STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF WILDLIFE CONSERVATION

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Memorandum

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Thru: Roy Nowlin
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From: Toby Boudreau, McGrath Area Biologist
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Subject: Results of 2003 19D East and 19C Moose Surveys

Introduction

The Department conducted moose surveys in Unit 19D East during November 16-25, 2003. Collecting moose population and trend estimates in this area is a top priority for the department because of the ongoing intensive management program to increase harvest of moose in this area, and because of the need to augment the ongoing moose research project. For these reasons, and because unsuitable survey conditions prevented surveys in fall 2002, we initiated the 2003 survey on November 16 with the knowledge that survey conditions were not optimal. Less than optimal survey conditions were created by three factors: 1) snow cover was minimal, 2) day length was short and decreasing, and 3) long-range weather forecasts were unfavorable. However, because of the large number of radiocolared moose within the Experimantal Micro-Management Area (EMMA) that could be used as a check of survey quality, we believed the survey was worth conducting. With this information in mind, survey protocol was designed beforehand to proceed incrementally, by priority, to ensure the attainment of some usable information even if the survey had to be terminated prematurely.

The prioritized survey objectives, were:
1) survey approximately 50% of the 87 sample units (SU) in the EMMA and calculate a sightability correction factor based on the proportion of radiocollared moose observed;
2) survey approximately 131 of the 773 SU's in the Unit 19D East moose survey area (19D East MSA);
3) survey the Candle-Wilson trend count area (Candle-Wilson TCA) and the Farewell TCA;
4) survey the remaining SU's in the EMMA.

Background

Figure 1 shows various areas pertinent not only to the moose survey addressed in this memo, but also to other aspects of the intensive management program in Unit 19D East. Unit 19D East encompasses 8,513 mi^2. The "19D East" designation arose when the Board of Game originally established a wolf predation control area (Alaska Administrative Code 92.125) that effected most, but not all, of Game Management Subunit 19D.

The 19D East moose survey area (MSA) consists of a 5,204 mi^2 portion of 19D East. The MSA contains 860 SU's, 87 of which are in the EMMA. This survey area was established to provide more detailed moose population information for intensive management purposes in Unit 19D East. The MSA does not encompass all of 19D East because of logistic and financial constraints. Conducting a moose population estimation survey in an area the size of the 19D East MSA approaches the upper limit of what normally can be accomplished even under the best of conditions (Figure 1).

The Experimental Micro-Management Area is 528 mi^2 in size, consists of 87 SU's, and is located in the southwestern portion of the 19D East MSA. It includes the community of McGrath, contains some of the best habitat and highest moose population densities in 19D East, and is traditionally one of the most heavily hunted areas in the upper Kuskokwim River drainage (Figure 1).

The EMMA wolf control zone is another geographic designation. It surrounds and includes the EMMA and is where pilots are currently permitted to take wolves from aircraft. This zone may be modified in the future to meet program needs. The 528 mi^2 of the EMMA are included in the 1,728 mi^2 of the wolf control zone. Although this area is not pertinent to an explanation of the 2003 moose survey, it is described here to avoid misinterpretations of moose survey data or the implications that these data may have for the overall intensive management program in 19D East (Figure 1).

The Candle-Wilson TCA encompasses 60 mi^2 (Figure 1). This TCA is located close to McGrath, has been surveyed since 1989, and like all TCA's provides a means of monitoring trends in moose populations. TCA data provide indices to moose population trends over time, but do not necessarily reflect the actual sex and age composition of the entire moose population. Even though more intensive surveys are currently being conducted because of the ongoing intensive management program, we continue to conduct Candle-Wilson TCA surveys because it affords an opportunity to track (i.e., compare) the traditional index information of the TCA with more comprehensive and statistically quantifiable data obtained through more intensive surveys. This should enhance our ability to interpret TCA survey information in the future after intensive moose surveys have ceased.

The Farewell TCA (102 mi^2) is also shown in Figure 1. This TCA is located in Unit 19C adjacent to Unit 19D, and it provides control or comparison information useful for an analysis of the moose survey results in Unit 19D East, since there are no active manipulations occurring there.

In 2001, all 87 SU's in the EMMA were surveyed (100% sampling intensity). An additional 131 out of a possible 773 SU's were surveyed (17% sampling intensity) in the remainder of the 19D

East MSA (Figure 2). The sightability of moose was calculated at 84%, based on observations of 32 of 38 radiocollared moose. The desired goal for 2003 surveys was to repeat the 2001 level of sampling intensity and to recalculate a sightability correction factor to maintain as much consistency between the two surveys as possible. However, minimum required snowfall did not accumulate until mid-November, approximately 3 weeks later than in 2001. This delayed initiation of the survey until November 16. Day length was, of course, shorter and rapidly diminishing by then, further complicating survey efforts. After the survey was initiated on the 17th, two weather fronts passed delivering snow, rain and wind, which grounded survey crews multiple times between the 19th and 24th. The survey was terminated on the 25th prior to meeting all 4 previously mentioned objectives. This resulted in 52% and 7% sampling intensity of the EMMA and the remainder of the 19D East MSA, respectively (Figure 3). Sightability of moose was also determined, and the Candle-Wilson and Farewell TCA's were surveyed.

Methods

SU's consist of north-south boundaries formed by 2 minutes of latitude (approximately 2 miles) and east-west boundaries formed by 5 minutes of longitude (about 2.5 miles). SU's were searched at an intensity of 8-10 minutes per mi^2 depending on vegetation type. TCA's were search at an intensity of 3-5 min/mi^2. Radiocollared moose observed within EMMA sample units were recorded for sightability calculations. We analyzed the data using stratified random sampling methods, as described in Gasaway (1986). We computed separate estimates for the population in the EMMA and in the remainder of the 19D East MSA. Both of these estimates were added for the total estimate.

Results and Discussion

From November 16-25, 2003, we surveyed 45 (52%) of the 87 SU's in the EMMA, and 52 (7%) of the 773 SU's in the remainder of the 19D East MSA (Figure 3). Twenty-one out of 28 radiocollared moose were observed in the EMMA, indicating a sightability of 75%. The 2003 sightability of 75% compared to the 2001 sightability of 84% reflects the poorer survey conditions. Results for both years of surveys, corrected for sightability, are given in Table 1. Also, the Candle-Wilson (Table 2) and Farewell (Table 3) TCA's were surveyed.

We achieved our 1st and most important objective of obtaining 50% sampling coverage within the EMMA and obtaining a sightablity correction factor based on radiocollared moose within the EMMA. Estimates for the EMMA are based on 237 moose counted in 45 SUs and information on distribution and sightability of collared animals adds further credibility to survey results from within the EMMA despite not achieving 100% coverage within the EMMA.

Although we did obtain some data which we present in this memo, because of weather constraints and the premature termination of the survey, we did not fully meet our 2nd objective of sampling 131 units in the remainder of the 19D MSA. Therefore, caution needs to be used when interpreting the 2003 survey results for the 19D East MSA. We counted only 52 of 773 SUs, and estimates are based upon 57 moose seen in those units. This fact is reflected in the large confidence intervals seen around each point estimate. Additionally, because we have few radiocollared moose outside of the EMMA, we are less certain of moose distribution on the landscape and what that may mean to our sampling design this year.

Table 1. Results of 2001 and 2003 moose surveys in the EMMA, the remainder of 19D East MSA, and combined results for the 19D East MSA total. The three values given are the lower 90% confidence interval, the estimate, and the upper 90% confidence interval.

Year	Area (mi^2)	Population estimate	Calves:100 Cows	Bulls:100 Cows	Yearling bulls:100 cows
2001	EMMA (528)	479,531,605	29,34,40	15,18,21	2,5,8
2003	EMMA (528)	457,580,736	39,57,79	12,19,28	6,8,9
2001	Remainder 19D East MSA (4,676)	1135,2005,2912	10,24,45	20,47,88	1,7,15
2003	Remainder 19D East MSA (4,676)	692,1084,1528	21,53,99	5,29,60	0,2,4
2001	19D East MSA (5,204)	1652,2536,3469	14,25,42	19,39,66	3,7,13
2003	19D East MSA (5,204)	1219,1664,2195	30,53,84	13,23,37	0,3,13

Here are some observations from Table 1.

- The population in the 19D East MSA appears to have declined from 2001 to 2003. We do not believe that the apparent drop in 19D East moose numbers from 2003 to 2001 is cause for alarm. This decline is not statistically significant and Figures 2 and 3 can help to explain the difference. In 2001, there are relatively large numbers of moose along the southeastern border of 19D. This, along with the fact that many of these plots were sampled randomly, helped to increase the overall estimate. In contrast, in 2003, because the survey was terminated prematurely, relatively few units were sampled along this southeastern border, and when they were, relatively few moose were counted. These findings corroborate our radiocollar information that moose from southeastern 19D move seasonally into Unit 19C, as opposed to moose in the EMMA which are relatively sedentary.
- The population in the EMMA appears to have increased slightly from 2001 to 2003. This increase is not statistically significant. However, the calf:cow ratio is significantly higher in the EMMA in 2003 and if an increase in the population did occur it is likely due to these extra calves.
- Calf:cow ratios appear to have increased in both the EMMA and the remainder of 19D East MSA from 2001 to 2003. The increase is significantly higher in the EMMA, but it is not significantly different from the MSA outside of the EMMA. Further, the increase between 2001 and 2003 is not significantly higher for the MSA outside of the EMMA. Confidence intervals are so large on the 2003 estimate outside the EMMA (because of the very small number of moose sampled) that making any inference about this area would be difficult.
- Bull:cow ratios appear to be higher inside and lower outside the EMMA. The difference between years is not significant for either area. However, the lower bull:cow ratios within the EMMA are consistent with our understanding of 19D hunting patterns. The EMMA is generally more accessible by river, and its proximity to McGrath (the major population center) allows for greater hunting pressure and therefore tends to lower the bull cow ratio in that area.

The Candle-Wilson TCA results from 2003 showed very little difference from 2001.

Table 2. Results of moose surveys within the Candle-Wilson trend count area, 1989–2003.

Year	Bulls:100 Cows (N)	Yearling bulls:100 Cows (N)	Calves:100 Cows (N)	Total moose counted
1989	17 (12)	6 (4)	45 (31)	112
1990	26 (19)	4 (3)	25 (18)	110
1991[a]	20 (9)	0 (0)	31 (14)	67
1992	9 (6)	3 (2)	27 (18)	90
1993	24 (9)	13 (5)	38 (14)	60
1994	20 (18)	4 (4)	17 (16)	126
1995				no survey
1996	18 (10)	7 (4)	34 (19)	85
1997	13 (6)	6 (3)	52 (25)	79
1998	13 (5)	8 (3)	34 (13)	56
1999				no survey
2000	9 (5)	4 (2)	29 (16)	77
2001	6 (4)	2 (1)	22 (14)	82
2002				no survey
2003	5(2)	3(1)	29(11)	51

[a] Only half of the trend count area was surveyed in 1991.

A majority of migratory moose identified in southeast19D travel into 19C during middle to late summer, based on radiocollared moose movement data. The Farewell TCA composition data is likely comparable to composition data gathered in the 19D East MSA outside of the EMMA based on the proximity of the TCA to the MSA and the known mixing of animals. However, Farewell TCA composition data may be may be more reliable to use for comparison purposes in 2003 because of the larger sample of moose obtained (305 in the TCA versus 57 in the MSA). The Farewell bull:cow ratio indicated no apparent change from 2001 to 2003, similar to 19D East. The observed calf:cow ratio was higher in 2003 than previous years, as was the case in 19D East, and other GMUs across the interior.

Table 3. Results of moose surveys within the Farewell TCA, 1987-2003.

Year	Bulls:100 Cows	Yearling bulls:100 Cows	Calves:100 Cows	Total moose counted
1987	53	10	19	242
1988	58	20	34	265
1989	47	15	22	416
1990	43	8	26	373
1991	44	8	29	352

Year	Bulls:100 Cows	Yearling bulls:100 Cows	Calves:100 Cows	Total moose counted
1992	46	8	38	278
1993[a]				
1994	52	10	19	404
1995[a]				
1996	46	11	15	454
1997	30	10	27	443
1998[a]				
1999[b]	33	11	27	248
2000[a]				
2001	25	3	25	454
2002[a]				
2003	25	8	34	305

[a] No survey.
[b] 1999 – only 77.5% of the survey area flown.

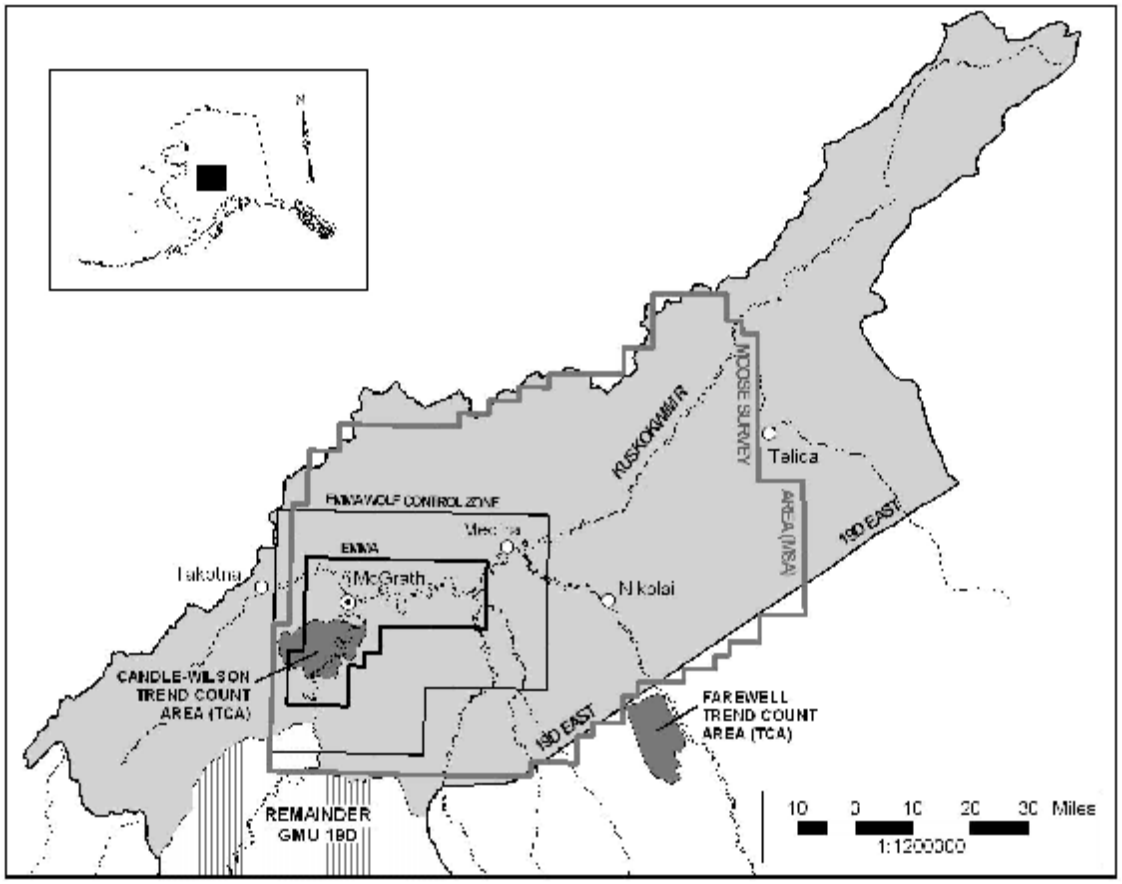
Conclusions

We obtained a population estimate and ratio data for the EMMA moose population based upon 50% coverage of the survey area. In addition, we obtained a sightability correction factor based on radiocollared moose, and we completed counts in both the Farewell TCA and Candle-Wilson TCA. Because of weather constraints, we were unable to complete a survey in the remainder of the 19D East MSA. We sampled only 52 of 773 SU's, resulting in insufficient data to form a reliable picture of the status of the moose population in the MSA. However, this effort did provide information for some 'guarded' estimates, can be used supplement existing information, and will help with future survey design.

References

Gasaway, W.C., DuBois, S.D., Reed, D.J., and Harbo, S.J. 1986. Estimating moose population parameters from aerial surveys. Biological Papers of the University of Alaska, Number **22**, 108.

Figure 1. Unit 19D East and associated management zones.



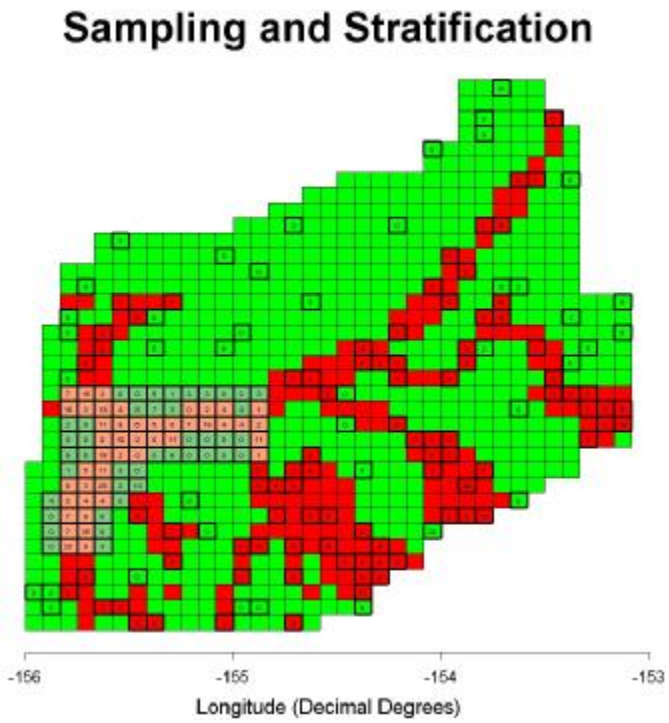
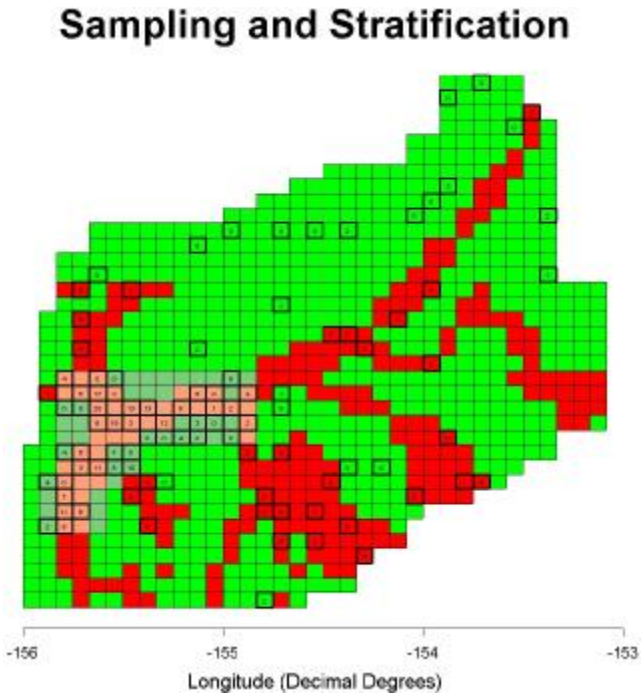


Figure 2. Sampling and stratification for 2001. Red samples indicate the high strata, green samples indicate the low strata. The samples with a heavy border were sampled, and the number of moose counted are shown. The EMMA is shown by the lighter shades of red and green.



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