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## ***MOUNTAIN GOAT MOVEMENTS STUDY***

BY

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Volume I

Project Progress Report  
Federal Aid in Wildlife Restoration  
Project W-21-1, Job No. 12.5R

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(September 1980)

JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperator: Lyman Nichols

Project No.: W-21-1                      Project Title: Big Game Investigations

Job No.: 12.5 R                      Job Title: Mountain Goat Fidelity  
to Given Areas by Season  
and Seasonal Movements

Period Covered: July 1, 1979 to June 30, 1980

SUMMARY

In August 1979, 20 mountain goats were captured in the Kenai Mountains, Alaska, using drugged darts fired from a helicopter. Radio collars were installed on all 20, which included 8 males and 12 females. One collar failed shortly after installation, but the remainder continued to operate well. A total of 18 tracking flights have been made during fall, winter and spring since collaring, and the locations of goats were plotted as observed. Five of the collared goats died during winter. Weights, measurements and physiological samples were taken upon capture, but no analyses of these data or movement data have been attempted as yet.

## BACKGROUND

One of the major concerns of game managers in Alaska is the difficulty in counting mountain goats (*Oreamnos americanus*) accurately from the air, making the assessment of populations and population changes highly questionable. Previous studies have shown that acceptable accuracy can be obtained from aerial counts conducted under suitable conditions (Ballard 1975 and Nichols In Press). However, on the Kenai it was found that goats moved considerable distances between seasonal ranges, and in so doing, crossed count areas or hunting unit boundaries. Furthermore, it was strongly suspected that at least some goats moved from area to area during midsummer when aerial counts were most practicable.

Gross movement studies were attempted by aerially dye marking goats for identification. While the marking was relatively inexpensive and successful, the method was useful only for detecting gross movements; individuals could not be identified or tracked. Also, the dyes used so far have proven too short-lived for serious movement study.

If goats do move during the summer counting season, it is apparent that counting inaccuracies will result when unknown movements occur between count areas. Increases or decreases in count results can reflect unknown movements rather than real population changes. Thus, the management biologist does not know the true population sizes within the units for which he issues hunting permits.

Therefore, it is of immediate concern to learn whether such movements are random or predictable; whether the same herds or sub-herds can be expected on a given area during part of the year, or whether their seasonal or intra-seasonal movements cannot be predicted. If movements are predictable, censuses can be interpreted properly; if unpredictable it will be necessary to establish larger count areas to include such movements. Otherwise unit management will have to be conservative to take into account the possibility of serious counting errors.

This job has been designed to determine the fidelity of goats to particular areas by time, and hence the predictability of given animals being in a given area at a given season where they may be counted each year. It has also been designed to discover major seasonal movements by the various sub-segments of the Ptarmigan Lake-Trail Glacier-King's Bay herd which has been under study, and to learn whether goats move into and out of the study area boundaries. Additional information obtained will indicate mortality causes and rates, home range size of individuals, winter range sizes, and should provide an additional check on the accuracy obtained in aerial censuses.

Since the fieldwork has been underway less than a year this report will be merely a brief summary of progress to date. No data analyses have been attempted nor have any conclusions been drawn.

#### OBJECTIVES

To determine the seasonal movements of mountain goats in the Kenai Mountains, and to assess the fidelity of goats to given areas within seasons and between years.

#### PROCEDURES

In August 1979, 20 goats were captured and equipped with radio collars (Telonics, Inc. Mesa, AZ) in the Kenai Mountains study area. They were captured by means of drugged darts fired from a Bell 206 Helicopter utilizing a Palmer Cap-Chur Gun. The drug used was M-99 (Etorphine) with the antagonist M 50-50 (Diprenorphine).

Goats were selected for capture largely by the type of terrain in which they were found. Only where it appeared reasonably certain that they could be recovered without undue danger to goats or crew were capture attempts made. The helicopter was used to herd animals away from dangerous ground after darting and before they went down. It was then landed as near as possible to the drugged goat, and the crew proceeded on foot.

Captured goats were sexed, aged by horn annuli, weighed, and standard measurements were taken. Blood, hair and rectal smear samples were collected. Radio collars and ear tags (Y-Tex Corp., Cody, Wyoming, "Lonestar" model) were affixed, horn photographs taken, and horns painted with fluorescent orange paint over a white, epoxy-paint base. Large body numbers were also spray painted on the goats' sides to aid in initial tracking and identification. The radio collars had been previously color-coded with plastic tape in various colors to aid in identification after location by radio and after body numbers faded. Finally, drugged goats were given the antagonist intravenously and allowed to recover and move away. The location of each goat collared was plotted on a 1:63,360 map.

To relocate collared goats, a Telonics programmable receiver-scanner was used in conjunction with dual, 3-element Yagi antennas attached to the lift struts of a Piper PA-18-150 Supercub airplane. Earphones were plugged into the receiver for ease in listening and the antennas wired through a switch allowing both, right only or left only, to be used. In practice, all collar frequencies were programmed into the scanner, it was set to scan and volume was turned up with antennas set on "both." When a signal was heard, the scanner was locked on and the collared animal

located by utilizing the volume as received by left or right antenna and directing the airplane towards the loudest signal until the goat was located visually or a close radio-fix obtained.

Clipboards were made up with background maps of 1:63,360 scale to cover the entire study area, and clear plastic overlays attached. Once located, each goat's location was plotted as accurately as possible on the indexed overlay; overlays could be replaced each flight or as needed, and served as a record of the location of all goats relocated each flight. An additional clipboard was utilized to hold a form for recording the sightings and any incidental notes. In all, 5 clipboards were used. I was able to handle, by myself, all flying, tracking and plotting.

A base map was constructed on a large drawing board and indexed for separate Mylar overlays for each collared goat. After each flight, the location of each goat seen was transferred from the flight maps to that individual's base-map overlay, giving a separate record of resightings of that animal over time. It is anticipated that these plots will be located according to coordinates and computerized for analyses of home ranges.

One aerial survey was conducted of the study herd on 12 and 31 May, 1980, to obtain an estimate of the percentage of yearlings in the herd to be used in future population estimates.

#### FINDINGS

The capture method worked well; out of 23 goats darted, 20 were successfully captured and collared. One was hit but escaped by climbing into low clouds. It was seen alive and active the following day. Another simply disappeared after being hit, presumably getting out of sight in a rock crevice. It was assumed to have recovered. The third to be lost showed no effect of the drug, hid under a glacier where it could be seen but not approached, and was abandoned after about 45 minutes. The dart may not have fired.

Of the 20 captured, the sex-age breakdown was as follows:

|                                |                                  |                                |                                  |                                |                                  |                               |                                 |
|--------------------------------|----------------------------------|--------------------------------|----------------------------------|--------------------------------|----------------------------------|-------------------------------|---------------------------------|
| $\frac{\text{YRL } \sigma}{1}$ | $\frac{\text{YRL } \text{♀}}{1}$ | $\frac{\text{2YR } \sigma}{1}$ | $\frac{\text{2YR } \text{♀}}{2}$ | $\frac{\text{3YR } \sigma}{2}$ | $\frac{\text{3YR } \text{♀}}{1}$ | $\frac{\text{AD } \sigma}{3}$ | $\frac{\text{AD } \text{♀}}{9}$ |
|--------------------------------|----------------------------------|--------------------------------|----------------------------------|--------------------------------|----------------------------------|-------------------------------|---------------------------------|

A detailed listing of the assigned numbers, sex and age, weight, drug dosage, radio collar frequencies, and ear tag numbers is presented in Table 1.

Location of each goat captured and collared is shown in Fig. 1. We had hoped to capture more animals in King's Bay Valley, but bad weather and early emigration by many goats made this impossible.

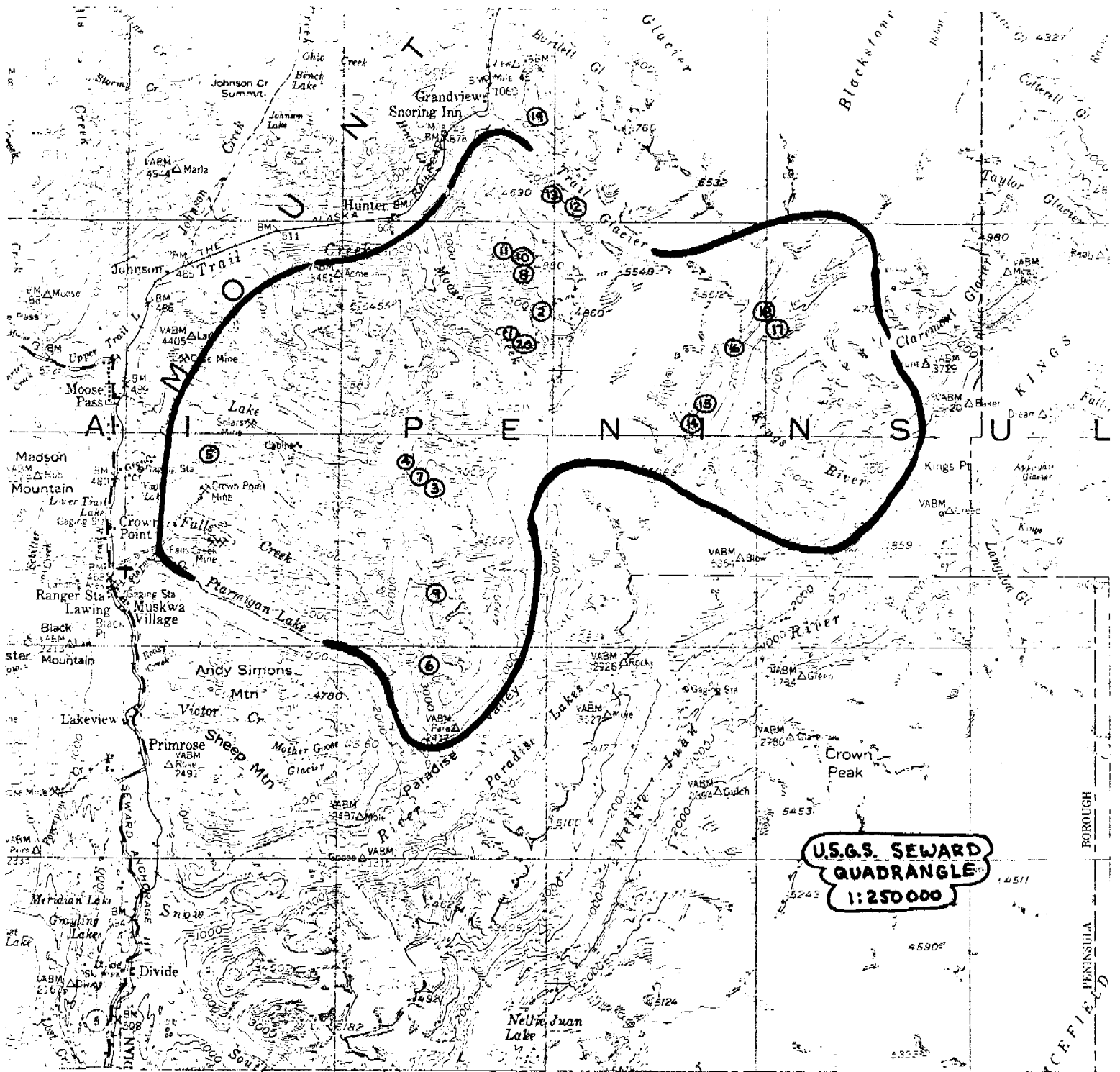
Table 1. List of Mountain goats captured in August 1979.

| Serial No. | Accession No. | Age | Sex | With Kid? | Date Captured | Collar Frequency MHz | Drug Dosage Mg | Weight Lbs. | Ear Tag No. |    | Notes  |
|------------|---------------|-----|-----|-----------|---------------|----------------------|----------------|-------------|-------------|----|--|
|            |               |     |     |           |               |                      |                |             | R           | L  |  |
| 1          | 73501         | 2   | ♀   | -         | 8/7           | 151.135              | 4.0            | 118         | -           | -  | No ear tags  |
| 2          | 73502         | 7   | ♀   | 1         | 8/7           | 151.200              | 4.0            | 166         | 2           | 1  |  |
| 3          | 73503         | 4   | ♀   | -         | 8/7           | 151.175              | 4.0            | 157         | 3           | 4  |  |
| 4          | 73504         | 2   | ♀   | -         | 8/7           | 151.295              | 4.0            | 134         | 6           | 5  |  |
| 5          | 73505         | 5   | ♂   | -         | 8/8           | 151.115              | 4.0            | 280+        | 8           | 7  | Could not lift completely for weight                               |
| 6          | 73506         | 2   | ♂   | -         | 8/10          | 151.375              | 4.0            | 162         | 9           | 10 |  |
| 7          | 73507         | 3   | ♀   | -         | 8/10          | 151.150              | 4.0            | 171         | 12          | 13 |  |
| 8          | 73508         | 9   | ♀   | 1         | 8/10          | 151.330              | 4.0            | 187         | 15          | 14 |  |
| 9          | 73509         | 8   | ♀   | -         | 8/11          | 151.400              | 4.0            | 167         | 16          | 17 |  |
| 10         | 73510         | 8   | ♀   | 2         | 8/11          | 151.215              | 4.0            | 173         | 18          | 19 |  |
| 11         | 73511         | 5   | ♀   | 1         | 8/11          | 151.075              | 4.0+2.0        | 168         | 21          | 20 | Took 2 darts to capture  |
| 12         | 73512         | 1   | ♀   | -         | 8/11          | 151.310              | 4.0            | 100         | 22          | 23 |  |
| 13         | 73513         | 10  | ♂   | -         | 8/11          | 151.225              | 15.5           | 330+        | 24          | 25 | Took 5 darts & 1 injection to capture. Could not weigh - estimated |
| 14         | 73514         | 1   | ♂   | -         | 8/12          | 151.102              | 4.0            | 122         | 27          | 26 |  |
| 15         | 73515         | 3   | ♂   | -         | 8/12          | 151.410              | 4.0            | 195         | 28          | 29 |  |
| 16         | 73516         | 7   | ♀   | 1         | 8/12          | 151.275              | 4.0            | 171         | 30          | 31 |  |
| 17         | 73517         | 3   | ♂   | -         | 8/12          | 151.350              | 4.0            | -           | 33          | 32 | Unable to weigh  |
| 18         | 73518         | 8   | ♂   | -         | 8/12          | 151.450              | 5.0            | -           | 35          | 36 | Not weighed  |

Table 1. List of Mountain goats captured in August 1979 - continued

| <u>Serial<br/>No.</u> | <u>Accession<br/>No.</u> | <u>Age</u> | <u>Sex</u> | <u>With<br/>Kid?</u> | <u>Date<br/>Captured</u> | <u>Collar<br/>Frequency MHz</u> | <u>Drug<br/>Dosage Mg</u> | <u>Weight<br/>Lbs.</u> | <u>Ear Tag No.</u> |          | <u>Notes</u> |
|-----------------------|--------------------------|------------|------------|----------------------|--------------------------|---------------------------------|---------------------------|------------------------|--------------------|----------|--------------|
|                       |                          |            |            |                      |                          |                                 |                           |                        | <u>R</u>           | <u>L</u> |              |
| 19                    | 73519                    | 5          | ♀          | 1                    | 8/12                     | 151.430                         | 4.0                       | 163                    | 34                 | 37       |              |
| 20                    | 73520                    | 6          | ♀          | 1                    | 8/12                     | 151.250                         | 4.0                       | 158                    | 38                 | 39       |              |

Fig. 1. Study area boundary and locations where goats were collared, August, 1979.





No analyses have yet been attempted of weights and measurements of captured goats, nor of blood constituents or hair samples.

Blood sera from eight captured goats were tested by the National Veterinary Services Laboratory, Ames, Iowa. No evidence of the following pathogens was found:

Brucella spp.  
Bluetongue virus  
Epizootic hemorrhagic disease virus  
Ovine progressive pneumonia virus  
Contagious ecthyma virus  
Q-fever  
Chlamydia psittaci

No other test results have been received.

Eighteen tracking flights were conducted during fall, winter and spring following radio-collaring. During most of the flights, all of the goats were located and their positions plotted. One of the collars (#6) apparently quit working a month after installation, or the goat was illegally killed and the collar removed from the area or rendered inoperative. Neither the color-coded collar nor the radio signal has been seen or heard since. All the rest have worked throughout the winter.

Five of the collared goats have died. Four apparently were killed by avalanches (#'s 2, 8, 13 and 17)--their collars are still broadcasting on "mortality" mode from under the snow. The remaining goat (#10) was either killed or found dead by a large brown bear (*Ursus arctos*) early in May 1980. The bear consumed almost the entire goat, leaving only the collar, horns, hair and a few bone scraps. The collar was still operating and was recovered.

Although seven of the adult female goats had eight kids when captured (1 set of twins), none of the kids appeared to have survived the winter; they were not seen with their nannies in early spring. Two kids may have perished with their mothers under avalanches. The twins were seen with their mother once after collaring, but never again. The other 4 kids disappeared during the winter. Winter in this area was exceptionally severe this year, having the heaviest snow pack and worst avalanche conditions ever recorded (Clagett et al. 1980).

By the last flight conducted before this paper was prepared (flown on 23 June 1980) 4 of the adult nannies had new kids. Two (#'s 3 and 7) did not have kids when collared, while two (#'s 16 and 19) did have kids last year.

No analyses of movements have been attempted at this time. Some goats have remained all winter within 1 or 2 miles of where they were collared, while others moved over 15 miles from summer range in King's Bay Valley to Grant Lake slope for winter. Little movement was noted during winter. As of this writing, at least 1 animal had returned to summer range in King's Bay Valley from Grant Lake.

During a spring aerial census of the study herd 122 goats were observed, including 21 yearlings. The yearlings thus made up 17 percent of the total seen. These data will be used in conjunction with more complete summer counts to estimate herd composition.

#### RECOMMENDATIONS

1. That radio-tracking be continued as long as radio collar batteries last.
2. That goats with collars be recaptured and recollared before present collars quit functioning to obtain approximately 4 years of movement and growth data on these individuals.
3. That 20 additional goats be radiocollared in FY-1981 to provide a larger sample of the study herd for movement study.

#### ACKNOWLEDGEMENTS

I would like to thank Al Franzmann and Ted Spraker for their generous assistance in capturing and collaring the goats. In particular, I would like to acknowledge Spraker's spectacular ride of "unlucky thirteen" down the scree to a successful and bloodless standstill. Without the expert helicopter piloting by Vern Loftstedt, of Kenai Air Alaska, Inc., the job could not have been done at all. He also chipped in and got as wet, dirty and scared as the rest of us in the actual handling of the goats among the cliffs and glaciers.

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