Caribou of the Central Arctic Region of Alaska in relation to adjacent caribou herds

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Abstract: There was an unusual increase in numbers of caribou *(Rangifer tarandus granti)* in the Central Arctic region of Alaska from 1981 to 1985. In fall and winter numbers were up to five times greater than at the onset of calving in June. Numbers appeared to double during the month of June each year, then remain relatively stable over the summer period with a further increase in the fall. Ingress of caribou from outside the region in fall was observed in all years and egress in the early spring is postulated. We conclude that a small resident herd inhabits the region year round with numbers increasing through ingress of caribou from the Western Arctic herd possibly beginning as early as June. Increases or decreases in the size of adjacent herds probably will affect the numbers of caribou occupying the Central Arctic region.

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Introduction

In 1976, Cameron and Whitten (1979) identified caribou in the Central Arctic region of Alaska between the Colville and Canning rivers as the Central Arctic caribou herd (Fig. 1). Since then caribou numbers in the region have increased at a rate of 12 to 20% per year to 13 000 in 1983 (Whitten and Cameron, 1983; Smith, 1985). The current view that these caribou represent a «distinct unit» is based on the concept of fidelity to a calving ground and synchronous, uniform movements (Cameron and Whitten, 1979:630).

Prior to 1976, caribou in the region were sometimes described as a herd although specific calving grounds were not described (Child, 1973; Roseneau *et al.*, 1974; Gavin, 1979). Skoog (1968:356) concluded that Central Arctic caribou made up a «remnant» herd occurring outside «centers of habitation» of the Porcupine and Western Arctic herds (Fig. 2).

During the course of monitoring caribou in the Central Arctic region from 1981 through 1985, we noted changes in numbers and movements which suggested an overlapping of range with the adjacent Western Arctic herd. Our observations are consistent with the views of Skoog (1968) and raise questions concerning range relationships of caribou in the region. We discuss the results in relation to the current concept of a caribou herd and implications to research and management of caribou in the region. The objective of this paper is to provide more data on the changing numbers of caribou in the Central Arctic Region of Alaska and to show that more than one herd occurs in the region.

Study area

The study area, located in north-central Alaska, covers 46 000 km^2 (Fig. 1). The area is treeless and ranges in elevation from 0 to 1500 m above sea level. The physiography of the area was described by Roby (1978).

Methods

The area was sampled by aerial survey at 10% coverage with 20 to 30% coverage along a coastal strip 100 km wide during Mid-June. Most caribou in the area are within this 100 km zone between late May and July. Standard strip

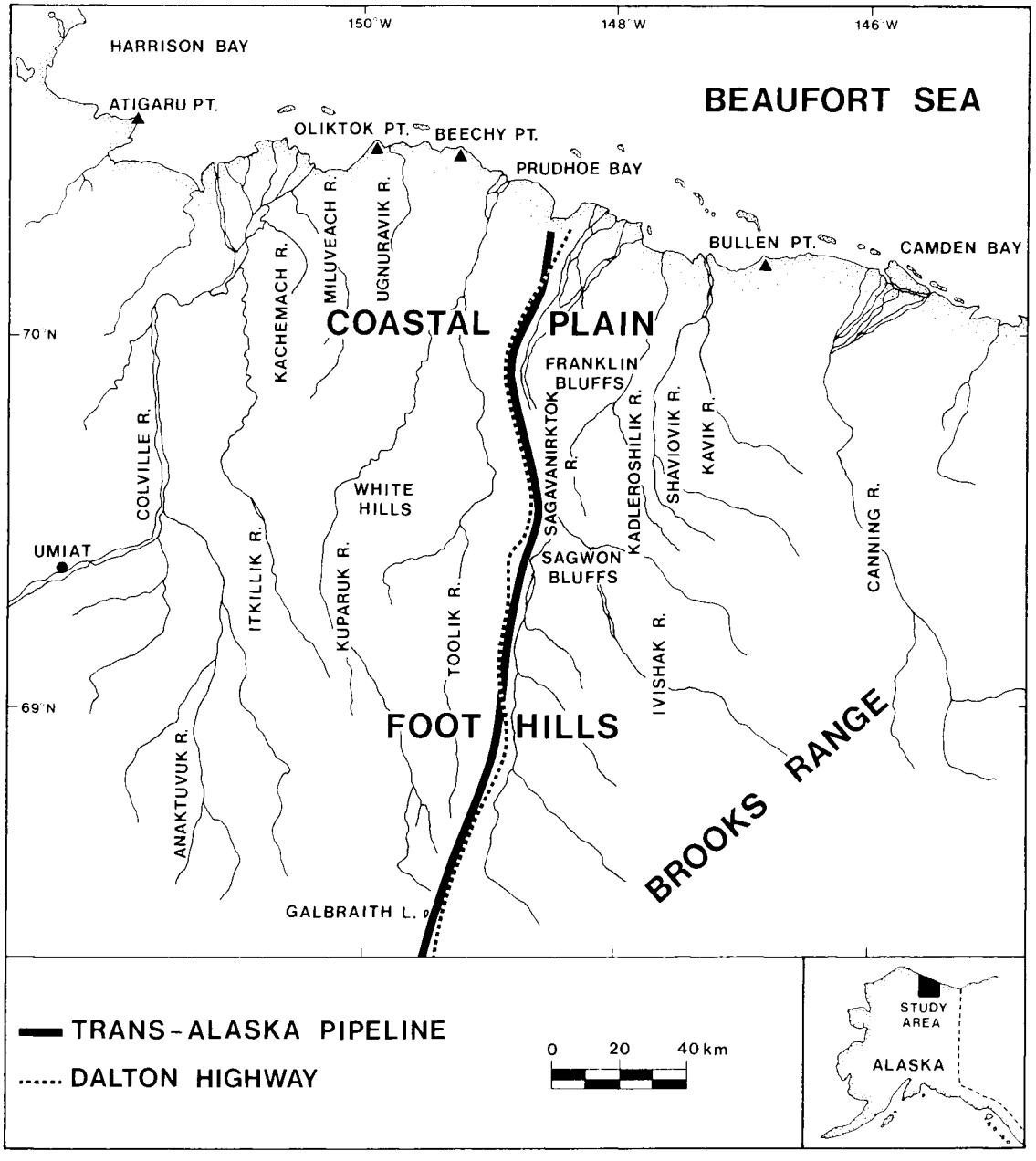

Fig. 1. The Central Arctic region and study area bounded by the Colville and Canning rivers.

transects (Caughley, 1977; Eberhardt, 1981) oriented north to south were systematically located and consistently sampled from May to March. Helio Courier and Cessna fixed-wing aircraft were flown at 120 m agl at 160 kmph. Two experienced observers were used in all surveys with the pilot as navigator.

The numbers of caribou were derived as a raw ratio estimate using 10% survey coverage (Jolly, 1969), with the variance estimated according to the formula of Miller *et al.* (1977). All estimates were corrected for visibility bias by multiplying by 1.25 based on convention and recent work by Heard (1985). However, this correction assumes equal bias over all survey periods. We believe that visibility bias can be higher during late May surveys because of snow melt conditions which varied considerably over the 4 years and because new born calves are not easily seen. Bias was not measured during any survey but estimates of

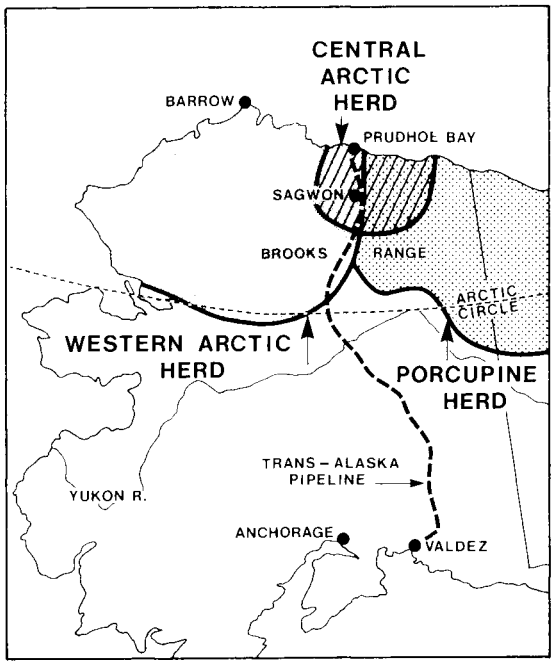

Fig. 2. General ranges of the Central Arctic, Western Arctic and Porcupine caribou herds in Alaska (Western Arctic and Porcupine ranges after Hemming, 1971).

numbers during June were similar to those reported by Whitten and Cameron (1983) and Smith (1985).

Average annual rate of increase (r) was measured by regressing log e of population size on time (Caughley and Birch, 1971).

Results

Estimates of numbers of caribou in the study area were made for 26 surveys conducted between June 1981 and June 1985 (Table 1). The average annual rate of increase (r) was variable depending on the time of year the data were collected. The highest estimate of r was obtained for late winter (r = 0.56) and rut periods (r = 0.52), and the lowest in the spring (late May) (r = 0.04). During the post-calving period in mid-July (r = 0.20) caribou were highly aggregated and estimates are qualified by high variances. Our best estimate of numbers based on the lowest variance (CV = 0.18) was during the calving period in mid-June. Numbers increased at r = 0.31 from 1981 to 1985 based on the calving period estimates. These observations suggest an ingress of caribou during the pre-rut in 1982 and during the rut in most years. Egress appears to occur during the early spring.

There were three times the number of caribou in the study area in fall and late-winter compared with May and June. By May the numbers declined to less than 25% of the March estimate. However, 3 weeks later, in Mid-June, the numbers more than doubled in size. In 1985 we sampled the study area at 10% coverage twice from 30 May to 17 June. The estimated number of caribou in the study area almost tripled during this period from an estimated 6400 (SE = 1000) to 17 000 (SE = 2900). From 1982 to 1984 a further 3 to 4-fold increase in numbers occurred between calving and the rut. The greatest

Table 1. Estimate of Caribou numbers in the study area based on 10% survey coverage.

Life cycle phase	Estimate of numbers ± SE[1]										Average annual rate of increase
	1981		1982		1983		1984		1985		
Late winter	—		5300	1200	16600	3900	—		33000	8300	0.56
Spring	—		3900	1300	5600	1300	1900	500	6400	1000	0.04
Calving	4700	700	6600	1100	9400	1700	10900	1800	17000	2900	0.31
Post-calving	6400	2600	10000	4300	3700	2000	30200	12400	—		0.20
August dispersal	7700	3100	6200	1700	11400	5000	—		—		0.20
Pre-rut	5000	1300	13500	2500	9400	4600	—		—		0.32
Rut	6300	1400	27300	5000	29000	7200	35700	10100	—		0.52

[1] Rounded to the nearest 100.

Table 2. Ratio of adult males: 100 females in various seasons from 1981 to 1985.

Year	Late winter	Spring	Calving	Post calving	August dispersal	Pre-rut	Rut
1981	—[1]	—	32.5	117.9	23.3	52.2	175.4
			(1350)[2]	(427)	(502)	(280)	(168)
1982	22.8	21.7	47.8	42.9	67.7	76.8	61.2
	(124)	(146)	(683)	(140)	(317)	(442)	(574)
1983	36.2	23.7	32.4	40.4	35.4	39.5	54.8
	(531)	(245)	(886)	(1414)	(562)	(413)	(1184)
1984	—	55.9	55.5	118.5	—	—	71.4
		(212)	(1454)	(118)			(744)
1985	129.4	195.3	108.4	—	—	—	—
	(1670)	(685)	(1384)				

[1] Dash indicates no sample.
[2] Number of adults classified.

increase occurred in the fall while numbers were relatively stable during the summer.

The ratio of adult males to adult females was highly variable both within and between years (Table 2). No consistent changes in sex ratios were observed during periods of ingress/egress. Although seasonal biases in classification are possible, consistent methodologies were employed on all surveys.

The increase in numbers in the fall resulted from an ingress of caribou from the west. In all years in September or October we observed large numbers of caribou (2500 — 15 000) moving into the region from the northwest up the Itkillik River Valley and in the Anaktuvuk River area. In the fall and late winter of 1985, a relatively high proportion of these animals were males (Table 2). The apparent increase in numbers (from late May to July) occurred in all years but no obvious movement of caribou from outside the study area was detected.

Discussion

Our observations of caribou in the study area and review of recent and historical data strongly support the view of Skoog (1968) concerning the origin of caribou in the area. There appears to be a small number of resident caribou (6400 in 1985) that remain in the study area throughout the year. During the calving period, caribou from outside the study area move into the area to calve along with caribou resident year round in the study area. By fall there is a larger ingress of caribou that overwinter in the area. We suspect that most of these animals move to the west and northwest in the spring leaving behind a resident herd that calves along the coastal zone each spring.

This resident herd is analogous to the Central Brooks Range herd described by Skoog (1968) as a relict of previous population highs in the adjacent Western Arctic and Porcupine caribou herds. This view is corroborated by observations made by Child (1973), Gavin (1979) and Roseneau *et al.* (1974). During the early 1970s when the adjacent Western Arctic and Porcupine herds were large (Davis *et al.*, 1980; Bergerud *et al.*,1984), Child (1973) described a small, distinct resident «Central herd» of about 3000 animals in the region with periodic large influxes of caribou from other herds during the summer and fall (White *et al.*, 1975). Roseneau *et al.* (1974) described a similar situation referring to a remnant «Central Arctic herd».

Coincident with the decline of the Western Arctic herd during the early 1970's (Davis *et al.*, 1980) the number of caribou in the study area also declined at the same rate (see Gavin, 1979). Ingress and egress in the east and west during the fall and spring, respectively, ceased during this period. In 1975, Whitten and Cameron (1983) estimated only 5000 caribou in the study area and designated them the Central Arctic herd (Cameron and Whitten, 1979).

Since 1975 the Central Arctic herd has increased at a rate of 13 to 20% per year (Whitten and Cameron, 1983; Smith, 1985). The Western Arctic herd has increased since 1976 an average of 11 — 14% annually (Davis *et al.*, 1980;

Anderson and James, 1984) and the Porcupine herd at 10 — 12% since 1981 (Whitten, 1984). In fall 1976, 1200 Western Arctic caribou were observed in the Central Arctic region (Whitten, in Roby, 1978) but subsequently, fall movements of the Western Arctie herd into the area were not documented until 1981 and have accelerated since then (this study; Valkenburg *et al.*, 1983).

Caribou that moved into the area in the fall probably wintered in the region in 1983 and 1985 and perhaps in other years. Historically, when caribou numbers north of the Brooks Range were high, caribou have wintered in the region (Skoog, 1968; Roseneau *et al.*, 1974; Valkenburg *et al.*, 1983). Olson (1959) reported 150 000 caribou wintering in the Central Arctic in 1958.

Caribou presumably moved out of the area between late winter and spring. Roseneau *et al.* (1974), Skoog (1968), Gavin (1979) and Valkenburg *et al.* (1983) reported movements to the west and east by caribou that wintered in the foothills of the study area. These movements occurred in late April and May and involved much larger numbers of caribou than those moving north at that time. Surveys during this period are required to confirm these movements.

The apparent increasing male: female ratio from calving to the rut suggests a movement of male caribou into the study area during the summer and an exodus during the spring consistent with changes in overall numbers. Previous researchers speculated that an ingress of males occurred in the study area during summer (Gavin, 1979; Whitten and Cameron, 1983). This observation is common for other caribou herds where males move slowly from winter to summer ranges along similar but broader routes than those used by migrating females (Kelsall, 1968; Parker, 1972).

The definition of a caribou herd centers on seasonal range use and association with specific calving grounds (Skoog, 1968; Thomas, 1967). The Central Arctic herd was described on this basis (Cameron and Whitten, 1979). However, the mobility of caribou confounds herd identification. If we measured the size of the herd at the onset of calving we would derive an estimate quite different from that obtained a week or two later. The most recent estimate of 13 000 in 1983 was based on a photo census in late July (Smith, 1985). This estimate is consistent with previous estimates and extrapolations (Whitten and Cameron, 1983) but probably includes a substantial number of caribou that originated from outside the study area.

The overall range of caribou censused in July 1983 is quite different than previously reported (Cameron and Whitten, 1979). When we extended our surveys west of the Colville River and east of the Canning River we continued to encounter calving caribou, indicating a continuum of calving beyond the boundaries previously established for the herd. The numbers of caribou within the artificially established boundaries include those from other «herds» for at least 10 months of the year. The numbers within the study area are variable throughout the year but can reach a total in late fall and winter which is up to five times that of late May and calving populations. These differences have a bearing on virtually all aspects of understanding the ecology of earibou within the region. For example, there are significant considerations in such diverse areas as range use studies, disturbance studies, harvest allocations and in interpretations of herd demography.

Large changes in the size of some herds (e.g., Kaminuriak, George River, Bathurst, Beverly), the discovery of «new» herds (e.g., Lorillard, Wager Bay, Melville, Teshekpuk, Central Arctic) and the extinction of others (e.g., Dolphin and Union, Arctic Islands) demonstrates the importance of understanding the mobility of caribou (Bergerud, 1980). «Unusual» movements of caribou (e.g., Fortymile, Bluenose, Nelehina, Western Arctic) have significance to the animals and we should strive to incorporate their meaning into our understanding of caribou biology. What might be considered to be an aberrant or unusual distribution or movement may reflect events which have significant adaptive value. These may involve re-occupation of unused or predator free ranges or may reflect population size, characteristics and trends.

The Central Arctic herd appears to be manifesting itself once again according to the incomplete scenario constructed by Skoog (1968) almost 20 years ago. In 1984, Bergerud *et al.* (1984) reiterated that change within the study area was imminent. Based on Skoog's hypothesis (1968), there could be many more caribou occupying the study area if the adjacent Western Arctic and Porcupine herds continue to increase and expand their ranges into the Central Arctic Region. Alternatively, a decline in numbers

might be associated with a major range shift or decline in the numbers of adjacent herds. We must be prepared to recognize and document the occurrence of these events if and when they occur.

We believe that researchers and managers should acknowledge the variable status of caribou in the Central Arctic region which are currently considered to be a distinct herd (Cameron and Whitten, 1979). If this variability is ignored, interpretation of research conducted in the region may be in serious error. The dynamic nature of the population must also be considered in management decisions affecting caribou found in the Central Arctic region.

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