

Calving distribution of Alaska's Steese-Fortymile caribou herd: A case of infidelity?

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Abstract: The Steese-Fortymile caribou (*Rangifer tarandus granti*) herd has changed its calving distribution frequently during the past 30 years. A «traditional» calving area, used for decades, west of the Steese Highway (Preacher Creek) was abandoned after 1963. By the early 1970's, a new calving area had been established 74 km to the southeast in the Birch Creek drainage. This new calving area was abandoned after 1976. From 1977 through 1983, calving occurred in annually variable locations approximately 136 km southeast of the Birch Creek calving area. In 1984, however, the herd again calved in the general vicinity of the Birch Creek calving area. General characteristics of the various calving areas are described, and calving distribution is discussed in relation to herd size, development and disturbance, predator abundance, and other factors. Location of calving in recent years was unpredictable, which warrants reconsidering the merit of protecting only previously important calving grounds.

Key words: caribou, Steese-Fortymile herd, calving, Alaska, wolf.

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Introduction

Caribou (*Rangifer tarandus* L.) have been shown to be more faithful to their calving grounds than to other seasonal ranges (Skoog, 1968:121; Fleck and Gunn, 1982; Valkenburg *et al.*, 1983; Cameron *et al.*, 1986). Also, caribou seem most sensitive to disturbance during calving (DeVos, 1960; Lent, 1964; Kelsall, 1968; Bergerud, 1974; Miller and Gunn, 1979), and severe disturbance during calving may be of greater consequence to the population (through direct mortality of calves) than disturbance at other times. Presumably there are advantages, leading to increased survival, for caribou to annually use traditional calving areas.

For the above reason, calving areas are generally considered «critical habitat» and are frequently excluded from mineral exploration and production by land managers. There is often intense pressure from industry to keep these excluded areas as small as possible, but there is mounting evidence that caribou may select

different calving areas over time (Davis *et al.*, 1985). Short-term studies, especially on northern herds where historical information is lacking, may fail to identify important potential calving areas. With this in mind, we examined the historic pattern of calving ground use by the Steese-Fortymile caribou herd (FCH) in east-central Alaska (Fig. 1) and discuss it in relation to population size, tradition, predation, development, interaction with other herds, habitat, and weather.

Methods

We examined the historical information on calving ground use in the FCH as presented by Skoog (1956, 1968), Hemming (1970), and Davis *et al.*, (1978). Data since 1976 are from unpublished reports in the Alaska Department of Fish and Game (ADF&G) files and Shrier (1983). Information from radio-collared caribou was not available until October 1980, when four

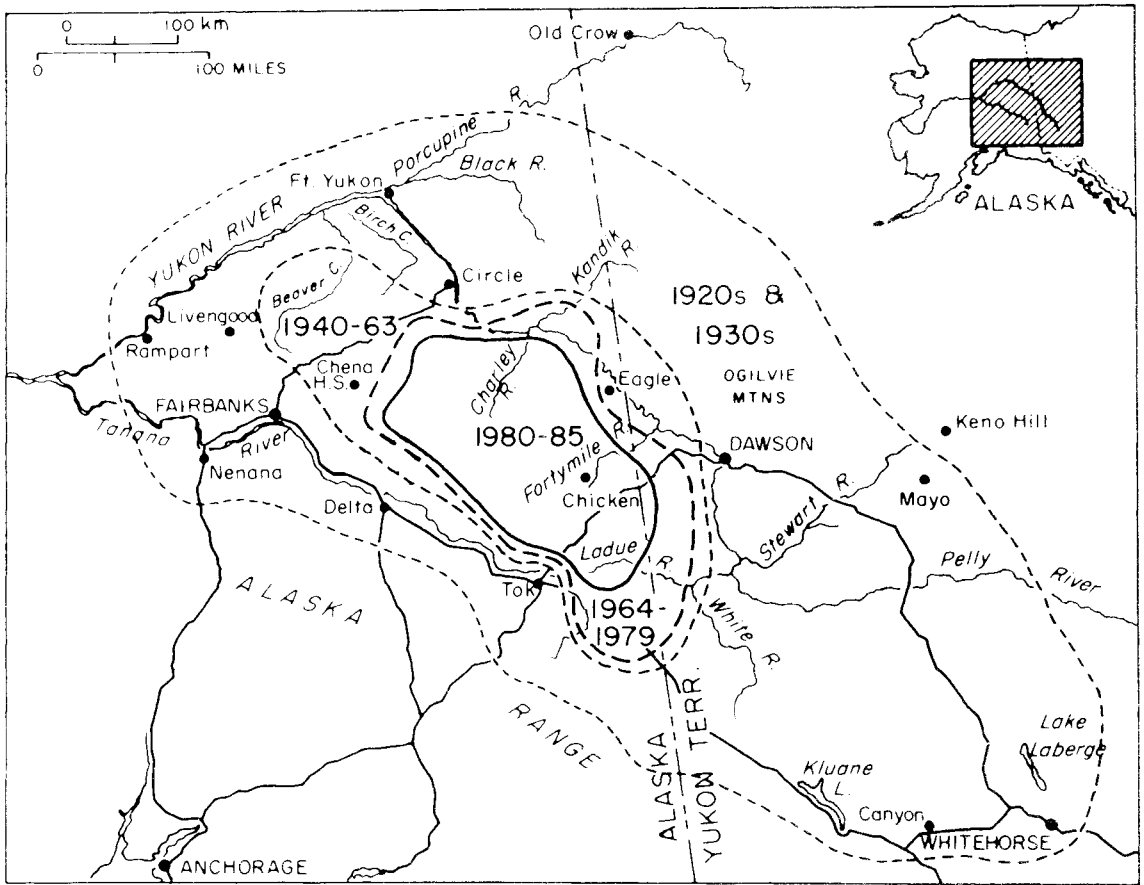


Fig. 1. Greater range of the Fortymile caribou herd, 1920-1985.

females were radio-collared. From December 1981 through April 1982, 16 more caribou (14 females and 2 males) were collared to investigate the interaction between Porcupine herd and FCH caribou that were wintering together. Seven of these caribou left with the caribou from the Porcupine herd as they returned north in May, one female died from capture-related causes shortly after tagging, one was killed by wolves (*Canis lupus*), and one died of unknown causes, leaving 10 caribou with functioning radio collars during calving in 1982 in the range of the FCH.

During September 1983, 16 more females were radio-collared, and in December 1984, 2 females and 10 males were radio-collared. The radio-collared caribou have contributed to substantially better documentation of calving areas since May 1982.

Delineation of calving grounds from old reports was subjective and often depended upon interpretations of various different observers over

the years. In this paper, the main calving area is the area in which the density of calving caribou was highest and/or including over 50% of all calving caribou, based on ocular estimates during aerial reconnaissance ranging from intensive to extensive. Secondary calving areas were those areas, usually on the periphery of the main calving areas, where additional calving caribou were seen.

FCH calving areas have been aerially surveyed annually since 1950. In general, these surveys were designed to estimate initial productivity and to determine roughly where calving occurred. Little effort was made to count caribou on calving areas. The FCH was generally censused (Table 1) 10-30 days after 15-25 May, which is the normal peak of calving.

Results

Calving areas of the FCH were not accurately mapped before the advent of aerial surveys in the late 1940's. From 1920 to 1950, the area

Table 1. Estimates of the size of the Fortymile caribou herd since 1920.

Year	Number of caribou counted	Estimated population size	Source
1920	13 200	568 000	Murie, 1935
1953	40 000	60 000	Skoog, 1956
1956	30 000	45 000	Olson, 1957
1960	28 000	50 000	Jones, 1962
1961	-- --	50 000	Jones, 1963
1962	-- --	50 000	Jones, 1963
1963	26 000	50 000	Skoog, 1964
1964	-- --	30 000	Lentfer, 1965
1969	-- --	20 000	Alaska Department of Fish and Game files
1973	-- --	5 300	Davis <i>et al.</i> , 1978
1983	12 150	12 500	Alaska Department of Fish and Game files
1984	13 073	14 000	Valkenburg and Davis, 1985

northwest of Eagle Summit and Twelvemile Summit was regularly used for calving (Murie, 1935), but calving was also reported in the upper Salcha, upper Charley, and upper Goodpaster River drainages in some years (Skoog, 1956) (Fig. 2a). Between 1950 and 1954, most calving occurred north of the Steese Highway in the White Mountains (Skoog, 1968; Hemming, 1970) (Fig. 2b). From 1955 through 1960 there was considerable calving along the ridges on Birch Creek and some on the upper Salcha and Charley rivers, although the White Mountains were still heavily used (Skoog, 1968; Hemming, 1970) (Fig. 2c).

From 1961 through 1963 there was a definite shift to the southeast. What had been the main calving area in the White Mountains became a secondary calving area, and most caribou calved in Birch Creek and the upper Chena and Salcha rivers (Skoog, 1968; Hemming 1970) (Fig. 2d). After 1963, little calving occurred northwest of the Steese Highway, and the southeastward trend in location of the calving area continued (Hemming, 1970; Davis *et al.*, 1978) (Figs. 2e and 2f.) After 1979, the Clums Fork-Birch Creek calving area, which had been regularly used for 16 years, was abandoned, and calving was dispersed in the upper Salcha, Charley and Seventymile river drainages and the Slate Creek drainage (Alaska Department of Fish and Game files) (Fig. 2g).

In 1984 many caribou calved in the head of the Salcha River and the South Fork of Birch Creek, near the old Clums Fork calving area. In 1985, the spring weather was unseasonably cold and during calving the only areas that were snowfree were muskegs along the Charley River. Most calving occurred on these snowfree muskegs. However, calving also occurred in the Middle Fork of the Fortymile River and upper Charley River drainages, which was along the migration route from winter range.

Discussion

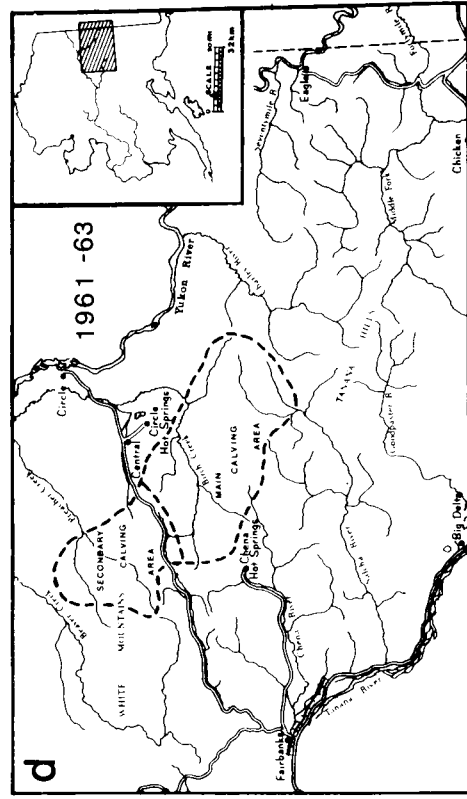
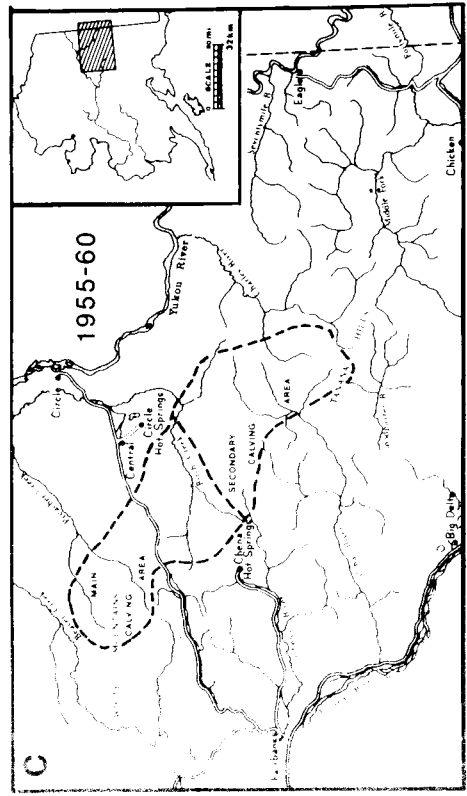
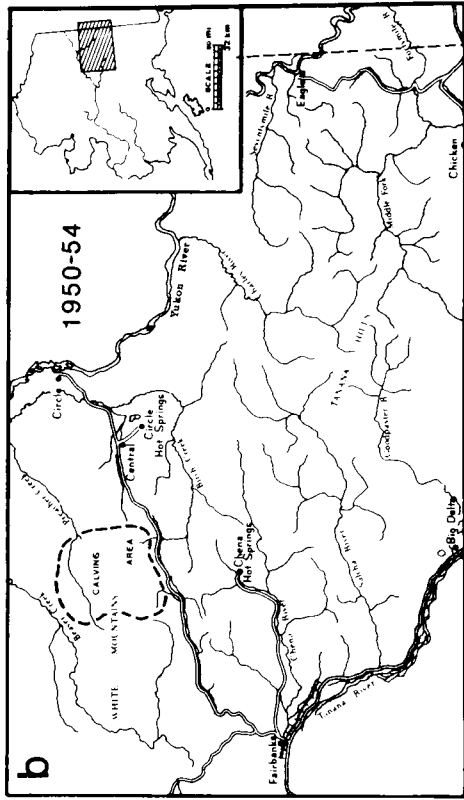
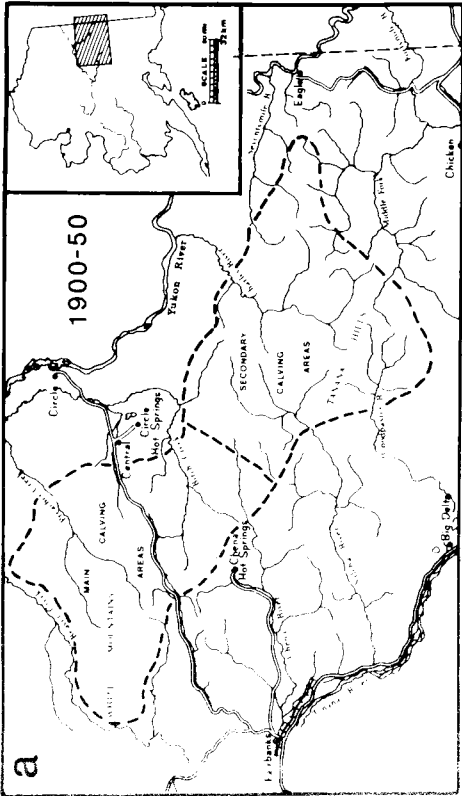
During the mid-1950's some factor(s) apparently caused caribou of the FCH to select calving areas other than the traditional calving area in the White Mountains. Various influences have been proposed as reasons why caribou select calving areas, but few of the proposed influences have been substantiated. Experimentation is necessary to determine the influence of some of the factors currently thought to affect caribou behaviour. For example, restocking calves to new ranges in Newfoundland demonstrated the importance of learning and tradition to caribou movement behaviour (Bergerud, 1974).

Population size

Population size and range size appear to be positively correlated in the FCH (Fig. 1 and Table 1), but the extent and/or location of calving areas seems poorly correlated with population size. During the early 1950's the herd was relatively small (40 000 - 60 000) compared to historic size, the calving area was relatively small, and calving took place at the western extreme of the herd's range. In the late 1950's, calving distribution shifted to the southeast. This shift, which persisted into the early 1960's, occurred as the population was stable or possibly increasing (Table 1). Later, as the population declined during the 1960's and early 1970's, the size and location of the calving area apparently remained stable. After 1977, when the herd was again increasing (albeit slowly), calving appeared to be more scattered and calving distribution had shifted farther southeastward.

Tradition

Tradition probably has a strong influence on the location of calving areas from year to year.



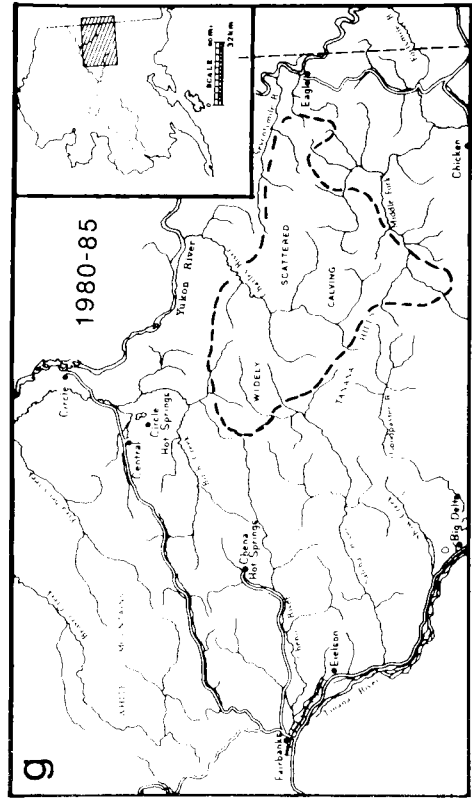
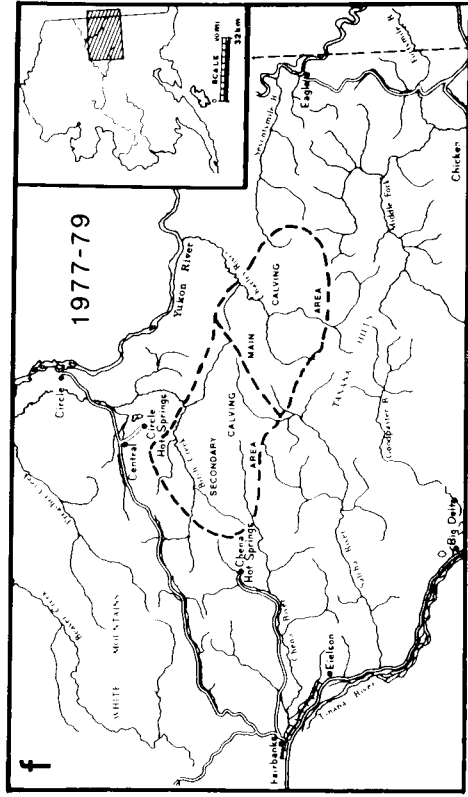
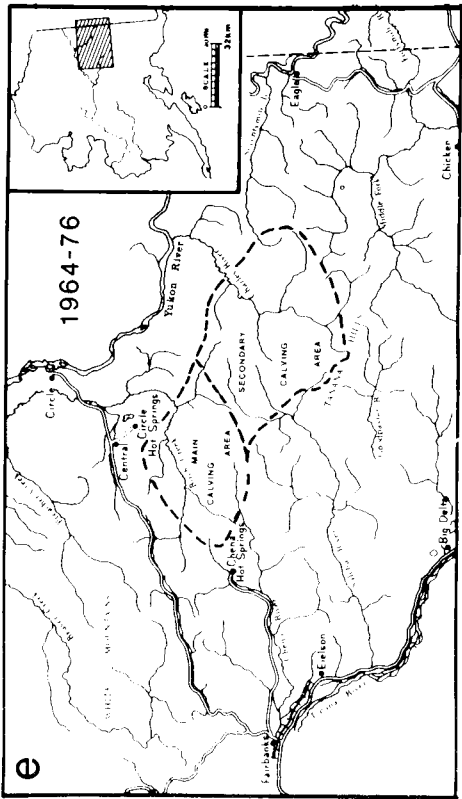


Fig. 2. Probable calving range of the Fortymile caribou herd, 1900 - 1950, and calving range of the Fortymile caribou herd, 1951 - 1985; (a) 1900 - 1950, (b) 1950 - 1954, (c) 1955 - 1960, (d) 1961 - 1963, (e) 1964 - 1976, (f) 1977 - 1979, (g) 1980 - 1985.

Some individual radio-collared caribou return to specific calving sites year after year (Alaska Department of Fish and Game files), and most return to the same general area unless weather conditions are particularly adverse (Lent, 1964; Skoog, 1968; Hemming 1970; Fleck and Gunn, 1982; Whitten and Cameron, 1983; Valkenburg *et al.*, 1983; Davis *et al.*, 1985). This strong affinity of female caribou for their calving areas was graphically demonstrated by the movements of one radio-collared cow from the Teshekpuk herd (for her locations see Davis, 1980) on the Alaskan arctic coastal plain in 1982. She had wintered with Western Arctic and Central Arctic herd caribou near the Trans-Alaska Pipeline until late April, but was observed 160 km west of the area, in early May, migrating with Western Arctic herd caribou enroute to the Utukok calving area. Between early May and late May she must have returned to her traditional Teshekpuk calving area 240 km to the northeast where we found her in early June.

Caribou abandon calving ranges relatively rarely, although small annual shifts within the greater calving area are common (Skoog, 1968; Bergerud, 1974; Fleck and Gunn, 1982; Davis *et al.*, 1985). Major long-term shifts in calving distribution, such as that which occurred in the FCH beginning in the early 1960's, are not common and certainly not well-documented. In view of the affinity that caribou have for calving areas, there must have been a good reason for the shift, at least initially.

Predation

We could not determine if caribou of the FCH successfully avoided wolves by shifting calving areas. Calf numbers were chronically low between 1961 and 1975, and available data suggest a strong inverse correlation between wolf numbers and calf survival and a weak correlation, if any, between shifting calving areas and calf survival (Valkenburg and Davis, 1985).

Shifting the location of calving areas could be advantageous to caribou if wolves key in on regularly used calving areas. This may be especially true if alternate prey species, e.g., Dall sheep (*Ovis dalli*) and moose (*Alces alces*), support the wolves when caribou are absent. However, wolves can also shift seasonal ranges to take advantage of a seasonal abundance of prey (Kelsall, 1968:248; Stephenson, 1979).

Predators, especially wolves, may influence the selection of calving areas by caribou (Lent, 1964; Kelsall, 1968; Skoog, 1968; Bergerud, 1974). Wolves are relatively uncommon on the calving grounds of large, migratory herds (Kelsall, 1968; Bergerud, 1974; Fleck and Gunn, 1982; Davis and Valkenburg, 1985). Wolves were extensively shot and poisoned in the White Mountains between the late 1940's and 1954 (Davis *et al.*, 1978; Harbo and Dean, 1983). Wolf control was discontinued between 1954 and 1957. During these 3 years, wolves apparently increased dramatically (Davis *et al.*, 1978; Olson, 1958) in the White Mountains calving area, and the number of calves present in the caribou population in autumn plunged (Davis *et al.*, 1978). It may be significant that the shift in calving distribution was detected shortly after the wolf population increased after 1954.

In response to the dramatically lowered calf numbers between 1955 and 1957, poisoning and aerial hunting of wolves was resumed in 1957 and calf recruitment again rebounded (Davis *et al.*, 1978). In 1960, predator control was terminated in all of Alaska except the Seward Peninsula reindeer ranges, and wolves again became numerous and remained numerous until the mid-1970's (Davis *et al.*, 1978). Based on the lack of observations of large packs of wolves by pilots and hunters and the general decline in moose and caribou after the early 1970's, it appears that the wolf population has declined on the White Mountains calving area since the mid-1970's (Alaska Department of Fish and Game files). The FCH has been increasing slowly since the mid-1970's (Valkenburg and Davis, 1985).

Development and disturbance

The range of the FCH has remained relatively free from development and human activity although it is traversed by two major highways. The Steese Highway (Fig. 1) was built in the 1920's and has been gradually upgraded. Before major reconstruction in the early 1980's it was a narrow, winding gravel road. Caribou crossed this highway regularly going to and from their calving grounds until 1963. There was never any significant hunting from the highway in spring. Caribou also often crossed the Steese Highway in August and September because they periodically used the surrounding area as summer range, and they were commonly hunted. However,

there is no evidence that the Steese Highway acted as a barrier to movements, nor did cessation of caribou crossing of the Steese Highway correlate with a significant increase in traffic.

In contrast to the Steese Highway, hunting was heavy along the Taylor Highway in October, especially in the late 1960's and early 1970's. «Firing line» situations were common and groups of caribou were often temporarily prevented from crossing the highway by hunters and associated traffic. Nevertheless, the caribou have continued to cross the Taylor Highway. In the absence of caribou hunters, traffic on the road is light.

Interactions with other herds.

Two major emigrations from the FCH have been reported. In the 1957 emigration, approximately 30 000 caribou of the FCH that wintered with the Porcupine herd in the Ogilvie Mountains supposedly went north to calve with the Porcupine herd. Olson (1958) implied that calving in the FCH was late that year and only 5000 calved in the White Mountains. A «large» segment of the herd also calved in the Charley River drainage, however. If the 1957 emigration indeed occurred, the caribou must have returned almost immediately because the 1958 and 1960 censuses revealed no net loss of animals (Olson, 1959; Jones, 1962; Skoog, 1968). Skoog (1968) mentioned that, in 1964, most of the FCH wintered in the Ogilvie Mountains and had moved north in the spring. These caribou were thought to have returned (Skoog, 1968). A general population decline was recognized throughout the late 1960's and by 1973 only 5312 caribou were found (Davis *et al.*, 1978). This population decline can be adequately explained by an imbalance between mortality and recruitment (Davis *et al.*, 1978).

In 1982, approximately 20 000 Porcupine herd caribou crossed the Yukon River and wintered in the FCH's range (Whitten and Cameron, 1983). Only one radio-collared caribou was among the 20 000, and at the time there were only four radio-collared caribou of the FCH on the air. In May, the one known Porcupine caribou returned north and the four known caribou of the FCH stayed. Censuses of the FCH in 1983, and 1984 did not reveal that any unexpectedly large increases in population had occurred.

So far, the evidence for large-scale interchanges between ranges and herds is anecdotal and speculative. Despite the presence of hundreds of radio-collared caribou in various herds throughout Alaska, there have been few documented interchanges of individuals even though it is common for caribou from different herds to share winter range (Davis and Valkenburg, 1985; Cameron *et al.*, 1986).

Habitat

Although few data have been recorded on selection of habitat by calving caribou of the FCH until recently, there has been an apparent trend away from using generally treeless, higher elevation habitat to more forested areas. The old White Mountains calving area was almost entirely treeless tussock and alpine tundra above 800 m elevation. The Birch Creek calving area has considerably more timbered habitat than the White Mountains calving area. Farther east, the upper Saleha River drainage is treeless and many ridges along the Yukon Fork, Birch Creek, and Charley River are treeless, but most of the area is at least sparsely forested. In 1983, 1984 and 1985, when radio-collared caribou were monitored, 56% of the relocations ($n = 52$) in late May were in treeless habitats and 44% were in sparse or closed-canopy forest habitats.

Whether caribou use open, higher elevation habitat for calving or lower elevations muskegs interspersed with spruce, the *Eriophorum* flower buds which are their main food prior to leaf emergence are still widely available. However, at lower elevations, caribou may have more ready access to birch (*Betula* spp.) and willow (*Salix* spp.) leaves when they first emerge. In the absence of a compelling reason to go to the White Mountains calving area, like avoiding predators, it may be advantageous for the cows to remain farther east at lower elevations to take advantage of earlier leaf emergence (Kuropat and Bryant, 1980; Bergerud, 1984).

Weather

Selection of calving habitat is partially dependent on weather (Lent, 1964; Kelsall, 1968; Skoog, 1968), and snowmelt patterns (Lent, 1980; Fleck and Gunn, 1982). If snowmelt is late, caribou may be forced or prefer to remain at lower elevations where snow disappears sooner. They may also be prevented from

reaching traditional calving areas and be forced to calve en route (Lent, 1964; Kelsall, 1968; Skoog, 1968; Davis and Valkenburg, 1985). Spring 1985 was about 2-3 weeks later in the FCH's range and many caribou calved farther east than ever recorded. They also used primarily muskeg and forested habitats at low elevation for calving but climbed in elevation to open areas as soon as the snow receded.

Although weather may influence yearly variations in use of calving area, it is unlikely that it has caused long-term shifts in use of calving areas by the FCH. Perusal of weather records for Fairbanks indicates that although there were some particularly severe winters in the 1960's and early 1970's, they were interspersed with some rather mild winters. With the exception of 1974-75 and 1984-85, winters have been mild in the Fairbanks area since 1971-72.

Landsat data have been available only since the early 1970's, so it is not possible to determine whether or not snowmelt patterns changed during the mid-1950's when the first major shift in calving ground use was detected.

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