

MEMORANDUM

STATE OF ALASKA

DATE: February 5, 1988

TO: Steve Ulvi  
Resource Specialist  
Yukon-Charley Rivers National Preserve  
National Park Service  
P.O. Box 64  
Eagle, Alaska 99738

From: Roy Nowlin  
Area Biologist-Unit 25  
Division of Game  
Department of Fish and Game  
1300 College Road  
Fairbanks, Alaska 99701

SUBJECT: Cooperative Moose Surveys in the Yukon-Charley Rivers Preserve.

I have completed analysis of survey data you and I collected during November 1987 within a 3,556 mi<sup>2</sup> section of the preserve that is adjacent to the Yukon River. Our effort involved a density stratification followed by intensive search of small areas. The objectives were to map relative distribution of moose, establish survey areas to monitor population trends, and estimate the total number of moose. We achieved all 3 and have thereby made significant progress toward understanding moose populations within the Yukon-Charley. Our methods and results are summarized below and management recommendations are made.

Distribution of Moose

The relative distribution of moose was mapped by stratifying the survey area into 10-18 mi<sup>2</sup> sample units of high, medium or low density. The stratification was accomplished by taking a quick look at each block using a Cessna 185 aircraft manned by a pilot and 3 observers. The airplane was flown at approximately 120 mph about 500 ft above ground level. An average of 14 blocks were covered during each hour of survey. Any moose or moose tracks that were seen were recorded and brief notes were made about habitat

quality. Sample units were classified as high density if 7 or more moose were seen, medium density if 2 to 6 animals were observed, and low density if 0 or 1 were seen.

Survey conditions were generally good. Snow cover was complete, with an accumulation of about 12 in. Three days before the survey began, about 8 in of new snow fell in the area, obliterating old tracks and significantly improving sightability. Weather was good most of the time. However, there were periods of low cloud ceilings and snow flurries when visibility was limited.

Flight dates and times, number of sample units flown, and weather conditions were:

11/11/87-4.25 hrs survey time; 62 sample units (14.6 su/hr); +10° F, overcast at 3000 to 5000 ft, some snow flurries with limited visibility.

11/13/87-3.95 hrs survey time; 55 sample units (13.9 su/hr); +10° F, overcast at 3000 ft, some icing early in the day, improved conditions by afternoon.

11/14/87-5.0 hrs survey time; 64 sample units (12.8 su/hr); +6° F, broken clouds at 4000-6000 ft, light west wind.

11/15/87-5.1 hrs survey time; 73 sample units (14.3 su/hr); -6° F, thin clouds at 15000 ft, excellent visibility.

A 1:250000 scale map is attached which shows the density classification of each sample unit in the survey area.

#### Population Trend Areas

Two groups of sample units were selected for intensive survey as moose population trend areas. One was located near Snowy Peak on the Kandik River, and the other was on the Hard Luck Creek drainage of the Nation River (see attached maps). Both contained 6 sample units, with Snowy Peak totaling 87.9 mi<sup>2</sup> and Hard Luck Creek being 86.4 mi<sup>2</sup>.

The two groups of sample units were chosen because they both contained mostly medium and/or high density sample units. This guaranteed that enough moose would be seen during intensive surveys to have confidence in population ratios generated from the data.

Survey of the trend areas was done with a Piper Supercub flying at approximately 60 mph and 300 ft above ground level. Snowy Peak was flown on November 17-18, with an overall search intensity of 4.4 min/mi<sup>2</sup>. Survey conditions were good in 3 units, but were marginal in the 3 others because of wind turbulence. Hard Luck Creek was done on November 16-17, with an overall search intensity of 4.8 min/mi<sup>2</sup>. Conditions were good in all but one sample unit. The problem again was wind turbulence.

An additional trend area in the Washington Creek drainage was also surveyed. It was not established as a result of this stratification, but has been in existence for several years. It was done to provide extra information to help achieve the current objectives. The area contained 5 sample units and was 65.7 mi<sup>2</sup>. It was flown on November 29, with a search intensity of 3.74 min/mi<sup>2</sup>. Survey conditions were good in all units.

Tables containing the data from all trend areas are attached. A total of 169 moose were observed. Some of the important ratios calculated from the sample were: 121 bulls:100 females, 14 yearling bulls:100 females; and 10 calves:100 females. There were also 12% yearlings and 4% calves. These data indicate that the current harvest of bulls only is having very little impact on the population. This is indicated by the extremely high bull:cow ratio. By comparison, other areas in the interior with bulls only seasons that are heavily hunted have ratios that are 25-35 bulls:100 cows. These data also indicate that recruitment into the yearling age class and calf survival to 6 months are very poor. Highly productive areas in the interior have 15%-20% yearlings and calves in the population. It is likely that poor productivity in the Yukon-Charley is due to predation by wolves and bears.

Total Number of Moose

The size of the moose population was estimated by multiplying the number of square miles stratified as high, medium or low density times the number of moose per square mile in each stratum. The moose per square mile value was an average density of all sample units in each stratum that were intensively searched as part of the trend area effort. The value was also corrected upward by 20% to account for moose that were likely not seen during the intensive search. Only 1 sample unit in the low density stratum was flown, therefore the average density for that stratum was assumed to be 0.10 moose/mi<sup>2</sup>. Experience in 3 other stratifications in similar density situations has shown that this is likely a valid assumption.

The estimated size of the population was 1,116 moose. It is important to realize that this is not a statistically valid estimate. There is no confidence interval that can be calculated. It is simply a "best guess". The calculations were:

| Stratum     |                                     |             |                                     |
|-------------|-------------------------------------|-------------|-------------------------------------|
| High        |                                     | Medium      |                                     |
| Sample Unit | Density<br>(moose/mi <sup>2</sup> ) | Sample Unit | Density<br>(moose/mi <sup>2</sup> ) |
| 10          | 0.73                                | 6           | 0.53                                |
| 129         | 1.72                                | 7           | 0.73                                |
| 183         | 0.84                                | 8           | 1.44                                |
| 185         | 0.67                                | 13          | 1.67                                |
| 186         | 1.96                                | 105         | 0.24                                |
| 190         | 0.97                                | 127         | 0.30                                |
| 191         | 0.86                                | 128         | 0.44                                |
|             |                                     | 131         | 0.07                                |
|             |                                     | 182         | 0.92                                |
|             | mean=1.11                           |             |                                     |
|             |                                     |             | mean=0.66                           |

| Stratum | Mean Density<br>(moose/mi <sup>2</sup> ) |   | Area<br>(mi <sup>2</sup> ) |   | No. of Moose |
|---------|------------------------------------------|---|----------------------------|---|--------------|
| High    | 1.11                                     | X | 263.5                      | = | 292.5        |
| Medium  | 0.66                                     | X | 883.5                      | = | 583.1        |
| Low     | 0.10                                     | X | <u>2409.4</u>              | = | <u>240.9</u> |
|         |                                          |   | 3556.4                     |   |              |
|         |                                          |   | Total Moose Population =   |   |              |

$$\text{Overall Density} = \frac{1116.5}{3556.4} = 0.31$$

As mentioned above, the population estimate is not statistically valid. However, experience with approximately 20 other similar survey efforts where valid estimates were calculated has shown that we generally see from 27% to 40% of the total population during a stratification flight. In this effort we saw 440 moose during the stratification, which was 40% of our estimated population. Therefore, I conclude that our guess is reasonable but is likely a conservative estimate of total number.

I used the population estimate to help assess the impact of hunter harvest. It appears that the yearly kill is only about 1%-2% of the population. Harvest reports indicate that during 1983-86 the take was 20, 19, 26, and 13 animals, respectively.

#### Management Recommendations

The data indicate that no changes are needed in the moose season within the survey area. The high bull:cow ratio indicates that the current small harvest of bulls is having little impact on the population. However, productivity is low and therefore any significant increase in yearly harvest (more than 20) will likely require either season restrictions or initiation of a management program to reduce predation by wolves and bears.

cc: Chris Smith

Date of Report: 02/04/68

Report Contents: Moose classification data summarized by year for the area requested.

Data Selection Conditions: PROB1<"Y" AND SUBSTR(INDG,1,3)="20E", OR SUBSTR(INDG,1,3)="25B"

Area included in this report: ALL TREND AREAS SURVEYED IN SUBUNITS 25B AND 20E AS PART OF NPS STRATIFICATION ALONG YUKON R.-1987

Note: All calculations except density include moose seen adjacent to the survey area.

| Year | Sm<br>Bulls | Med<br>Bulls | Lg<br>Bulls | Cows        |             |               |               |               | Lone<br>Calves | Unid<br>Calves | No.<br>Sigs | Area      |             | Total<br>Bulls | Total<br>Cows | Total<br>Calves | Total<br>Moose | Total<br>Yr19s | Total<br>Adults<br>>=2 yrs |
|------|-------------|--------------|-------------|-------------|-------------|---------------|---------------|---------------|----------------|----------------|-------------|-----------|-------------|----------------|---------------|-----------------|----------------|----------------|----------------------------|
|      |             |              |             | W/O<br>Calf | W/1<br>Calf | W/2<br>Calves | W/3<br>Calves | W/4<br>Calves |                |                |             | in<br>SqM | in<br>Hours |                |               |                 |                |                |                            |
| 1987 | 10          | 35           | 43          | 67          | 6           | 0             | 0             | 1             | 1              | 17             | 240.0       | 17.50     |             | 88             | 73            | 7               | 169            | 20             | 142                        |



Date of Report: 02/04/88

Report Contents: Moose classification data summarized by year for the area requested.

Date Selection Conditions: SUBSTR(100,1,3)="25B".AND.PROB1<>"7"

Area included in this report: ALL TREND AREAS, SUBUNIT 25B-1987

Note: All calculations except density include moose seen adjacent to the survey area.

| Year | Sm<br>Bulls | Med<br>Bulls | Lg<br>Bulls | Cows |     |     |     | Cows |      |     |       | Area       |             | Total<br>Bulls | Total<br>Cows | Total<br>Calves | Total<br>Moose | Total<br>Trigs | Total<br>Adults<br>≥2 yrs |
|------|-------------|--------------|-------------|------|-----|-----|-----|------|------|-----|-------|------------|-------------|----------------|---------------|-----------------|----------------|----------------|---------------------------|
|      |             |              |             | W/O  | W/1 | W/2 | W/3 | Long | Unit | Mo. | SV's  | in<br>SqMi | in<br>Hours |                |               |                 |                |                |                           |
| 1987 | 3           | 18           | 36          | 44   | 4   | 0   | 0   | 1    | 1    | 12  | 174.3 | 13.40      |             | 57             | 48            | 5               | 111            | 6              | 100                       |



Date of Report: 02/04/88  
 Report Contents: Moose classification data and other pertinent information for each survey area requested.  
 Data Selection Conditions: SUBSTR(LONG,1,3)+SUBSTR(LONG,9,2)="25B0187".AND.PROB1<"Z"

Area included in this report: SNOW PK, TREND AREA, SUPUNIT 25B-1987

Note: All calculations except density include moose seen adjacent to the survey area.

| Sub-<br>Unit                        | Trend Area | SUB# | Date     | Sa<br>Bulls | Med<br>Bulls | Ls<br>Bulls | Total<br>Bulls | Cows<br>W/O<br>Calf | Cows<br>W/1<br>Calf | Cows<br>W/2<br>Calves | Cows<br>W/3<br>Calves | Total<br>Cows | Total<br>Adults | Total<br>Lone<br>Calves | Total<br>Calves | Unit | Total<br>Moose | Area<br>in<br>SqMi | Time<br>in<br>Min | Codes -<br>Remarks/<br>Problems |
|-------------------------------------|------------|------|----------|-------------|--------------|-------------|----------------|---------------------|---------------------|-----------------------|-----------------------|---------------|-----------------|-------------------------|-----------------|------|----------------|--------------------|-------------------|---------------------------------|
| 25B                                 | SNOW PK.   | 182  | 11/18/87 | 0           | 1            | 7           | 8              | 2                   | 1                   | 0                     | 0                     | 3             | 11              | 0                       | 1               | 0    | 12             | 15.6               | 67                | 0                               |
| 25B                                 | SNOW PK.   | 183  | 11/17/87 | 0           | 1            | 8           | 9              | 1                   | 0                   | 0                     | 0                     | 1             | 10              | 0                       | 0               | 0    | 10             | 14.2               | 69                | A                               |
| 25B                                 | SNOW PK.   | 185  | 11/18/87 | 0           | 0            | 1           | 1              | 4                   | 1                   | 0                     | 0                     | 5             | 6               | 0                       | 1               | 0    | 7              | 12.4               | 45                | D                               |
| 25B                                 | SNOW PK.   | 186  | 11/17/87 | 1           | 4            | 8           | 13             | 12                  | 0                   | 0                     | 0                     | 12            | 25              | 0                       | 0               | 1    | 26             | 15.3               | 71                | A                               |
| 25B                                 | SNOW PK.   | 190  | 11/18/87 | 0           | 0            | 3           | 3              | 7                   | 0                   | 0                     | 0                     | 7             | 10              | 0                       | 0               | 0    | 10             | 12.4               | 61                | A                               |
| 25B                                 | SNOW PK.   | 191  | 11/18/87 | 1           | 2            | 6           | 9              | 4                   | 0                   | 0                     | 0                     | 4             | 13              | 0                       | 0               | 0    | 13             | 18.0               | 73                | D                               |
| 25B                                 | SNOW PK.   | --   | 11/18/87 | 0           | 0            | 0           | 0              | 1                   | 0                   | 0                     | 0                     | 1             | 1               | 0                       | 0               | 0    | 1              | ----               | --                | Y                               |
| Totals for all tested sample units: |            |      |          | 2           | 8            | 33          | 43             | 31                  | 2                   | 0                     | 0                     | 33            | 76              | 0                       | 2               | 1    | 79             | 87.9               | 386               |                                 |

Date of Report: 02/04/88

Report Contents: Sex and age ratios, search intensity and density calculations for each survey area requested.  
Data Selection Conditions: SUBSTR(DNO,1,5)+SUBSTR(DNO,9,2)="2580187", AND, PROBL<>"Z"

Area included in this report: SNOWY PK, TREND AREA, SUBUNIT 258-1987

Note: All calculations except density include moose seen adjacent to the survey area.

| Sub-Unit | Trend Area | SU# | Date     | Total Moose | Moose Seen Per Sq Mi | Search Effort (min./Sq Mi) | Total Bulls per 100 F | Yr19 Bulls per 100 F | Yr19 Bulls % in Herd | Calves per 100 F | Calves =2Yrs | Twins per 100 F | Calf % in Herd | Remarks/Problems (from problem codes) |
|----------|------------|-----|----------|-------------|----------------------|----------------------------|-----------------------|----------------------|----------------------|------------------|--------------|-----------------|----------------|---------------------------------------|
| 258      | SNOWY PK.  | 182 | 11/18/87 | 12          | 0.77                 | 4.29                       | 267                   | 0                    | 0                    | 33               | 33           | 0               | 8              | Windy/turbulent                       |
| 258      | SNOWY PK.  | 183 | 11/17/87 | 10          | 0.70                 | 4.86                       | 900                   | 0                    | 0                    | 0                | 0            | 0               | 0              | None - good survey                    |
| 258      | SNOWY PK.  | 185 | 11/18/87 | 7           | 0.56                 | 3.63                       | 20                    | 0                    | 0                    | 20               | 20           | 0               | 14             | Windy/turbulent                       |
| 258      | SNOWY PK.  | 186 | 11/17/87 | 26          | 1.70                 | 4.64                       | 108                   | 8                    | 4                    | 0                | 0            | 0               | 0              | None - good survey                    |
| 258      | SNOWY PK.  | 190 | 11/18/87 | 10          | 0.81                 | 4.92                       | 43                    | 0                    | 0                    | 0                | 0            | 0               | 0              | None - good survey                    |
| 258      | SNOWY PK.  | 191 | 11/18/87 | 13          | 0.72                 | 4.06                       | 225                   | 25                   | 8                    | 0                | 0            | 0               | 0              | Windy/turbulent                       |
| 258      | SNOWY PK.  | --  | 11/18/87 | 1           | ----                 | ----                       | 0                     | 0                    | 0                    | 0                | 0            | 0               | 0              | Moose adjacent to SU's surveyed       |

All sample units combined:

79 0.89 4.39 130 6 3 6 6 0 3