

# Informational Leaflet 20

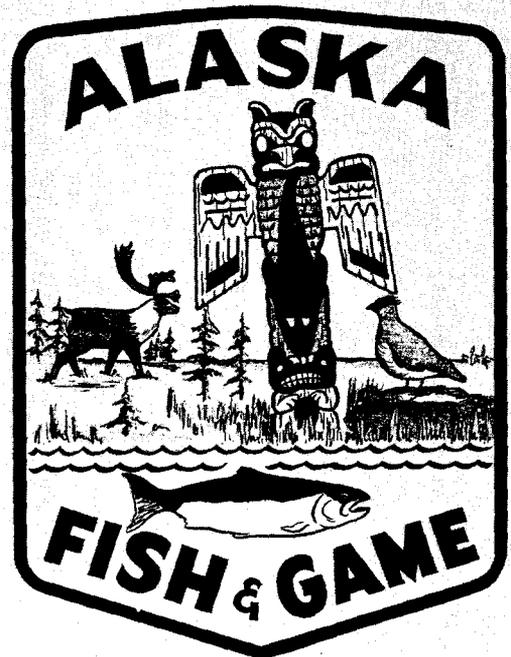
## METHOD FOR ESTIMATING CARIBOU HERDS

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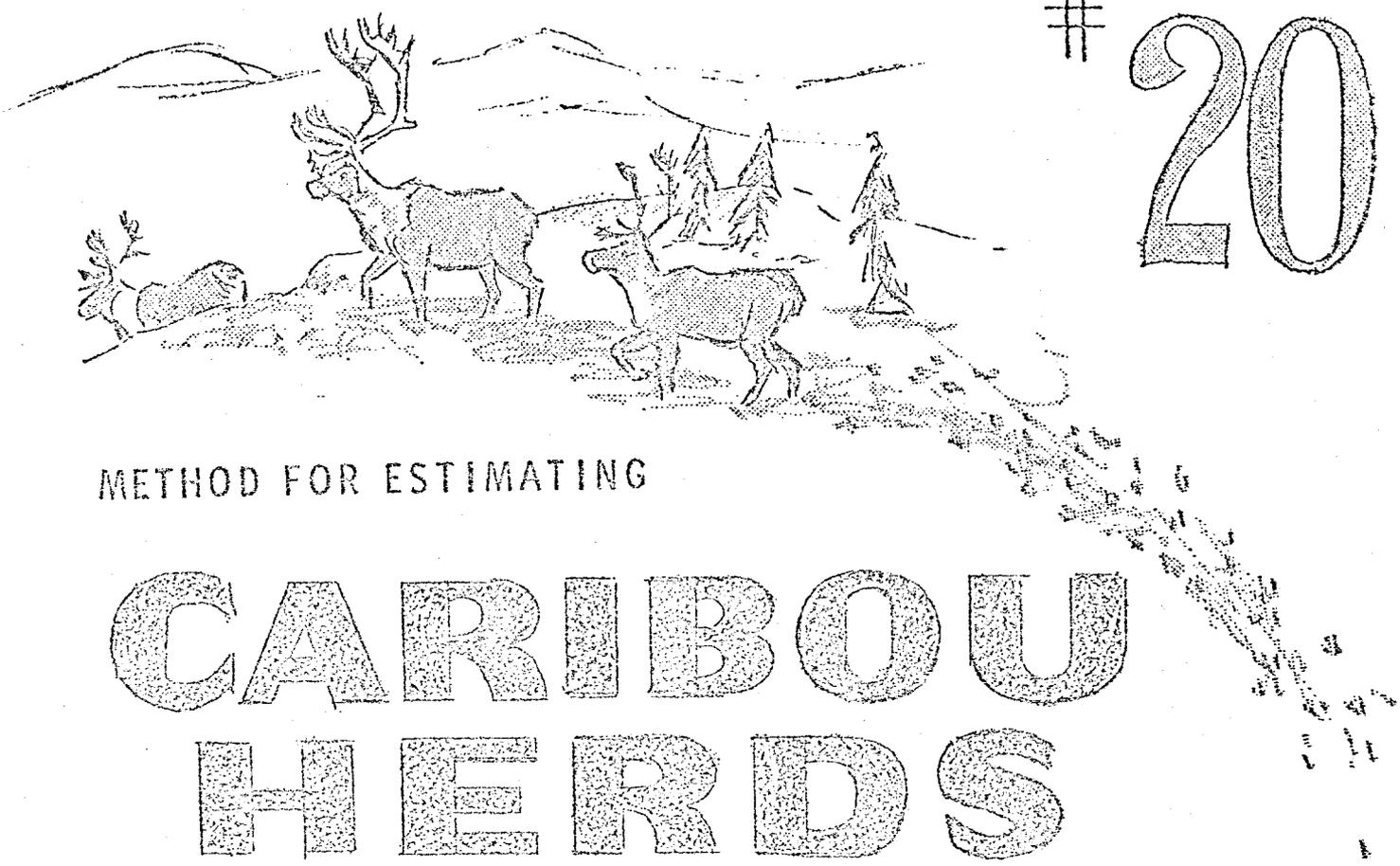
December 3, 1962

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*Informational Leaflet*  
ALASKA DEPARTMENT OF FISH AND GAME  
WILLIAM A. EGAN, GOVERNOR ——— WALTER KIRKNESS, COMMISSIONER

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METHOD FOR ESTIMATING

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## METHOD FOR ESTIMATING CARIBOU HERDS

An important phase of game management work concerns the inventory of game populations. Its main purpose is to obtain current information relative to the distribution, abundance, and status of a game species. Such an inventory usually serves as a prelude to more intensive studies.

The Alaska Department of Fish and Game, through its Federal Aid in Wildlife Restoration program, presently is attempting to determine the distribution and relative abundance of caribou (*Rangifer tarandus granti*) (Banfield 1961) throughout the State. It is intended to classify these caribou according to herd and "home range" and to assess the status of each. Such a large undertaking will require several years of effort. Routine aerial reconnaissance and field observations by various people can supply some of the information needed, but the bulk must be obtained from more intensive work. It is not feasible to use such censusing techniques as has been described by Banfield et al. (1955), Watson and Scott (1956), and Siniff and Skoog (1962), because of the high costs. In the course of this project, however, the writer has developed a technique for assessing the status of a caribou herd that requires a minimum of time and provides acceptable accuracy. It is believed that this technique can be used successfully with most herds, assuming reasonably "normal" conditions.

### Background Information

One of the most consistent behavioral characteristics of a caribou herd (as pertains to Alaska at least) is that sometime during the period mid-April to late May the calving segment of the herd will move to a definite calving area where most of the herd's pregnant cows will drop their calves. This area may be rather extensive at times or perhaps quite restrictive, but usually the same general locality is used year after year. Two herds do range together occasionally during the year, notably in winter, and such intermingling has been reported by wildlife biologists in both Alaska and Canada. Generally, however, the herds separate in the spring as the calving groups return to their respective calving grounds, although one herd may sustain a substantial loss or gain in numbers. The calving grounds, then, can be considered to be more or less a focal point for the movements and range of an individual caribou herd.

The movements of caribou, their frequent wide dispersal, and the usual heterogeneous mixture of sex and age groups make difficult most efforts to obtain an adequate estimate of a herd's size. Hours of reconnaissance flying usually result in little more than a vague idea of caribou numbers, depending upon how widely the animals are dispersed. In lieu of a complete census, the best estimates can be obtained from large concentrations of animals. Even then much of the herd could be missed and at best the figures obtained are minimal. The calving period, however, brings together a definite, recognizable segment of a herd, in that most of the pregnant cows are present on the main calving grounds. The breeding cows, of course, comprise the most important segment of the herd, and when adequately censused provide an appropriate base for

estimating the total herd size. The other segments can be extrapolated through the use of population composition data.

The caribou is the only member of the deer family in which the female commonly bears antlers. In certain subspecies a large percentage of the cows are antlerless, such as the woodland caribou (*Rangifer tarandus caribou*) of Newfoundland (Bergerud 1961), but in the Alaska-Yukon race (*R. t. granti*) antlerless cows are the exception. In ten years of work with caribou in Alaska, the writer has observed that much less than one percent of the females do not bear antlers. Furthermore, most pregnant cows carry their antlers into the calving period (mid-May to mid-June), losing them just before or shortly after parturition. This phenomenon has been recorded by various workers throughout the northern hemisphere (Murie 1935; Shaposhnikoff 1955; Skoog 1956; de Vos 1960; Lent and Lønø 1962). Yearlings, two-year old bulls, and non-pregnant two-year-old cows frequently carry hard antlers past mid-May, but by the end of May nearly all of the animals still with antlers are parturient cows. At that time, then, a parturient cow can be identified as such by the antlers or by the presence of a calf if the antlers have been shed.

The sex and age composition and the fertility of caribou populations differ from one herd to another depending upon various factors. Canadian studies have recorded sex ratios ranging from 36 males:100 cows to 60:100 (Kelsall 1960), while in Alaska the ratios obtained have ranged from 46:100 to 100:100. Much of the variance can be attributed to a non-representative mixture of the sexes among the groups tallied. A ratio of about 76 males:100 cows is present in the Nelchina herd of Southcentral Alaska, a herd which is hunted intensively by sportsmen and in which the hunter kill has averaged 70 percent males for ten years. Judging from the data available from Alaskan studies, the writer assumes that in healthy herds which are hunted little, or in which there is little hunter bias toward males, that the ratio would approach 100:100. Yearling sex ratios in Alaska are close to 100:100, and the yearling age-class in June constitutes 10 to 25 percent of the total herd (calves excluded), depending upon the previous year's survival of calves. Fertility studies on the Nelchina herd have indicated that about 70 percent of the cows one year and older become pregnant. (Few caribou breed until two years of age, hence the apparent low percentage). That figure probably would be applicable to other Alaskan herds as well, provided the animals were in good health.

### Procedure and Application

The inventory method herein reported was developed on the basis of the above information, and can be outlined briefly as follows. First, an aerial reconnaissance in late May is made over the area to be examined to find and delineate the calving grounds. Next, the calving area is divided into segments based upon readily identifiable landmarks, such as drainages. Each segment is traversed as completely as possible by airplane to tally the adult caribou (older than calves). Of these, at least 1,000 in each segment are segregated more completely to establish the proportion of parturient cows present. Calves are tallied for productivity data and the relative number of yearlings present is noted as an index to the previous year's calf crop. An estimate is made of

the total caribou in each segment. The total number of parturient cows on the calving grounds, and therefore in the herd, is estimated based on the sample segregation counts. The remaining portion of the herd then can be estimated using the sex-ratio and fertility data available, with certain necessary assumptions, of course.

The survey as described would provide current information about the population status of a caribou herd relative to the following:

- 1) Total numbers.
- 2) Size of calf crop.
- 3) Approximate peak of calving.
- 4) Relative success of calving.
- 5) Relative size and survival of previous year's calf crop.

To better illustrate the application of this technique, the writer will describe briefly its use in Alaska last year.

Early in 1961, the Alaska Department of Fish and Game decided to make a survey of the caribou population in northeast Alaska. This survey was needed to complement the caribou work being done in the northwest by the Cape Thompson Project, in order that more complete set of data might be obtained concerning the herds ranging throughout arctic Alaska. The work was planned for the period May 18 through June 6, along the lines of thought expressed above. Ten days were considered adequate, but additional time was scheduled to allow for weather and unforeseen delays.

The area to be covered extended north of the Yukon and Porcupine Rivers to the Arctic Ocean and east of 152° W longitude to the Alaska-Yukon border, an area approximating 75,000 square miles. At the time it was known that the Porcupine herd, which ranges northern Yukon Territory and northeast Alaska, utilized the area for calving, but what other distinct herds were present was unknown.

Fourteen hours of reconnaissance flying in a chartered Piper Comanche revealed that only one major calving area was being used. That information indicated that only one herd, the Porcupine, apparently was in the region. The only other caribou evident were stragglers of a portion of the western Arctic herd that had wintered in the western part of the area under discussion, but had moved to the west in early May. The calving area lay on the north slopes of the Brooks Range between the Canning and Kongakut Rivers, an area of about 2,500 square miles. Two days of flying in a Cessna 180 and a Champion Challenger were used to delineate the calving grounds.

The calving area was divided into five segments according to drainages. The Cessna crew covered the two segments most distant from the home base at Barter Island, and the Champion, the other three. A total of 29,703 adults was tallied, with an estimate of 60,000 for the whole calving area. Segregation

counts on 5,694 animals revealed that about 67 percent of the adults were parturient cows, of which 50 percent were accompanied by calves on May 31.

It was estimated that there was a total of 40,000 (.67 x 60,000) parturient cows in the calving area, and therefore in the herd. Applying the assumed 70 percent fertility rate to this herd indicates a total adult-cow population of 57,000. The bull:cow ratio in this herd probably is rather high due to an unbiased hunter kill, and should be at least as high as that of the Nelchina herd, 76:100. That sex ratio would indicate a total adult-bull population in this arctic herd of about 43,000. The only segment of the herd remaining is the yearling age-class of both sexes. In the Nelchina herd a good calf crop and good survival results in a yearling proportion of about 20 percent of the total herd. The large number of yearlings sighted on the survey indicated a good survival of calves. An adequate tally is not possible due to the fact that many yearlings do not reach the calving grounds and those present frequently are difficult to separate from two-year-old cows. A 15 percent figure would not be too high in all probability, making a total of about 17,000 yearlings. An estimated 57,000 cows, 43,000 bulls, and 17,000 yearlings resulted in a total population figure of 117,000 animals (excluding calves).

The 50:100 calf: parturient cow ratio on May 31 indicated that the peak of calving occurred just prior to that day. Assuming a normal curve in the parturition rate, as has been obtained in the Nelchina herd (Skoog 1957), one would expect the peak to occur when 50 percent of the pregnant cows had dropped their calves. Exactly when that occurred depends on the extent of calf mortality insofar as interpretation of the data is concerned. The peak probably took place about May 28, which is close to the May 26 date determined for the Steese-Fortymile and Nelchina caribou herds to the south.

The high calf:cow ratio obtained at the end of May indicates a relatively slight calf mortality and a close similarity to the other Alaskan herds studied. A calf mortality of about 10 percent, as found in the Nelchina herd (Skoog op. cit.), could be applied to the theoretical calf crop of 40,000 (i.e., parturient cows). Thus, the final crop for the Porcupine herd in 1961 would approximate 36,000 calves.

In ten days of flying the airplanes logged a total of about 100 hours, and the chartered Comanche, an additional 14 hours. The total cost of the survey, excluding salaries and per diem for four men, approximated \$2,500. Much of the cost incurred resulted from having to ship barrels of aviation gas to Barter Island from Fairbanks.

### Discussion

Many variables exist that would preclude the use of this technique. A herd may change its "home range". Weather conditions or other factors may disrupt the pre-calving movements to the extent that the herd calves in a new area or perhaps in several areas. Small herds (less than 5,000) are more sedentary than the larger ones and may not have a specific calving area at all. Weather is always a problem. Anyone who has worked with caribou for any length of

time, however, soon learns that this animal is not exactly predictable and that it seldom behaves as expected.

Obviously, there are many assumptions necessary in using this technique, and certainly precision is not possible. Obtaining an estimate of the parturient cows in the herd, however, alone supplies valuable data concerning its size and status. Even though the adult sex-ratio and the yearling proportion is highly variable, one usually can choose percentages that provide minimal total figures and that appear logical in view of the observations made during this survey. Nevertheless, in an inventory of this sort, it is possible to reconnoiter a relatively large area with a minimum of time and money, and still obtain data that are of value to management.

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