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DALL SHEEP MOVEMENTS NEAR FORT GREELY, ALASKA: PRELIMINARY FINDINGS

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Abstract: Movements and seasonal ecology of 8 ewe and 7 ram radio-collared Dall sheep (Ovis dalli dalli) on and adjacent to Fort Greely, Alaska (FGA) were studied to allow mitigation of potential disturbance due to military training exercises. Relocations indicated 5 different subpopulations, 4 of which used a centrally located mineral lick in early summer. Older rams traveled greater distances than ewes and young rams. No rams died during the 2-year study, but 4 of 8 ewes died. Recommendations are offered to protect these populations and their habitat with respect to military exercises.

FGA is 1 of 2 military bases in the world with Dall sheep and the only one open to sheep hunting. In the study area (Fig. 1), 24 hunters took 14 full-curl rams in 1988. The Army has rarely used sheep habitat for training, but increasing troop strength and resistance to Army use of off-post lands could alter the situation.

The Army began research in cooperation with the Alaska Department of Fish and Game (ADF&G) to identify seasonal use patterns of alpine terrain within the study area and to recommend mitigation in the event of Army/sheep conflicts.

Objectives of this study were: to delineate summer and winter ranges, migration routes, lambing area, rutting areas, and mineral licks; and to estimate population size, sex-age composition, and adult mortality. In this paper we report preliminary findings and offer insights into the suitability of our methods.

We thank R. Duckworth, U.S. Army Forces Command (retired), for efforts in funding this project. Without funds from the Army Agricultural/Grazing Outlease Program, the study would not have begun. Majors R. Aaron and T. Roberts, Aviation Detachment Commanders at Fort Greely, and their officers and men are especially recognized for preparing and flying the many relocation missions. All helicopter costs were borne by their budget. Many ADF&G personnel assisted: C. Smith helped define the project; E. Crain, R. Beasley, and M. McNay assisted in the net capture; R. Nowlin darted sheep; and P. Valkenburg and S. DuBois relocated collared sheep. L. Laravee and R. Warbelow expertly piloted capture helicopters under less than ideal conditions. The efforts of all are gratefully acknowledged.

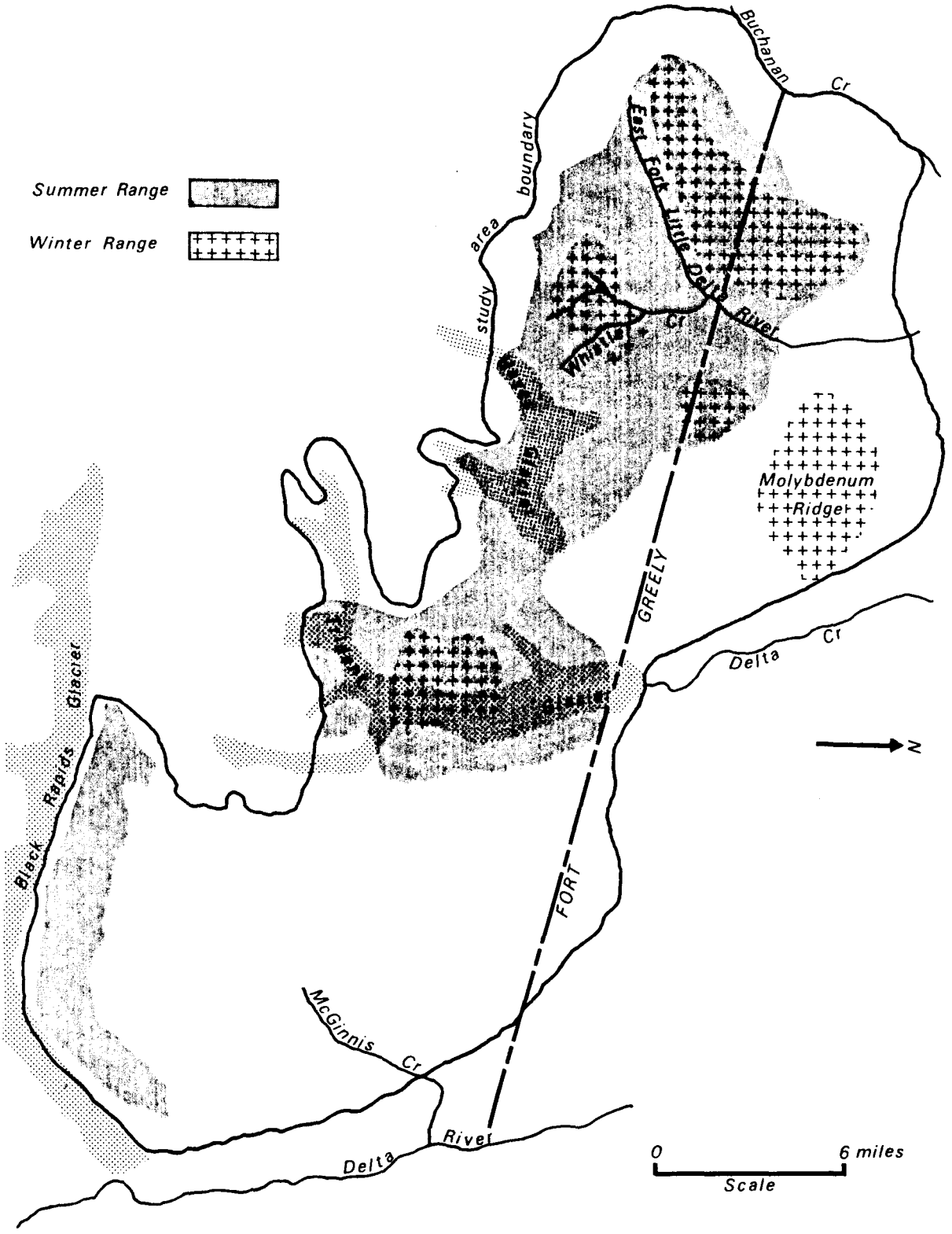

Fig. 1. Winter and summer ranges of Dall sheep, Fort Greely, Alaska study area.

STUDY AREA AND METHODS

The study area, about 1150 km^2, is on the north face of the eastern Alaska Range in interior Alaska. Most of the military reservation lies on the Tanana Flats at about 800 m elevation, but some alpine terrain (850-2,150 m) supports Dall sheep. Peaks up to 4,250 m lie immediately south with 4 major glaciers occupying heads of the drainages. Lower elevations are shrub-dominated by alder (Alnus spp.), dwarf birch (Betula nana), and willow (Salix spp.). The alpine zone is dominated by forbs and grasses of typical Dall sheep habitat with many rock falls and talus slopes almost devoid of vascular plants. Temperatures range from 32C to -48C. North-bound air flowing over the Alaska Range produces prevailing catabatic winds that remove snow from exposed slopes, creating stable habitat for sheep. Moose (Alces alces), caribou (Rangifer tarandus), grizzly bear (Ursus arctos), and wolves (Canis lupus) are common in the area.

To determine seasonal movements we captured and radio-collared 15 sheep and aged each by counting horn annuli (Table 1). Six ewes and 4 rams were captured using a helicopter skid-mounted projectile net (Heimer and Mauer 1990) and fitted with mortality-sensing (11-hr delay) radio collars (Telonics, Mesa, AZ) on April 21, 1988. On July 18, 3 rams and 2 ewes were fitted with similar collars after being captured using conventional darting techniques (Heimer and Mauer 1990).

Table 1. Dall sheep captured in 1988 at Fort Greely, Alaska.

Collar ID	Sex	Capture method	Date of capture	Age[a] (years)	Date of death[b]	Age at death (years)	Cause of death
8	F	net	4/21/88	3.9	12/02/89	5.5	unknown
3	F	net	4/21/88	5.9	10/22/88	6.5	unknown
1	F	net	4/21/88	"old"	1/28/89	?	unknown
0	F	net	4/21/88	7.9	4/26/89	8.9	fall
7	F	net	4/21/88	7.9			
2	F	net	4/21/88	3.9			
17	F	dart	7/18/88	3.1			
6	F	dart	7/18/88	7.1			
X	M	net	4/21/88	1.9			
F	M	net	4/21/88	1.9			
V	M	net	4/21/88	4.9			
T	M	net	4/21/88	1.9			
4	M	dart	7/18/88	5.1			
Z	M	dart	7/18/88	5.1			
11	M	dart	7/18/88	2.1			

[a] Birth date assumed to be the last week of May.
[b] Date of death assumed to be the midpoint between the last live mode signal and the first mortality mode signal.

Beginning on May 25, 1988, marked sheep were located 6 times from a Piper PA-18 Super Cub and 14 times from an Army Bell UH-1 helicopter. We never located all 15 sheep in 1 flight. Once, 2 sheep were located when we visited a mineral lick. Tracking flights ended April 10, 1990. Each location was plotted on a 1:250,000 USGS map. Heimer's (1973) definitions were used to classify Dall sheep range as summer range (territory occupied after peak mineral lick use in early July until migration to winter range in early October), or winter range (occupied from November until movement toward a mineral lick in early May).

Sheep were assumed dead when the collar broadcasted in mortality mode. Collars were retrieved as soon as practical. When possible, cause of death was determined from evidence at the site. However, this was difficult because landing clearance and snow conditions dictated that 2-4 months passed before death sites could be investigated on the ground.

A high-intensity survey of the study area was attempted using standard techniques (Geist 1968, Heimer 1985, Heimer and Watson 1986). However, high winds and logistic problems resulted in early termination of the survey. The area between Trident and Black Rapids Glaciers was covered.

RESULTS

One hundred fifty-four observations ($\bar{x}$ = 10.3/sheep) suggest 5 separate subpopulations (Fig. 2). Except on Molybdenum Ridge, where about 50 ewes and lambs wintered, winter ranges appear to lie within summer ranges. Separate winter ranges are uncommon in the Alaska Range (Heimer 1973, Heimer and Watson 1986). Molybdenum Ridge and the northern extension of sheep distribution along the west side of the East Fork, Little Delta River (EFLDR) lie on FGA. We sometimes observed about 100 sheep in the latter area. Migration routes were not observed. However, we inferred the approximate migration routes of 1 subpopulation (Fig. 2). Also, we could not find rutting or lambing locations, but these areas are typically small areas within winter ranges (Heimer 1973, Heimer and Watson 1986).

Of the 15 sheep collared, 13 used the headwaters of Whistler Creek (Fig. 2) in late June. We identified a mineral lick where about 80 sheep were seen at 1 time. Lick use was consistent with reported patterns of mineral lick use in Alaska (Heimer 1988). Two sheep captured near Trident Glacier were not seen during the period of lick use. We do not know if they use this lick.

Four collared ewes died (Table 1). At least 1 was over 8 years old and "at risk" (Watson and Heimer 1984). Cause of death - a fall - was apparent in 1 case. Other causes were uncertain, but the locations of these deaths suggested predation was involved. These sites were typical of areas where predation has been documented (Murie 1944, Heimer 1973). No rams died during the study. Rams in these age classes (2-7 yrs) usually have low mortality rates (Heimer and Watson 1986).

Between Trident and Black Rapids Glaciers (Fig. 1), 161 sheep were counted. Of these, 58% were classed as ewes, 14.2% as lambs, and 27.7% as Class II, III, and IV rams. Class II, III, and IV rams comprised 7.4%,

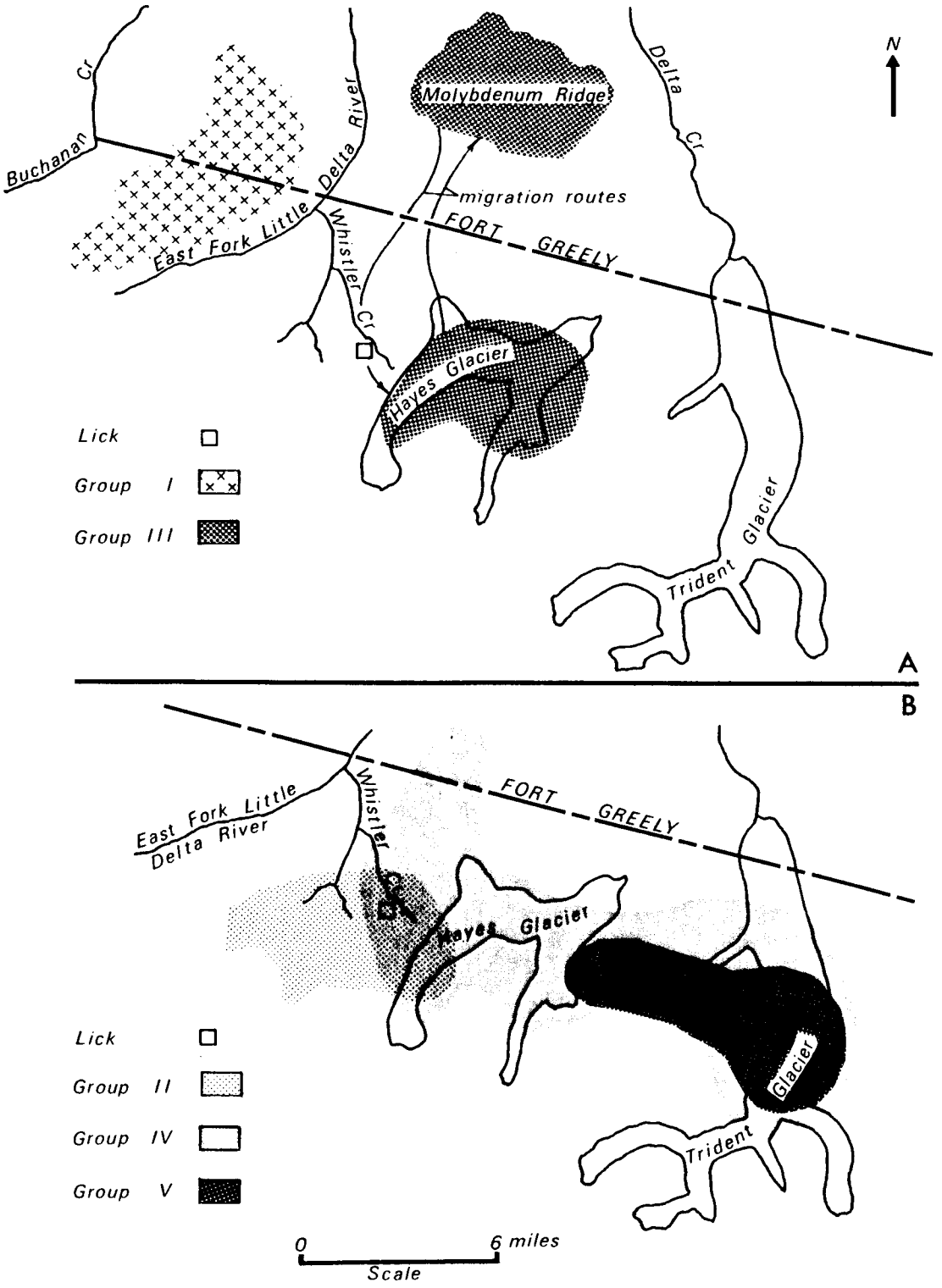

Fig. 2. Ranges of subpopulations in western half of study area, Fort Greely, Alaska, 1988–1989.

15.4%, and 4.9%, respectively, of the population sampled. This sample indicated poor lamb production (24 lambs:100 ewes). We observed no sheep between Trident Glacier and McGinnis Creek (Fig. 1).

DISCUSSION

Each of the 5 subgroups of Dall sheep in the western part of the study area (Fig. 2) contains marked individuals. Group I, with 6 marked sheep, consists of ewes and young rams that winter and summer in the mountains west of the EFLDR and cross the EFLDR only to use the Whistler Creek mineral lick. Group II, with 3 marked sheep, also consists of ewes and young rams. It winters and summers in the Whistler Creek/Hayes Glacier area. Group III (2 marked sheep) is mainly ewes. It winters on Molybdenum Ridge, moves to Whistler Creek to use the mineral lick, and then summers in the Hayes Glacier vicinity. Group IV is a ram band containing 2 marked rams and moves between Whistler Creek and Trident Glacier (19 km), the greatest distance traveled by any group. Seasonal ranges have yet to be determined for these rams. Group V, with 2 marked sheep, is a ewe and young ram band that winters and summers between Hayes Glacier and Trident Glacier. We found no evidence that Group V uses the Whistler Creek mineral lick.

There was no evidence that any of these groups moves outside the study area. Sheep were collared on the margins of the area but were never found outside it. Their main seasonal movements were toward the Whistler Creek drainage in the center of the study area, and then to their individual seasonal ranges.

We observed about 150 sheep on FGA in winter and 100 in summer (Group III wintered south of FGA). All sheep habitat on the installation warrants protection, and Molybdenum Ridge, Group III's winter range, may be essential habitat.

We recommend the Army take the following protective measures. First, vehicular traffic should be excluded from elevations above 1070 m (3500 ft) in the mountains between Buchanan Creek and Delta Creek. This will preclude destruction of alpine habitat. Second, large ground exercises spread over a large area should not occur on sheep range. Small numbers of troops may deploy in sheep habitat as if they remain within 1 m^2 at any given time. This should provide ample escape territory for any sheep frightened by men and equipment.

Anticipated annual mortality for prime age ewes is 3-6% (Watson and Heimer, 1984), but our sample was too small to make a meaningful comparison. The high annual mortality of collared ewes in this study (25%) may have been due to sheep avoiding our large, low flying tracking helicopter. There is frequent helicopter activity in this area, but Army pilots normally stay at least 500 ft above ground. One mortality was due to a fall, but the cause of the fall was unknown. Still, sheep in this area are less likely to run when approached by small helicopters such as those used in capture operations (Heimer and Mauer 1990) than are sheep in other areas.

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