Medium	51	14.20	0	0	0	0	2	0	0	4	2	2
65	Medium	62	15.10	0	1	2	2	2	1	0	12		
27	Low	57	14.70	0	2	0	2	1	0	0	6	0	0
32	Medium	66	13.20	0	2	1	3	1	0	0	8	1	2

[a] Bull antler size classes: S=small (<25 in), M=medium (26-50 in), and L=large (>50 in)

[b] Cow associations: 0=no calf, 1=1 calf, 2=2 calves.

[c] Sightability Correction Factor (SCF); "S" is the number of moose sighted during the standard search and "I" is the number of moose counted in the same area during the intensive search

Table 2. MOOSEPOP results showing estimated population size, density, sightability, and precision for the Salmon River moose census, November 1995.

PAR/STRAT	TOTAL
N	70
Tot area	891.40
n	17
Area sur	232.60
# seen	147
Density	0.6320
To	563.4
V(To	13787.76
To df	16

SCFo=1.38378 V(SCFo)=0.0265516117 df(SCFo)= 14
Te= **779.6** V(Te)= 34461.91 df(Te)= 14

80% CI around Te = (529.9, 1029.2) is +/- 32.03%
90% CI around Te = (452.6, 1106.5) is +/- 41.94%
95% CI around Te = (381.4, 1177.8) is +/- 51.08%

Moose Density = 779.6/891.4 mi^2 = **0.87 moose/mi^2**

Table 3. Bull moose estimates calculated by MOOSEPOP, Salmon River moose census, November 1995.

PAR/STRAT	TOTAL
N	70
Tot area	891.40
n	17
Area sur	232.60
# seen	49
Density	0.2107
Wen	187.8
V(Wen)	1146.67
df	16

SCFo=1.38378 V(SCFo)=0.0265516117 df(SCFo)= 14
Wen= **259.9** V(Wen)= 3101.53 df(Wen)= 14

80% CI around Wen = (184.9, 334.8) is +/- 28.83%
90% CI around Wen = (161.8, 357.9) is +/- 37.74%
95% CI around Wen = (140.4, 379.3) is +/- 45.97%

Table 4. Cow moose estimates calculated by MOOSEPOP, Salmon River moose census, November 1995.

PAR/STRAT	TOTAL
N	70
Tot area	891.40
n	17
Area sur	232.60
# seen	63
Density	0.2709
Wen	241.4
V(Wen)	3295.43
df	16

SCFo=1.38378 V(SCFo)=0.0265516117 df(SCFo)= 14
Wen= **334.1** V(Wen)= 7770.48 df(Wen)= 14

80% CI around Wen = (215.5, 452.7) is +/- 35.49%
90% CI around Wen = (178.9, 489.3) is +/- 46.46%
95% CI around Wen = (145.0, 523.2) is +/- 56.60%

Table 5. Calf moose estimates calculated by MOOSEPOP, Salmon River moose census, November 1995.

PAR/STRAT	TOTAL
N	70
Tot area	891.40
n	17
Area sur	232.60
# seen	35
Density	0.1505
Wen	134.1
V(Wen)	1491.13
df	16

SCFo=1.38378 V(SCFo)=0.0265516117 df(SCFo)= 14
Wen= **185.6** V(Wen)= 3293.40 df(Wen)= 14

80% CI around Wen = (108.4, 262.8) is +/- 41.59%
90% CI around Wen = (84.5, 286.7) is +/- 54.45%
95% CI around Wen = (62.5, 308.7) is +/- 66.32%

Table 6. Bull:Cow ratios calculated by MOOSEPOP, Salmon River moose census, November 1995.

p= **0.7778** V(p)= 0.01967314 df(p)= 16

80% CI around p = (0.5902, 0.9653) is +/- 24.11%
90% CI around p = (0.5329, 1.0227) is +/- 31.49%
95% CI around p = (0.4804, 1.0751) is +/- 38.23%

Table 7. Calf:Cow ratios calculated by MOOSEPOP, Salmon River moose census, November 1995.

p= **0.5556** V(p)= 0.00428395 df(p)= 16

80% CI around p = (0.4680, 0.6431) is +/- 15.75%
90% CI around p = (0.4413, 0.6698) is +/- 20.57%
95% CI around p = (0.4168, 0.6943) is +/- 24.98%