

1997 MOOSE SURVEY REPORT, WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE, ALASKA

Prepared by: Carl D. Mitchell, Wildlife Biologist
Date: 15 December 1997

ABSTRACT: *Wrangell-St. Elias National Park and Preserve continued to monitor moose populations using the "No-Strat" sampling technique. We surveyed an area around the Crystalline Hills in the south-central area of the Park and Preserve. Due to poor weather conditions and a staff shortage, the survey area was limited to 129 mi² of high quality early winter habitat. Density estimates adjusted with a sightability correction factor were 1.38 moose/mi². Bull:cow:calf ratios were 75.6:100:21. The density estimates and sex:age ratios found in the 1994 survey of the same area are very close, suggesting a stable population. Suggestions are made for future survey efforts. The need to more accurately define seasonal moose habitat use is discussed.*

INTRODUCTION

Wrangell-St. Elias National Park and Preserve (WRST) began systematic monitoring of moose populations within its boundaries in 1991. Prior to that time, moose were monitored by the Alaska Department of Fish and Game (ADF&G) in a single area around Mt. Drum, in the western portion of WRST, and by the U.S. Fish and Wildlife Service (USFWS) on the north side of the Nutzotin Mountains. Initially, WRST chose two additional areas and annual trend surveys were conducted. Trend surveys were chosen because of a desire to be consistent with previous efforts by ADF&G and USFWS.

Trend surveys are relatively low intensity (≤ 1 minute/mi²) by a single pilot/observer team. If flown consistently (same area, time of year, observer, conditions, habitats) trend counts provide information on sex and age ratios and a rough idea of numerical trend. However, they do not provide density estimates (number of animals per unit area), are not statistically quantifiable, and do not correct for inevitable changes in survey format (e.g. snow conditions, visibility). If possible, managers should strive for more rigorous surveys to more accurately document and quantify population data. The WRST Moose Inventory and Monitoring Plan suggests using a combination of trend counts in four areas and Gasaway (or equivalent) surveys in at least two additional areas.

In 1994, Dale et al. modified and tested a stratified random survey technique widely used throughout Alaska (Gasaway or GDRH). They termed the variation "no strat", because it eliminates the expensive and time-consuming pre-survey density stratification flights originally included in the Gasaway survey design. That "no strat" technique is now used at WRST in lieu of the Gasaway technique.

STUDY AREA

WRST is located in south-eastern mainland Alaska (Fig. 1). It encompasses approximately 13.2 million acres ranging in elevation from sea-level to 18,000 feet. A wide diversity of geological land forms, climactic zones, vegetation and habitat types and fauna are found within WRST boundaries. Approximately 1 million acres within the external boundaries are in non-federal ownership.

In the study area, the dominant vegetation below 2500 feet is primarily black spruce (*Picea mariana*) in wet or poorly drained areas intermixed with dense stands of white spruce (*Picea glauca*) on drier, better drained sites. The area is interspersed with numerous small ponds, lakes and marshes, streams and a few larger creeks and small to very large rivers. As the elevation increases, taiga gives way to more open spruce woodlands, intermixed with stands of aspen (*Populus tremuloides*), Balsam poplar (*P. balsamifera*) or paper birch (*Betula papyifera*) or tall shrub (*Salix* or *Alnus*) communities. Above these are found dwarf shrub (*Betula nana*) communities and alpine tundra. Habitats surveyed include tundra above treeline, the shrub-scrub transition zone, boreal forest and lowland riparian areas.

The subject survey took place between the Kuskulana River and the Kennicott Glacier, lying north of the Chitina River and McCarthy Road, in the south-central portion of the Park and Preserve (Fig. 1). The actual survey took place in an area bounded by the Kuskulana, Chokosna and Lakina Rivers, Fireweed Mountain, Kennicott Glacier and the 4000 foot elevation contour (Fig. 2). The survey area was smaller than that surveyed in 1994, because of poor weather and lack of additional planes and personnel.

METHODS

We used the "no strat" technique as developed by Dale et al. (1994). this utilizes existing Gasaway techniques without a pre-survey density stratification. Briefly, when conducting Gasaway or "no strat" surveys, an area of suitable moose habitat between 300-500 mi² is selected for survey. The area is divided into a number of sampling units with a smaller, randomly selected subsample of 2-3 mi² areas used to determine sightability correction factors (SCF). For this survey I copied maps made for the 1994 survey area. Area size calculations were made using an English Area Grid overlay. The entire area is flown at an elevation of 300 feet AGL. The survey intensity is approximately 2 minutes of survey effort for each square mile for the entire area.

All moose observed are sequentially numbered, and the number, sex, antler size class (small, medium or large bulls) and number of calves (0, 1 or 2) with cows are recorded on standardized field data forms. Each sighting is also mapped on 1:63,360 topographic maps of the area carried during the flight for that purpose (and for orientation during the flight). Immediately after the areas previously chosen for SCF are surveyed, they are

resurveyed at much higher intensity ($\cong 5-15 \text{ min/mi}^2$ depending on vegetation and topography). The number of moose observed during the intensive survey are compared to the number observed during the regular survey effort.

After the survey is completed, data are entered into Moosepop 2.0 on the WRST wildlife computer (C:\wildlife\moose\h pop\moosepop.exe) for calculation of SCF's, sex and age ratios, densities, and Confidence Intervals.

RESULTS

The 1997 survey was completed on 5, 6 and 8 November. Jim Hannah piloted the Arctic Tern and Carl Mitchell observed and recorded data for the entire survey. We spent a total of 9.7 hours of survey time, and 16.8 hours of total flight time. The difference is due to flights to and from the study area from Gulkana every day, and additional flights to and from May Creek around the middle of each survey day to refuel. We covered 129 mi^2 before poor weather forced us to suspend surveys.

We counted a total of 140 moose in 60 groups, with a mean group size of 2.33 moose /group. Observed density was 1.08 moose/mi^2 . Corrected moose densities are 179 moose, or 1.38 moose/mi^2 . We missed from 0-28% of the moose present on SCF units. Overall densities $\pm 90\%$ CI are 139.8-204.4 moose for the study area.

We found 75.6 bulls:100 cows: 21 calves in 1997. Of the bulls observed, 19.6 bulls:100 cows were small (spike-fork) or yearling bulls. The ratio of medium (≤ 50 inches wide) bulls: 100 cows was 37.8. We found the ratio of large bulls (≥ 50 inch wide antlers) to be 18.2:100 cows.

DISCUSSION

The densities observed and calculated for the 1997 survey are considerably higher than those reported for 1994 in the same area, and other regional surveys. However, we only surveyed the area from ≈ 2500 feet up to 4000 feet, which is where most moose are found at this time of the year. The 1994 survey included a considerable area of lowland black spruce forest, with very low moose densities (approximately 0.11 moose/mi^2) in that habitat type. If we compare the same 129 mi^2 portion of the survey area for both 1994 and 1997, we compute 1.15 moose/mi^2 for the 1994 survey. This is remarkably similar to the 1.38 moose/mi^2 calculated for 1997. From this, we assume that moose densities in this area have not changed significantly in the three year interval.

Also, based on observations of moose and moose sign observed in lower elevation black spruce habitat during ferry time to and from the survey area, we assume that moose densities in these habitats in 1997 was very low, and therefore similar to that observed in

1994. Thus, overall moose densities ($\approx .65$ moose/mi² in 1994) are likely very similar to those found in 1997.

Bull:cow ratios in the area are also relatively similar between years (75.6 in 1997 versus 74 for the same restricted area in 1994). We did find a somewhat lower cow:calf ratio in 1997, but this ratio was similar to that observed during a 1991 trend count (Route 1994). The number of yearling bulls:100 cows suggests relatively good overall recruitment. Yearling ratios in 1997 were a bit higher than in 1994 and 1991 (19.6 versus 14.9 versus 8.9, respectively), suggesting improved recruitment. However overall population density estimates and bull:cow ratios do not reflect any significant improvement in recruitment in this area.

There has been a wide variety of moose survey efforts, techniques and areas in what is now WRST (Mitchell 1997). This results in a widely disparate data set that can be difficult to interpret, and impossible to compare quantitatively. As use of this resource changes due to predation, and /or sport and subsistence harvest, it becomes more important to have adequate data to determine if changes have occurred, what parameters are changing, if parameters change in response to any management actions, and so on. This can only be done through repeated measures in the same area at fixed intervals.

The “no strat” technique as discussed by Dale et al. (1994) appears to provide a relatively inexpensive, yet relatively rigorous quantitative assessment of moose populations. It is unlikely we will be able to conduct even this level of monitoring in enough areas to adequately document changes in moose population densities or characteristics. The current Moose Inventory and Monitoring Plan calls for two “no strat” areas flown every three years, and up to four additional trend count areas flown every year. That target is being met, with “no strat” surveys conducted in the Crystalline Hills and upper Copper River areas, and trend counts conducted near Mt. Drum (ADF&G), two areas north of the Nutzotin Mountains between the Nabesna and Chisana Rivers and between the Chisana River and the U.S. Canadian border (both by Tetlin NWR). Two areas where more work is required are the upper White River and the Malaspina Forelands. Every effort should be made to initiate and conduct at least annual trend counts in those two areas.

If moose populations are relatively stable in this environment, (as it appears from both Gasaway and “no strat” counts in the northwest and Crystalline Hills areas and trend count data from the Nutzotin and Mt. Drum areas), it might be possible to have a mix of seven representative areas (e.g. upper White River, Chisana River-border, Nabesna River - Chisana River, upper Copper River, Mt. Drum, Crystalline Hills, Malaspina Forelands), with a rotating monitoring scheme of annual trend counts interspersed with “no strat” surveys at three to five year intervals. This sampling scheme might prove especially useful if some trend counts could be conducted at the same time and in the same area that “no strat” surveys are, to see if trend counts show predictable biases. However, it should be noted that ADF&G monitoring and research in several other areas have documented relatively rapid changes in moose population density and structure. Populations in WRST

may or may not remain "stable". This will only be documented through temporally, spatially and quantitatively adequate surveys.

We also need additional information on seasonal habitat use by moose in this region. If moose are concentrated in predictable areas, surveys could concentrate on these smaller areas. It is expensive to spend time flying over habitats that do not hold moose. Efforts should be made to either radio-track moose to document habitat use in relation to season, moose behavior (e.g. rut, calving) and climatic variables (e.g. snow depth) to develop models, or use expert-opinion modeling to do the same thing. Pre-survey reconnaissance would also be appropriate, but would increase survey expense considerably.

CONCLUSIONS

1. The "no strat" technique provides statistically sound estimates of moose densities and demographic characteristics and should continue to be used in conjunction with trend counts to monitor WRST moose populations.
2. Moose densities in the Crystalline Hills study area are very similar to those calculated for the area in 1994.
3. Sex and age ratios differ somewhat between the 1994 and 1997 surveys. Yearling bull:cow ratios are higher now, total bull:cow ratios are very similar, and calf:cow ratios are slightly lower. Based on overall population density, overall bull:cow ratios, large bull:cow ratios and yearling bull:cow ratios, production and recruitment are adequate, and the lower calf:cow ratios are probably a short term phenomenon for 1997. Similar short-term drops in production are seen in other moose herds.
4. We can also infer that subsistence and sport harvest, predation and other losses are not excessive and do not appear to be detrimental to the population. The number of moose is staying roughly the same, bull:cow ratios are adequate and recruitment seems to be good.
5. Seasonal habitat use needs to be quantified through research or expert-opinion exercises, in order to survey moose populations more efficiently.

LITERATURE CITED

Dale, B.W., L.G. Adams and W. T. Rote. 1994. A relatively inexpensive aerial moose survey technique designed as a replacement for trend surveys or for use in areas with high sightability. unpub. report, National Park Service, Anchorage, AK.

Mitchell, C.D. ^{in prep} 1997. A synopsis of moose survey data for Wrangell-St. Elias National Park and Preserve, Alaska. unpub. rep., National Park Service, Copper Center, AK.

Route, W.T. 1994. 1994 Annual report on moose inventory and monitoring efforts in Wrangell-St. Elias National Park and Preserve, Alaska. NPS-WRST-94-05.

Figure 1. Wrangell-St. Elias National Park and Preserve, Alaska. Park boundaries, major access roads and location of 1994 and 1997 moose survey area shown.

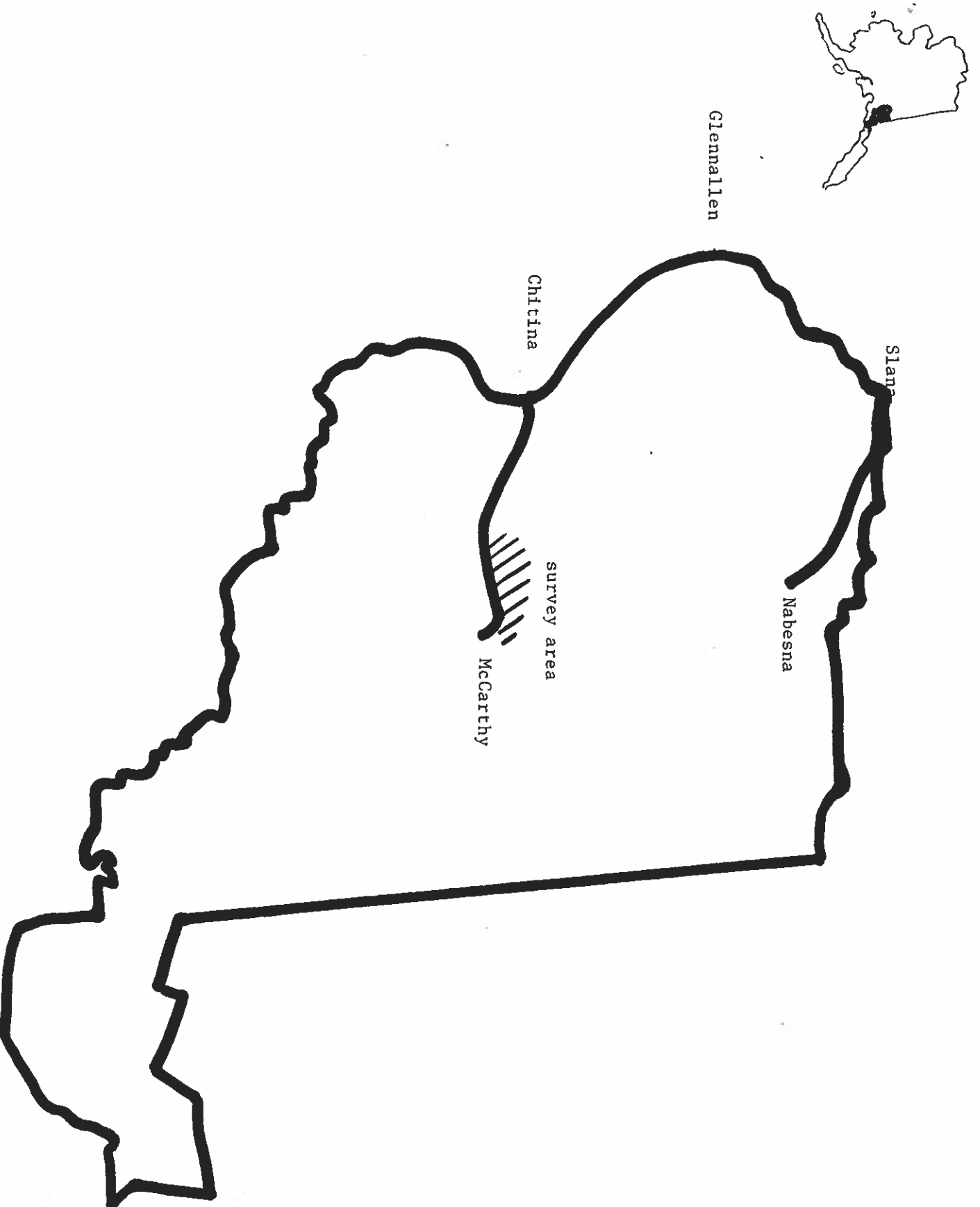


Figure 2. Crystalline Hills moose survey area. Solid line denotes 1994 survey area. Area north of dashed line denotes 1997 survey limits. (see text).

