

PROGRESS REPORT  
KILBUCK CARIBOU STUDY  
SEPTEMBER 1985 - MAY 1988

-- POPULATIONS, MOVEMENTS AND SEASONAL DISTRIBUTION OF THE KILBUCK  
CARIBOU HERD, SOUTHWEST ALASKA

BY  
MICHAEL T. HINKES  
JUNE 1988

KEY WORDS:

Caribou  
Distribution  
Movements

Aerial Survey  
Radio-telemetry  
Home Range

Kilbuck Mountains  
Kuskokwim Mountains  
Calving

Cooperative Study Between

U.S. Fish and Wildlife Service  
Yukon Delta National Wildlife Refuge  
P.O. Box 346  
Bethel, Alaska 99559

and

Alaska Department of Fish and Game  
P.O. Box 90  
Bethel, Alaska 99559

and

U.S. Fish and Wildlife Service  
Togiak National Wildlife Refuge  
P.O. Box 270  
Dillingham, Alaska 99576



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## SUMMARY

Historically, caribou occurred on the Yukon-Kuskokwim delta in large numbers. However, with the exception of small, remnant herds in the Kilbuck Mountains and upper Andreafsky River drainage, caribou were extirpated from the region by the early 1900's.

The population status and distribution of the Kilbuck herd is poorly understood and it is unclear whether these caribou are a resident herd or are a western extension of the expanding Mulchatna herd. Although these caribou have been managed as a distinct herd, cooperative studies between the U.S. Fish and Wildlife Service (FWS) and Alaska Department of Fish and Game (ADFG) were initiated in 1985 to better understand their biology.

The current population estimate is 800-900 animals. During early winter (Oct-Dec), caribou concentrate along the lower flats and foothills of the Kilbuck and western and central Kuskokwim Mountains. In late winter (Jan-Mar), they move to high, wind-blown slopes and ridge tops in the western Kuskokwim Mountains. Peak calving occurs mid-May in the high, rugged mountain tops and ridges of the western Kuskokwim Mountains. The majority of caribou spend the summer (Jun-Aug) in the western Kuskokwim Mountains, overlapping little with their winter range. As rut approaches, Kilbuck caribou return to their winter range.

Factors influencing distribution and movements are discussed as well as seasonal changes in group size, home range and mortality.



## BACKGROUND

Historically, caribou occurred on the Yukon-Kuskokwim delta in large numbers (Skoog 1968; Alaska Department of Fish and Game 1973; Bergerud 1978) and were the most abundant ungulate in the area (Alaska Department of Fish and Game 1976). Although no reliable population estimates exist, caribou may have once numbered >100,000 (Skoog 1968). Anecdotal accounts from the mid-1800's indicate that caribou migrated across the Kuskokwim River in large numbers and were abundant throughout the Yukon-Kuskokwim delta and on Nunivak Island (Alaska Department of Fish and Game 1973; Nelson 1888). Murie (1935) reported that historically, caribou migrated southward across the Kuskokwim River between present day Bethel and Aniak and into the Kilbuck Mountains. Petroff (1884) described large numbers of caribou in the Kilbuck Mountains between the Kuskokwim and Togiak Rivers. Murie (1935) noted that caribou were "common on the tundra about the lower Yukon and Kuskokwim Rivers 25 years earlier (statement made in 1924) and were much more plentiful before that."

In the late 1800's and early 1900's, over-harvesting, competition with introduced reindeer, wildfire and/or a possible shift in migration patterns may have caused a rapid decline in the delta's caribou population (Alaska Department of Fish and Game 1973, 1976). Caribou subsequently disappeared from the region, with the exception of small, remnant herds in the Kilbuck Mountains and upper Andreafsky River drainage (Skoog 1968; Alaska Department of Fish and Game 1973). Suggested reasons for caribou surviving in these regions despite their elimination elsewhere include optimum habitat (Skoog 1968) and inaccessibility.

Caribou population status and distribution of the Kilbuck herd is poorly understood. There has been some discussion on whether they comprise a distinct, resident herd deserving of special management considerations or are a western extension of the expanding Mulchatna herd. Although they are currently managed as a distinct herd, cooperative studies were initiated in 1985 to better understand their biology.

The Kilbuck Mountain caribou study is a cooperative effort between the Yukon Delta National Wildlife Refuge (YDNWR), Alaska Department of Fish and Game (ADFG), and Togiak National Wildlife Refuge (TNWR). The purpose of this progress report is to document and summarize the results of study efforts from September 1985 - May 1988.

The Kilbuck caribou study also includes a habitat mapping and description effort. Results from this phase of the project will be reported at a later date.



## OBJECTIVE

To determine herd identity, population size, age and sex composition and seasonal distribution of caribou in the Kilbuck Mountains, southwest Alaska.

## STUDY AREA

The study area is approximately 6,400 km<sup>2</sup> and includes the southern half of the Kilbuck Mountains and the western slopes of the southwestern end of the Kuskokwim Mountains (Fig. 1). It is located 80 km east of Bethel on the eastern boundary of the YDNWR, and includes portions of the TNWR and Wood-Tikchik State Park.

## PROCEDURES

### Aerial Surveys

Aerial surveys were used to determine caribou distribution, movements, population size and composition. A periodic survey was initiated in September 1985 and regularly scheduled monthly flights were begun in February 1986. Systematic searches of the study area were made using a variety of fixed-wing aircraft (Cessna 185, Cessna 206 and PA-18 Supercub). During aerial surveys, a combination of contour and transect flying were used dependent on terrain. Following radio-collaring in March 1987, surveys were conducted in conjunction with telemetry flights, time permitting. Observations of caribou and their snow-trails were recorded directly on USGS 1:63,360 quads and information such as numbers, age/sex composition (when feasible), and other pertinent data were recorded on standardized survey forms (Fig. 2).

To aid in counting and classifying caribou, 35mm black and white photographs or color slides were taken of all large groups starting in October 1987. In general, photographs worked well for determining total group size. Unfortunately, finer resolution of population parameters from photographs was sometimes limited by poor lighting conditions, aircraft motion and varying scale. This was particularly true for discriminating between young bulls and cows and occasionally between calves and adults. Very young calves were often hidden completely by older animals.

### Radio-Collaring

Twelve caribou were captured and radio-collared during March and April 1987. Three died soon after capture (1 male, 2 females)



leaving 1 male and 8 females with active radio-collars. Radio-collars from dead caribou were recovered and used on other animals. In February 1988 an additional 7 males and 2 females were captured and collared. The radio-collars of 4 males began transmitting on mortality mode within 2 months of capture and release. Bull collars were attached loosely to account for neck-swelling during rut and it is probable that these animals were not dead, but had simply slipped their collars. Deployment and status of radio-collared caribou are listed in Table 1.

During the capture operation, caribou were first located from fixed-winged aircraft. In 1987, caribou were captured from a Bell 206B Jet Ranger Helicopter (Homer Helicopter, Homer, AK) using a dart gun and drugs. Carfentinil (3mg @ 1mg/ml) was used as the immobilizing drug on all but 1 caribou. Time between dart hit and when the animal went down ranged from 4-15 minutes ( $\bar{x}$  = 8.5 min). The antagonist, naloxone (5-6cc), was administered intravenously and/or intramuscularly. One caribou was immobilized with etorphine (M99) and took 39 minutes to go down. Diprenorphine was used to reverse the effects of etorphine, however the animal never recovered.

Caribou mortality during the 1987 operation appeared capture drug-related. The first animal was a male and could not be revived, possibly due to overheating and an insufficient amount of the antagonist. The second animal was a female who recovered after the antagonist was administered, but was found dead at the bottom of a ravine the following day. We suspected the dosage of naloxone administered was insufficient to completely counteract the effect of carfentinil thus causing the animal to fall into the ravine. The third caribou, a female immobilized with M99, possibly died of overheating. The animal was darted twice and ran a considerable distance before going down. Efforts to revive her were unsuccessful.

No drugs were used during the February 1988 capture operation. All captures were accomplished using a skid-mounted net gun on a Hughes 500D helicopter (Soloy Helicopters, Inc., Wasilla, AK). The pilot operated the net gun with a trigger mechanism inside the helicopter. Once netted, 2 members of the capture crew held the caribou while a third member attached the collar. Following collaring, the net was then untangled and the animal released. Antlers on some caribou had to be sawed off to facilitate net removal. This capture method was more efficient than darting and drugging and appeared to be less stressful on caribou. One animal broke its leg during capture and had to be destroyed.



Radio-collars were purchased from Telonics, Inc. of Mesa, Arizona. All radios transmitted in the 150-152 MHz frequency range and contained motion-sensitive mortality switches. Normal pulse frequency was approximately 60 beats/minute. When movement ceased for approximately 4 hours, the pulse doubled or tripled.

#### Radio-Telemetry

Radio-collared caribou were located using fixed-wing aircraft equipped with 2 tracking antennas; 1 clamped to each wing strut. Antenna leads were attached to a left/right switch box coupled with a radio receiver/scanner from Telonics, Inc., Mesa, Arizona. Our goal was to locate every radio-collared caribou weekly during calving (15-31 May) and monthly, thereafter. Visual contact was made for most relocations, however, flight conditions (low clouds, turbulence, etc.) occasionally allowed only triangulated locations.

#### Data Storage and Analysis

Maps and data sheets are kept on file at the YDNWR headquarters in Bethel. Caribou observation and summary data were stored on an automated data base on a Compaq 286 computer using Lotus 123 software. Basic statistics, summary tables and graphs were also generated using Lotus 123.

Home ranges were determined using the minimum convex polygon method (Eddy 1977). Calculations were made using McPAAL (Version 1.1), a software program developed by M. Stuwe and C. Blohowiak (Conservation and Research Center, National Zoological Park, Smithsonian Institution). The study area was gridded into 1,000 m<sup>2</sup> plots, each with a specific x,y coordinate. All caribou locations were plotted and the x,y coordinate recorded in the data base. All x,y coordinates were then run through McPAAL, which connected the outside point (locations) and calculated the area within, providing a rough estimate of home range.

### RESULTS AND DISCUSSION

A total of 61 aerial survey and/or radio-tracking flights were conducted in the Kilbuck Mountains between September 1985 and May 1988. During these flights, a total of 8,547 caribou were observed in 399 separate groups (Appendix I). Appendix II summarizes caribou data by month and by year. Also included is mean group size and mean elevation observed for groups of caribou and individuals. Caribou observations by radio-collar frequency are summarized in Appendix III.



### Herd Identity

Jonrowe (1979) suggested the Kilbuck herd (called the Kisaralik herd by her) was a western extension of the Mulchatna herd in Game Management Unit (GMU) 17. Shepherd (1980) stated that the range of the Mulchatna herd appeared to be changing, with caribou (presumably from the Mulchatna herd) becoming more common in eastern GMU 18 and western portions of Subunit 19A (Kuskokwim Mountains). Patten (1984) hypothesized that passes in the Kuskokwim Mountains may allow movement of the Mulchatna herd into the Kisaralik drainage. Although pilots occasionally report animal trails in the snow of some mountain passes (Jonrowe 1979), little data exist to support a direct association between the Kilbuck and Mulchatna caribou herds. Data does exist, however to support the contention that Kilbuck caribou comprise a distinct, resident herd.

Skoog (1968) defined a herd as a group of caribou that regularly use a discrete calving area. Calving by Kilbuck caribou was first documented by Patten (1984), and was observed again in 1986-1988 during this study. Calving in all 4 years occurred in the same general area of the upper Kisaralik River Drainage (Appendix IV, Map 3).

The identity of the Kilbuck herd is further supported by the movements of radio-collared animals (Appendix V). All radio-collared caribou remained in the western and central Kuskokwim and southern Kilbuck Mountains throughout the study period with no apparent overlap with the Mulchatna herd. This is not to suggest that immigration from the expanding Mulchatna herd is not occurring, only that radio-collared animals residing in the study area have remained, regardless of their original source.

### Population Size

The largest count/estimate of Kilbuck caribou ( $n \geq 685$ ) was made during the October 1987 composition survey. Comparisons between photographic and aerial counts of the same group of animals during this survey indicated that aerial counts underestimated actual numbers by as much as 28%. Not all of the groups were photographed, therefore, the actual number of caribou may have totaled  $\geq 800$  animals. If the  $\geq 93$  calves observed during May 1988 are considered, it is reasonable to assume the Kilbuck herd presently numbers 800-900 animals.

This represents a significant increase from past estimates and may be related to several factors. First, past estimates were probably low. Since 1987, collared animals have provided a means of locating groups which might have been missed during survey



efforts alone. This is particularly true for a small, low density population residing predominantly in mountainous terrain. During months of partial or no snow cover, sightability is poor, and even large groups can be missed. For example, 1 group of >100 took 4 passes with an airplane to locate, and was finally observed only because we continued to search for a radio-collared animal. There have been other occasions when visual contact could not be made with telemetry-located animals.

A second factor that may have contributed to an increased population estimate is a reduction in harvest. As a result of heavy harvest during winter and early spring 1985, caribou hunting in GMU 18 (south of the Yukon River) was closed in June 1985. Although some illegal harvest occurred in 1986, none has been documented since.

A third factor may be the immigration of caribou from the Mulchatna herd east of the Kuskokwim Mountain. Although not substantiated, the possibility cannot be ruled out.

#### Sex and Age Ratio

Sex and age composition data were collected whenever time and conditions permitted. However, many radio-tracking and survey flights were conducted in Cessna fixed-wing aircraft which often did not facilitate classification. In addition, large groups of caribou were difficult to count and classify under the best conditions. In larger groups, an effort was made to initially count all obvious bulls and calves (<1 year), with the remainder classified as cows. An obvious error occurred by lumping younger bulls with females. Photographs were used to supplement and modify aerial estimates whenever possible. At this time, there is no objective method to assess the reliability of the composition counts.

The most complete and representative composition data was collected from 3 flights in October and November 1987. During these flights 1,130 of 1,268 caribou observed were classified. Average bull: cow ratio was 26:100. This low ratio probably resulted from misclassifying young bulls with cows.

#### Calf Production and Survival

Peak calving occurred during the third week of May for 3 consecutive years (1986-1988). Initial calf production was 80 calves:100 cows in late May 1986, 82 calves:100 cows in early June 1987, and 66 calves:100 cows in late May 1988. Information on calf survival or yearling recruitment is lacking for 1986 because of the small sample of caribou classified. In 1987,



composition counts 6 months post-calving indicated a range of 12-20 calves:100 cows, a significant reduction from calving. However, this ratio is probably low because of misclassifying young bulls with cows. Calf survival for 1988 has yet to be determined.

### Seasonal Distributions and Movements

Seasonal distributions of Kilbuck caribou are based on all observations between September 1985 and May 1988. Observations are illustrated in Appendix IV (Maps 1-15) by month and season. Appendix V (Maps 1-22) illustrates the distribution and movements of radio-collared caribou by season and individual animals. Although distribution is based on information dating from September 1985, approximately 90% of the data presented has been collected since February 1987.

Winter (Oct-Mar). The major winter concentration of Kilbuck caribou differed between early winter (Oct-Dec) and late winter (Jan-Mar) (Appendix IV, Map 1). During the early winter, caribou concentrated primarily along the lower flats and foothills along the Kisaralik River, Crooked Creek and Quicksilver Creek drainages. During late winter, while some caribou were observed in the same area as early winter, most shifted in concentration further east on the upper mountain slopes and ridgetops along the southwestern portion of the Kuskokwim Mountains.

The differences in distribution between early and late winter may be related to snow. Although no quantitative data was collected, changes in snow cover were apparent. Snowfall was greatest and snow cover most complete during early winter. As winter progressed, strong winds created hard packed snow conditions. These same winds however, swept numerous mountain tops and ridges free of snow and allowed easy access to lichen-rich areas. Snowfree areas were common along the southwestern portion of the Kuskokwim and southern Kilbuck Mountains where caribou were most often observed during late winter.

Unusual winter movements were documented for 2 radio-collared caribou during 1988. In March, male 151.060 and 11 other males moved west to Eek Lake and then onto the lowlands west of Great Ridge where they remained through April (Appendix V, Map 15). Female 150.340, with 25 others, moved west of Greenstone Ridge immediately south of the Kisaralik River (Appendix V, Map 16). These observations represent the furthest west movements ever documented for the Kilbuck caribou, and are the first caribou documented on the delta lowlands since the 1800's.



Spring Movement (Apr-May) and Calving. In April, most caribou moved west out of the mountains and into the flats and foothills they occupied during early winter (Appendix IV, Map 7). Possible reasons for the shift in distribution back west may have been related to snow cover as well as the emergence of new growth vegetation. Snow cover during April remained extensive throughout the Kuskokwim Mountains (with the exception of wind swept ridges and mountain tops). At the same time, lower areas to the west on the flats and foothills along Crooked Creek, Kisaralik River and Quicksilver Creek were snow-free. In these areas new plant growth is expected to occur first.

Caribou were widely dispersed by mid-May (Appendix IV, Map 5). Bulls and some cows remained throughout the lowlands along the river drainages and in the southern Kilbuck Mountains. The rest of the herd, primarily cows (assumed pregnant) and yearlings, moved back east into the higher, rugged mountain tops and ridges of the western Kuskokwim Mountains where they calved (Appendix IV, Map 3). Specific areas included the Crooked Mountain region between Heart Lake and Kisaralik River; the region between Milk Creek and Kisaralik Lake; and between Kisaralik Lake and North Fork Lakes.

Summer (Jun-Aug). The majority of caribou summered in the Kuskokwim Mountains (Appendix IV, Map 2). Caribou present on the calving area in May remained throughout June. By the end of July most caribou moved to the eastern portions of their range between Milk Creek and the upper Kipchuk River drainage. A few caribou, including male 151.360, summered in the southern Kilbuck Mountains along the upper Quicksilver drainage.

Most caribou groups on the summer range were comprised of cows, calves and yearlings. Surveys conducted north of the Kupchuk River lead to the discovery of 4 groups of bulls. It appeared that many bulls remained separate from cows and young, however, information on the extent of their summer range is incomplete. Bulls collared in 1988 should provide further information on this component of the herd.

Fall Movement (Sep) and Rut. Fall was a period of transition with some caribou remaining on the summer grounds near Kisaralik Lake while others returned west to the lowlands and foothills (Appendix IV, Map 12). By October, and with the onset of rut, bulls and cows concentrated at lower elevations along Crooked Creek and the Kisaralik River.

Elevational Changes. Elevational changes in seasonal distribution and movements were also observed (Fig. 3). The lowest mean elevation used by Kilbuck caribou occurred October -



November, during the rut and post-rut aggregation. At this time, the range of elevations utilized was also low. As winter progressed, mean elevation increased with a peak in March as caribou utilized high wind blown mountain and ridge tops. By early spring (Apr), mean elevation utilized declined >300 m as many caribou moved to the snow-free lowlands where green vegetation first appeared. By May, mean elevation had increased again coinciding with calving in the high mountains. Variability in elevation utilized was highest during this time because bulls and some cows without calves remained at lower elevations during calving.

Post-calving (Jun) caribou dispersed from the higher elevations of the calving area. However, by midsummer caribou were again found at higher elevations where they were often observed on snow fields. It is possible this behavior was an attempt to reduce insect harassment. As summer progressed, the mean elevation continued to decline through September until caribou arrived on the lowlands for the rut.

#### Seasonal Changes in Group Size.

A group of caribou is defined as any number of caribou functioning as a unit (Davis et al. 1978). Seasonal changes in mean group size were dramatic for the Kilbuck caribou (Fig. 4, Appendix II). Maximum group size occurred during winter (Oct-Mar) with mean peaks of 91 and 114 in December and January, respectively. Average group size decreased steadily through May. Mean group size was lowest (<20 animals) from April-September. Average group size increased during rut ( $x = 38$ ). Although mean group size was relatively low compared with December and January, groups observed during this period were found in close proximity to each other (within 200-400 m) and interaction probably occurred.

The results of this study differed from studies by other investigators in Alaska and Canada during several time periods. Davis et al. (1978) found the maximum mean group size of the Fortymile herd in Alaska occurred during the post-calving period (Jun-Aug). Kilbuck caribou group size during the same period was lowest. Doll et al. (1974) found caribou from the Porcupine herd in small groups during winter. Conversely, Kilbuck caribou occurred in large groups in winter.

#### Home Range

Mean home range for 9 radio-collared caribou was 820 km<sup>2</sup> with a range of 474-1,136 km<sup>2</sup> (Appendix III). Number of relocations from which home ranges were calculated ranged from 17-26 and covered a



period of 14-15 months (Mar 1987 - May 1988). These ranges provide a rough estimate of the amount of habitat utilized. No home ranges were estimated for caribou captured during 1988 due to the small number of relocations.

#### Mortality

Little information is available on natural mortality for the Kilbuck caribou. No radio-collared caribou have yet been lost to predators. The only predation documented to date was a female caribou killed by wolves in the southern Kilbuck Mountains (Feb 1988). The wolf pack was first observed in January 1988 on a moose kill, and is thought to range over the western edge of the study area. Moose densities are low in the area and caribou may be an important component of the wolves diet.

Two grizzly bears were seen on the calving grounds in May 1988 and although no kills were observed, they may have been hunting newborn calves.

#### RECOMMENDATIONS

Kilbuck caribou comprise a distinct, resident population that is increasing in numbers and possibly expanding in range. The current study should continue to further document population parameters, movements and distribution. Recommendations include:

1. Capture and radio-collar additional bulls in February-March 1989 to replace collars lost in 1988. Bull collars should be modified to allow for neck expansion during rut and to avoid collar slippage at other times of the year.
2. A composition count should be conducted each fall using Super-cub aircraft and black and white photography to facilitate classification.
3. A short yearling count each April should be conducted to determine recruitment rates.
4. Caribou immediately east of the Kuskokwim Range (Mulchatna herd) should be radio-collared and tracked to determine their relationship to the Kilbuck herd.
5. Initiate developing a study plan designed to investigate caribou-predator (wolf and grizzly bear) relationships for the Kilbuck caribou herd.



## ACKNOWLEDGMENTS

Special thanks to project assistant Rick Ernst (FWS) who played a major role in implementing all efforts associated with this study; and Sam Patten (ADFG) for his assistance during capture, survey and radio-tracking efforts, as well as help in preparing the text. Thanks to Ken Taylor (ADFG), Lee Hotchkiss (FWS), Randy Kacyon (ADFG) and Mark Lisac (FWS) who also assisted in capture efforts. Thanks to John Morgart, Supervisory Biologist, who edited the report and made it understandable. Particular thanks are given to Yukon Delta Refuge Manager Ron Perry, ADFG Regional Supervisor John Coady and Dave Fisher, Togiak Refuge Manager who made this project possible. I would also like to acknowledge Kurt Becker, who was responsible for the initial data collection (Sep 1985-Sep 1986).

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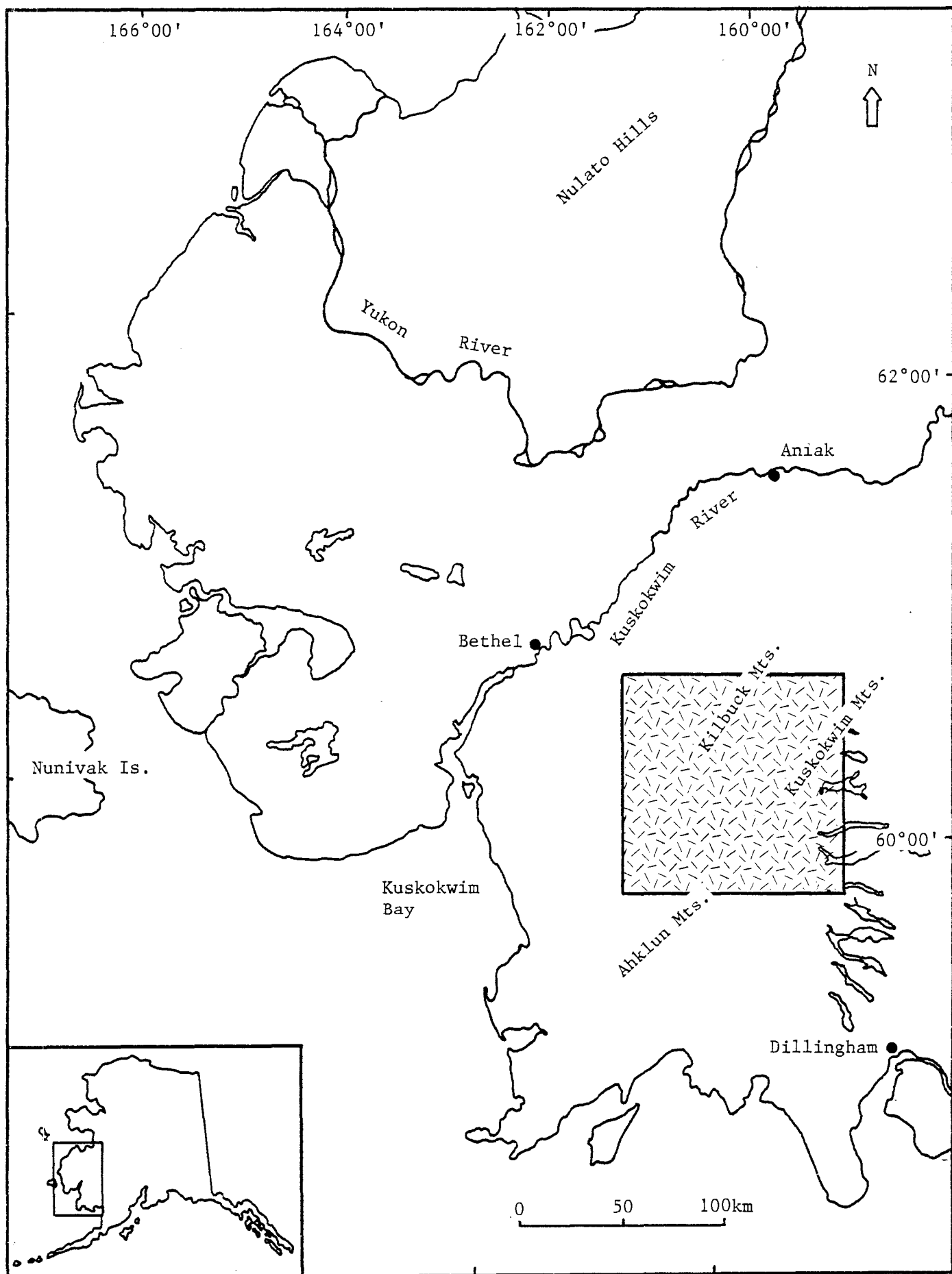


Fig. 1. Location of the Kilbuck caribou study area, southwest Alaska.



FIGURE 2.

KILBUCK CARIBOU STUDY  
AERIAL SURVEY/TRACKING FORM

DATE: \_\_\_\_\_ AIRCRAFT: \_\_\_\_\_ PILOT/OBSERVERS: \_\_\_\_\_

CLOUDS: \_\_\_\_\_ PRECIPITATION: \_\_\_\_\_ TEMPERATURE: \_\_\_\_\_ WIND: \_\_\_\_\_ TURBULENCE: \_\_\_\_\_

_____ LIGHT _____		_____ SNOW AGE AND CONDITION _____		_____ SEARCH TIME _____	
TYPE: _____	INTENSITY: _____	FRESH: _____	COMPLETE: _____	START TIME: _____	
BRIGHT: _____	HIGH: _____	MODERATE: _____	SOME VEG. SHOWING: _____	STOP TIME: _____	
FLAT: _____	MED: _____	OLD: _____	BARE GROUND SHOWING: _____		
	LOW: _____			TOTAL TIME: _____	

FREQUENCY: MALES: 151.060 150.300 150.240 151.530 151.390 150.225 151.440 FEMALES: 151.304  
151.360 150.120 150.860 150.170 150.310 150.020 151.080 151.625 150.340 150.520

REMARKS: \_\_\_\_\_

OBS.	RADIO							LOCATION				PHOTO
NO.	FREQ.	TOTAL	MALES	FEMAL	CALVE	UNCLS	ELEV	LAT	LONG	TIME	HABITAT TYPE	NUM
1											S B AT T LS TS D S	
2											S B AT T LS TS D S	
3											S B AT T LS TS D S	
4											S B AT T LS TS D S	
5											S B AT T LS TS D S	
6											S B AT T LS TS D S	
7											S B AT T LS TS D S	
8											S B AT T LS TS D S	
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22											S B AT T LS TS D S	
23											S B AT T LS TS D S	
24											S B AT T LS TS D S	
25											S B AT T LS TS D S	



Figure 3. Mean elevation by month of caribou observations in the Kilbuck Mountains, southwest Alaska, September 1985 - May 1988, n = 8547.

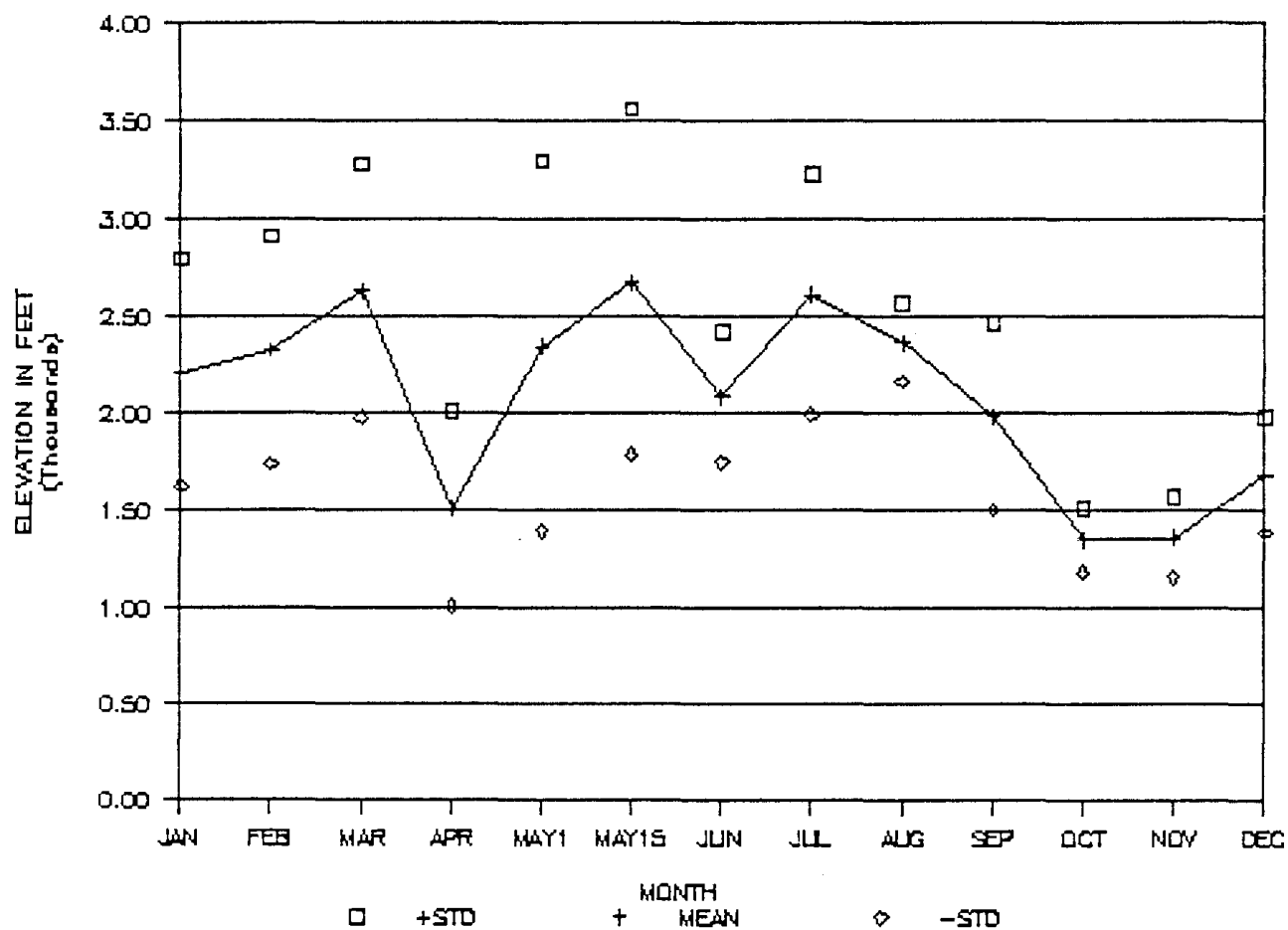




Figure 4. Mean monthly group size ( $n = 399$ ) of caribou in the Kilbuck Mountains, southwest Alaska, September 1985 - May 1988.

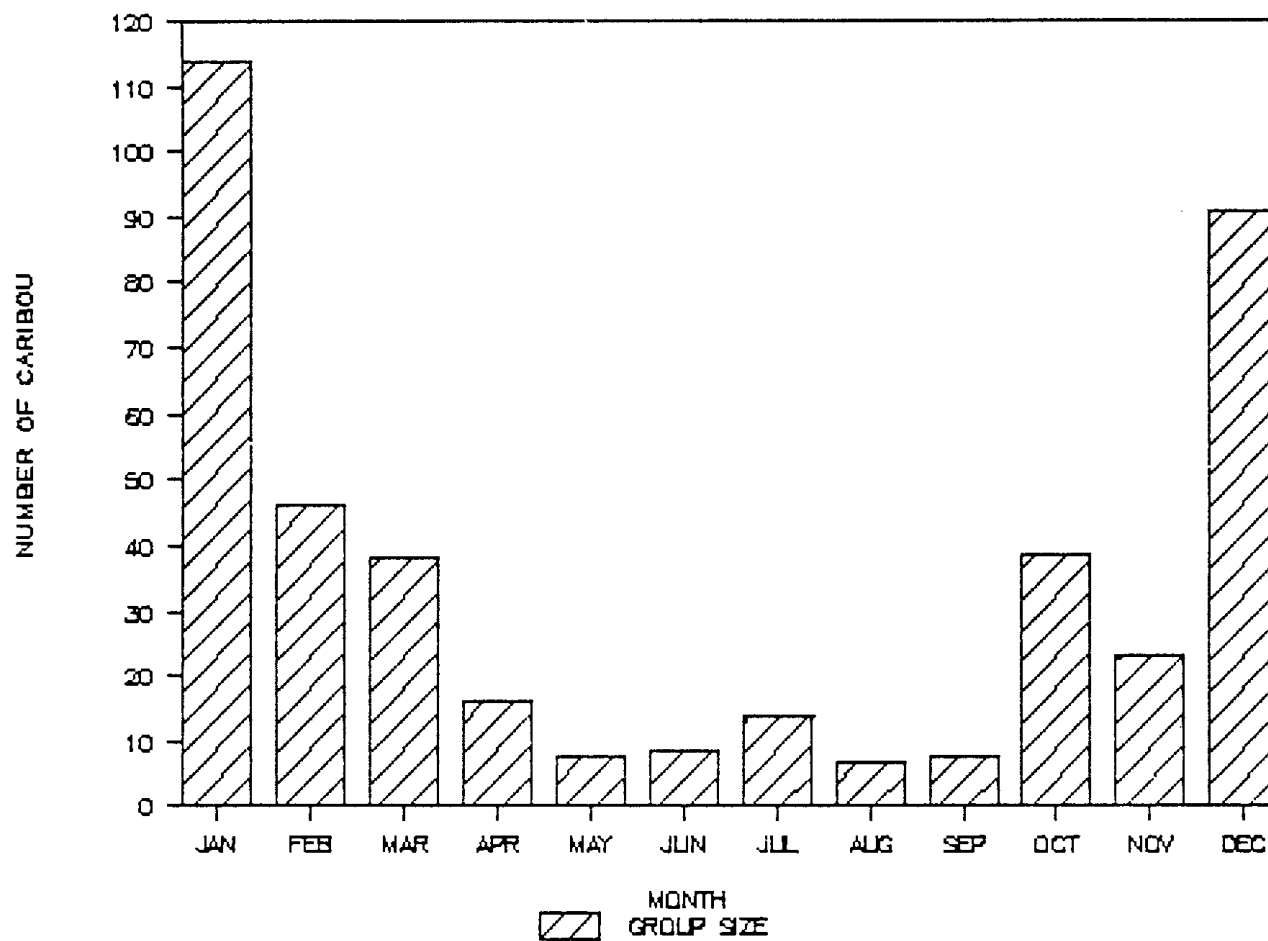




Table 1. Deployment and current status of radio collars on adult caribou in the Kilbuck Mountains, southwest Alaska, March 1987 - May 1988.

Collar Frequency	Visual Collar	Sex	Capture Date	Capture Method	Drugs Used	Comments and current status
	None	M	25Mar87	Dart gun	Carfentinil,3mg Naloxone,6cc	Died 25Mar87; capture mortality; Collar recovered 16Apr87
151.304	None	F	25Mar87	Dart gun	Carfentinil,3mg Naloxone,6cc	Still alive; transmitting
	None	F	25Mar87	Dart gun	Carfentinil,3mg Naloxone,5cc	Died 25Mar87; capture mortality; Collar recovered 15Apr87
151.360	None	M	13Apr87	Dart gun	Carfentinil Naloxone	Still alive; transmitting
	None	F	13Apr87	Dart gun	Etorphine Diprenorphine	Died 13Apr87; capture mortality; Collar recovered 15Apr87
150.120	None	F	15Apr87	Dart gun	Carfentinil Naloxone	Still alive; transmitting
150.860	None	F	15Apr87	Dart gun	Carfentinil Naloxone	Still alive; transmitting
150.170	None	F	15Apr87	Dart gun	Carfentinil Naloxone	Still alive; transmitting
150.310	None	F	15Apr87	Dart gun	Carfentinil Naloxone	Still alive; transmitting
150.020	None	F	15Apr87	Dart gun	Carfentinil Naloxone	Still alive; transmitting
151.080	None	F	15Apr87	Dart gun	Carfentinil Naloxone	Still alive; transmitting
151.625	None	F	15Apr87	Dart gun	Carfentinil Naloxone	Still alive; transmitting
151.530	Black #48 on orange	M	25Feb88	Net gun	None	Still alive; transmitting
150.300	Yellow #44 on green	M	25Feb88	Net gun	None	Slipped collar 22Mar88
150.340	None	F	25Feb88	Net gun	None	Still alive; transmitting
150.240	None	M	25Feb88	Net gun	None	Still alive; transmitting
151.440	None	M	25Feb88	Net gun	None	Slipped collar 29Feb88
151.060	Yellow #27 on green	M	25Feb88	Net gun	None	Still alive; transmitting
151.390	Yellow #12 on green	M	26Feb88	Net gun	None	Still alive; transmitting
150.225	Black #67 on yellow	M	26Feb88	Net gun	None	Slipped collar 22Mar88
150.520	None	F	26Feb88	Net gun	None	Still alive; transmitting



Appendix I. Observations of Kilbuck caribou, southwest Alaska, September 1985 - May 1988.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
1	17	SEP	85	3	3				1900	89	124					
2	17	SEP	85	28	1			27	2150	114	85					
3	17	SEP	85	1	1				2100	87	100					
4	17	SEP	85	5	5				1900	96	121					
5	17	SEP	85	4	1	2	1		1600	88	97					
6	17	SEP	85	5	2	2	1		1750	90	113					
7	20	SEP	85	11	5	3	1	2	2350	94	90					
8	20	SEP	85	2	1	1			2250	74	81					
9	3	FEB	86	46				46	2500	99	119					
10	13	FEB	86	11	2	7	2		1300	93	95					
11	1	MAR	86	93				93	2000	85	96					
12	1	MAR	86	3	1	2			2250	93	118					
13	3	APR	86	28				28	2400	106	95					
14	3	APR	86	5				5	1400	83	97					
15	3	APR	86	14			1	13	2000	89	120					
16	7	APR	86	7	2	4	1		1500	88	91					
17	16	APR	86	33				33	2700	100	90					
18	22	APR	86	11				11	1000	74	85					
19	6	MAY	86	18			2	16	2600	99	121					
20	8	MAY	86	7	6	1			1000	82	100					
21	15	MAY	86	11		10		1	1700	110	88					
22	15	MAY	86	4		2		2	1700	99	67					
23	15	MAY	86	4		2	2		3000	100	68					
24	15	MAY	86	4		2	2		3000	99	69					
25	15	MAY	86	2		1	1		3500	100	70					
26	15	MAY	86	1		1			2800	96	71					
27	15	MAY	86	6		4	2		3000	101	75					
28	15	MAY	86	2		1	1		3500	100	71					
29	15	MAY	86	9		5	4		2800	99	75					
30	15	MAY	86	8		4	4		3100	101	73					
31	15	MAY	86	2		1	1		3500	98	78					
32	15	MAY	86	6		3	3		3600	101	75					
33	15	MAY	86	2		1	1		2900	98	78					
34	15	MAY	86	2		1	1		3500	96	80					
35	21	MAY	86	2		1	1		3300	103	85					
36	21	MAY	86	13		7	6		3800	102	72					
37	21	MAY	86	2		1	1		3200	99	76					
38	21	MAY	86	17		9	8		3300	97	80					
39	21	MAY	86	1		1			2900	93	90					
40	21	MAY	86	1		1			3000	99	89					
41	16	JUN	86	3	2			1	1500	104	93					
42	16	JUN	86	12		7	5		1700	112	91					
43	16	JUN	86	2		1	1		2500	113	89					
44	16	JUN	86	16	1	12	3		2200	112	79					
45	16	JUN	86	1		1			2400	99	70					
46	16	JUN	86	2		1	1		3000	98	87					
47	16	JUN	86	4	4				2400	101	85					
48	17	JUN	86	2		2			1600	104	118					
49	17	JUN	86	2		1	1		1500	96	109					
50	20	JUN	86	10	1			9	2300	112	112					
51	20	JUN	86	2	2				2000	106	93					
52	26	JUL	86	7		4	3		2200	122	92					
53	30	JUL	86	3	3				2000	116	102					
54	30	JUL	86	27			4	23	2500	112	110					
55	30	JUL	86	25			3	22	2500	109	111					



## Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncs.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
56	25	AUG	86	14			3	11	2200	105	104					
57	25	AUG	86	12	4	6	2		2300	110	106					
58	25	AUG	86	6		4	2		2300	111	107					
59	25	AUG	86	5				5	2500	111	108					
60	25	AUG	86	5	1	1	1	2	2300	110	109					
61	25	AUG	86	3	2			1	3000	112	109					
62	25	AUG	86	6	6				2300	110	117					
63	25	AUG	86	3	3				2000	102	117					
64	25	AUG	86	1	1				2500	103	118					
65	25	AUG	86	3	3				1800	98	115					
66	25	AUG	86	3	3				2200	98	118					
67	19	AUG	86	2	2				2500	118	101					
68	19	AUG	86	28				28	2500	113	97					
69	19	AUG	86	2		1	1		2500	115	101					
70	16	SEP	86	1	1				1500	102	98					
71	16	SEP	86	7	2	3	2		1600	110	92					
72	16	SEP	86	1	1				2800	113	94					
73	16	SEP	86	27	5		1	21	2900	112	96					
74	16	SEP	86	6		4	1	1	2500	107	96					
75	16	SEP	86	2	2				2400	109	99					
76	16	SEP	86	2	2				2300	111	111					
77	16	SEP	86	21	8	2	2	9	2200	109	111					
78	16	SEP	86	2	2				2900	101	120					
79	16	SEP	86	9	9				2200	94	120					
80	16	SEP	86	1	1				2300	98	91					
81	16	SEP	86	7	2	3	2		2900	100	90					
82	16	SEP	86	1	1				2900	104	87					
83	16	SEP	86	1	1				2800	103	88					
84	16	SEP	86	7	3		1	3	1700	109	87					
85	16	SEP	86	3	3				1900	106	82					
86	16	SEP	86	1	1				2000	112	87					
87	16	SEP	86	8	6	1	1		2400	112	88					
88	16	SEP	86	33				33	1900	118	84					
89	16	SEP	86	18	3			15	1700	111	90					
90	16	SEP	86	5				5	1800	109	82					
91	16	SEP	86	14	2		3	9	2700	101	76					
92	16	SEP	86	2		1	1		2100	96	83					
93	16	SEP	86	1	1				2800	96	85					
94	16	SEP	86	1	1				2600	80	104					
95	16	SEP	86	3	3				2700	97	88					
96	16	SEP	86	4	1	2	1		2600	95	90					
97	22	OCT	86	160				160	1600	108	102					
98	4	FEB	87	39	2			37	2300	97	68					
99	4	FEB	87	80				80	2500	106	95					
100	4	FEB	87	35				35	1300	87	110					
101	9	FEB	87	7	1			6	1300	90	94					
102	9	FEB	87	280				280	1800	90	103					
103	2	MAR	87	120				120	2250	84	111					
104	25	MAR	87	20	20				1750	81	116					
105	25	MAR	87	150				150	2800	100	91					
106	25	MAR	87	100				100	3100	100	88	151.304				
107	26	MAR	87	1		1			1500	92	71	151.304				
108	1	APR	87	1		1			1200	87	87	151.304				
109	6	APR	87	1		1			1750	86	98	151.304				
110	7	APR	87	12		1		11	1650	86	100	151.304				



## Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
111	7	APR	87	80				80	1300	90	95					
112	13	APR	87	3		1		2	1750	86	100	151.304				
113	13	APR	87	13				13	2400	83	107					
114	13	APR	87	100	1	1		98	1500	104	93	151.360				
115	15	APR	87	15	1			14	1750	93	120	151.360				
116	15	APR	87	11				11	1350	84	83					
117	15	APR	87	12		1		11	1250	88	92	150.120				
118	15	APR	87	8		1		7	1500	83	107	151.304				
119	15	APR	87	60		3		57	1300	91	73	150.170	150.860	150.310		
120	15	APR	87	1		1			1500	85	80	150.020				
121	15	APR	87	6		1		5	1000	74	87	151.080				
122	15	APR	87	15				15	1100	82	88					
123	15	APR	87	1		1			1250	89	93	151.625				
124	24	APR	87	9		1		8	1150	82	102	151.304				
125	24	APR	87	1		1			1000	77	89	150.120				
126	24	APR	87	1		1			1000	78	84	150.170				
127	24	APR	87	11		1		10	1250	88	93	150.860				
128	24	APR	87	1		1			2200	91	87	150.310				
129	24	APR	87	13		1		12	1500	90	97	151.080				
130	24	APR	87	2		2			2500	96	89	151.625				
131	24	APR	87	1		1			875	68	80	150.020				
132	24	APR	87	24	1			23	1500	79	92	151.360				
133	7	MAY	87	1		1			1350	89	85	150.310				
134	7	MAY	87	13		2		11	1150	84	89	150.020	150.170			
135	7	MAY	87	9		1		8	1400	82	91	150.860				
136	7	MAY	87	9	1			8	1400	91	110	151.360				
137	7	MAY	87	35		1		34	3300	116	99	151.304				
138	7	MAY	87	1		1			4100	103	84	151.625				
139	7	MAY	87	2		2			3600	115	96	150.120	151.080			
140	15	MAY	87	2		1	1		3500	112	94					
141	15	MAY	87	5		3	2		3000	113	94	151.080				
142	15	MAY	87	2		1	1		4000	117	99					
143	15	MAY	87	10		2	1	7	3200	117	98	151.304	150.120			
144	15	MAY	87	1		1			3500	104	88	151.625				
145	15	MAY	87	1		1			1400	88	95	150.860				
146	15	MAY	87	8		1		7	1700	100	110	150.020				
147	15	MAY	87	11		1	1	9	2000	109	73	150.170				
148	15	MAY	87	1		1			2500	95	79	150.310				
149	15	MAY	87	8	1			7	1000	79	101	151.360				
150	10	JUN	87	3		1		2	2400	95	89	151.304				
151	10	JUN	87	6	1	1		4	2000	97	117	151.360				
152	10	JUN	87	17		6	6	5	2700	109	100	150.120				
153	10	JUN	87	1		1			3000	108	95	150.170				
154	10	JUN	87	7		3	3	1	1500	98	109	150.860				
155	10	JUN	87	60		21	21	18	2000	115	101	150.020	151.080			
156	10	JUN	87	1		1			3000	112	94	151.625				
157	11	JUN	87	17		6	6	5	2000	109	108	150.310				
158	11	JUN	87	4	1	3			1500	96	105	151.360				
159	9	JUL	87	4	1	3			1800	95	120	151.360				
160	9	JUL	87	18	1	2	2	13	3000	110	98	151.080				
161	9	JUL	87	2		1	1		2200	109	100					
162	9	JUL	87	28		8	8	12	1600	116	82	151.625	151.304	150.860		
163	9	JUL	87	18		2	2	14	2600	114	79	150.170				
164	9	JUL	87	40		5	5	30	2200	110	75					
165	9	JUL	87	32		4	4	24	2300	109	74					



## Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
166	9	JUL	87	28		8	8	12	2400	111	74					
167	9	JUL	87	19		6	6	7	2000	117	78	150.310				
168	9	JUL	87	9	2	1		6	1650	117	87	150.120				
169	9	JUL	87	19		2	2	15	1950	112	86	150.020				
170	9	JUL	87	46	2	5	5	34	3200	112	112					
171	9	JUL	87	1	1				2350	85	115					
172	31	JUL	87	15		2	2	11	4300	99	74	151.304				
173	31	JUL	87	1	1				1500	91	117	151.360				
174	31	JUL	87	9	1	1		7	2400	108	100	150.120				
175	31	JUL	87	7		1		6	2400	100	71	150.860				
176	31	JUL	87	4		2	2		2800	96	75	150.170				
177	31	JUL	87	3		2	1		3000	112	74	150.310				
178	31	JUL	87	33		4	4	25	3100	115	96	150.020				
179	31	JUL	87	1		1			2000	111	89	151.080				
180	31	JUL	87	2		1	1		3500	98	84	151.625				
181	31	JUL	87	11		3	3	5	3000	96	85					
182	31	JUL	87	35	9	7	7	12	4000	110	106					
183	31	JUL	87	10		1	1	8	2800	112	75					
184	31	JUL	87	2		1	1		3000	112	74					
185	31	JUL	87	12		2	2	8	2500	113	74					
186	31	JUL	87	1				1	2100	109	74					
187	31	JUL	87	12	1	9	2		3000	99	84					
188	31	JUL	87	7				7	2500	111	94					
189	31	JUL	87	9		2	2	5	2900	112	94					
190	31	JUL	87	10		2	2	6	2900	111	98					
191	31	JUL	87	10	10				2000	121	128					
192	31	JUL	87	26	1			25	2000	120	125					
193	31	JUL	87	6	6				1800	121	123					
194	31	JUL	87	30	30				2100	121	122					
195	31	JUL	87	35		25	10		3000	110	106					
196	31	JUL	87	6		3	3		2500	109	105					
197	31	JUL	87	7	7				2500	118	101					
198	31	JUL	87	2		1	1		3000	121	93					
199	31	JUL	87	9	1	4	4		2500	121	92					
200	31	JUL	87	1	1				1400	91	93					
201	8	SEP	87	5		5			1400	89	90	151.304				
202	8	SEP	87	32		20	6	6	1600	92	102	150.860	151.080	150.120		
203	8	SEP	87	13		11	2		1650	89	102	150.170				
204	8	SEP	87	1		1			1250	110	87	150.310				
205	8	SEP	87	11		5		6	2500	109	97	150.020				
206	8	SEP	87	1		1			2100	107	80	151.625				
207	8	SEP	87	8	3	5			1500	110	88					
208	8	SEP	87	6				6	1350	97	97					
209	9	SEP	87	7	4	3			1400	99	96					
210	9	SEP	87	31	3	24	4		1600	106	88					
211	10	SEP	87	14		7		7	1250	87	93					
212	10	SEP	87	8		4		4	1350	88	94					
213	10	SEP	87	6				6	1300	91	93					
214	10	SEP	87	2	2				1700	113	122					
215	11	SEP	87	1	1				1750	91	121	151.360				
216	11	SEP	87	7		3		4	1600	111	92					
217	11	SEP	87	2	2				1800	113	90					
218	26	OCT	87	109	27	39	10	33	1450	80	83	151.304				
219	26	OCT	87	111	10	64	6	31	1400	92	98	150.120	150.310			
220	26	OCT	87	100	25	68	7		1250	79	83	150.860	150.170	151.080		



## Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
221	26	OCT	87	22	6	16			1000	72	75	150.020				
222	26	OCT	87	52	7	41	4		1200	84	89	151.625				
223	26	OCT	87	14		2	2	10	1300	83	83					
224	26	OCT	87	9	2	6	1		1250	79	82					
225	26	OCT	87	9				9	1250	79	82					
226	26	OCT	87	60	7	51	2		1150	86	87					
227	26	OCT	87	14	7	5	2		1150	82	88					
228	26	OCT	87	19	3	16			1150	83	88					
229	26	OCT	87	7	4	2	1		1200	86	89					
230	26	OCT	87	9	2	7			1300	86	91					
231	26	OCT	87	19	1	16	2		1300	90	93					
232	26	OCT	87	15				15	1300	88	93					
233	26	OCT	87	7	5	2			1250	90	94					
234	26	OCT	87	6	2	4			1250	91	94					
235	26	OCT	87	29	3	23	3		1300	92	96					
236	26	OCT	87	20	8	12			1250	93	97					
237	26	OCT	87	1	1				1200	91	96					
238	26	OCT	87	53	9	36	8		1150	86	88					
239	16	NOV	87	17	4	11	2		900	71	87	150.170				
240	16	NOV	87	1		1			1600	82	80					
241	16	NOV	87	26	4	21	1		1400	84	81					
242	16	NOV	87	4	1	3			1350	84	82					
243	16	NOV	87	17	3	13	1		1250	88	82	151.304				
244	16	NOV	87	1	1				1300	89	76					
245	16	NOV	87	65	18	41	6		1300	89	78	150.310	150.120			
246	16	NOV	87	22	1	17	4		1300	89	80					
247	16	NOV	87	100	7	85	8		1500	82	83	150.020				
248	16	NOV	87	33	8	20	5		1400	83	83					
249	16	NOV	87	17	9	5	3		1100	78	90	151.360				
250	16	NOV	87	6	1	4	1		1150	79	91					
251	16	NOV	87	18	4	11	3		1150	72	84					
252	16	NOV	87	9	3	4	2		1000	72	76	150.860				
253	19	NOV	87	70	7	48	5	10	1150	85	88	151.625				
254	19	NOV	87	87	14	38	7	28	1600	79	93					
255	19	NOV	87	6	6				1500	79	96					
256	19	NOV	87	12	2	6	4		1300	79	95					
257	19	NOV	87	8		4	4		1400	81	94	151.080				
258	19	NOV	87	5		5			1500	78	83					
259	19	NOV	87	1	1				2100	93	72					
260	19	NOV	87	22		18	4		1750	93	92					
261	19	NOV	87	10		7	3		1250	86	95					
262	19	NOV	87	24	1	21	2		1050	86	94					
263	19	NOV	87	2				2	1000	77	101					
264	11	DEC	87	55				55	2000	82	102					
265	11	DEC	87	75				75	1450	83	101					
266	11	DEC	87	20				20	1250	83	102					
267	11	DEC	87	189	29	85	10	65	2000	86	100					
268	16	DEC	87	216	43	161	12		1600	97	100	150.120	150.310	150.860	150.170	
269	16	DEC	87	148	40	94	9	5	1250	83	92	151.304	150.020	151.625		
270	16	DEC	87	3	1	2			1000	84	100	151.360				
271	16	DEC	87	53	5	15	13	20	1400	93	110					
272	16	DEC	87	129	19	72	8	30	2000	82	108	151.080				
273	16	DEC	87	21	4	15	2		1650	80	93					
274	15	JAN	88	15		1		14	2300	100	84	151.080				
275	15	JAN	88	317		5		312	2300	104	97	150.860	150.170	150.310	151.625	150.120



## Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
276	15	JAN	88	42				42	1450	102	99					
277	15	JAN	88	157		2		155	1300	87	81	151.304	150.020			
278	15	JAN	88	15	1	5	2	7	1250	88	81					
279	15	JAN	88	64	4	19	4	37	1700	91	80					
280	15	JAN	88	19	6	11		2	2100	93	72	151.360				
281	15	JAN	88	7		4		3	1800	94	69					
282	27	JAN	88	360	21	30	11	298	2800	95	81	150.860	150.120	150.170	150.310	151.625
283	27	JAN	88	181	21	53	10	97	1700	92	105	151.304	150.020			
284	27	JAN	88	73		2		71	3200	97	72	151.080	151.360			
285	2	FEB	88	42	9	9		24	1500	86	83					
286	25	FEB	88	17	2			15	2400	93	82	150.300	151.440			
287	25	FEB	88	50	1	2		47	2600	98	87	150.340	150.240			
288	25	FEB	88	9	1			8	2400	93	82	151.060				
289	25	FEB	88	235	1			234	2050	97	76	151.530				
290	25	FEB	88	20				20	2700	98	93					
291	26	FEB	88	50	1			49	3100	96	78	151.390				
292	26	FEB	88	8	8				2000	94	72	150.225				
293	26	FEB	88	12	1			11	2000	93	72	151.530				
294	26	FEB	88	25				25	1350	91	72					
295	26	FEB	88	6		3	2	1	2500	94	86	150.520				
296	29	FEB	88	24	1			23	2400	93	75	151.390				
297	29	FEB	88	11	3			8	2800	95	74	150.225				
298	29	FEB	88	8				8	2300	94	73					
299	29	FEB	88	10		1		9	2300	96	74	150.520				
300	29	FEB	88	22	2	1		19	2700	96	73	151.360	150.240			
301	29	FEB	88	108		1		107	2700	96	78	150.120				
302	29	FEB	88	25	3			22	3100	96	80					
303	29	FEB	88	188	1	3		184	3300	100	73	151.080	151.625	151.530	150.170	
304	29	FEB	88	11	11				1050	63	80	151.060				
305	29	FEB	88	2		2			2500	108	96	151.304	150.020			
306	29	FEB	88	1		1			2500	100	85	150.310				
307	29	FEB	88	1	1				1600	84	98	151.440				
308	21	MAR	88	22	1			21	2300	93	76	151.530				
309	21	MAR	88	36	1	2		33	2400	94	85	150.520	150.310	150.170		
310	21	MAR	88	2		2			2600	96	90	150.120	151.080			
311	21	MAR	88	22		1		21	3700	100	83	150.860				
312	21	MAR	88	1		1			2200	98	81	151.625				
313	22	MAR	88	53		2		51	3800	108	97	151.304	150.020			
314	22	MAR	88	11	1			10	2550	95	85	151.390				
315	22	MAR	88	101	1	2		98	2900	96	84	150.240	150.120	151.080		
316	22	MAR	88	13		1		12	3200	97	84	150.310				
317	22	MAR	88	24				24	2900	95	72					
318	22	MAR	88	26		1		25	850	61	109	150.340				
319	22	MAR	88	12	12				450	49	55	151.060				
320	22	MAR	88	28	2	5	2	19	3000	96	91	151.360				
321	22	MAR	88	1	1				3100	107	99	150.300				
322	22	MAR	88	1	1				2000	84	113	150.225				
323	5	APR	88	26		1		25	1650	67	118	150.340				
324	5	APR	88	11	11				300	49	55	151.060				
325	25	APR	88	9	1			8	500	49	55	151.060				
326	25	APR	88	20		1		19	750	61	111	150.340				
327	25	APR	88	11		1		10	1100	85	90	150.860				
328	25	APR	88	17		1		16	2000	91	89	150.170				
329	25	APR	88	14		1		13	950	68	87	151.304				
330	3	MAY	88	1	1				1750	72	88	151.360				



## Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
331	3	MAY	88	1	1				3000	97	73	151.390				
332	16	MAY	88	3		2	1		3900	105	86	151.625				
333	16	MAY	88	2				2	3600	98	83					
334	16	MAY	88	4		2	2		3000	100	81					
335	16	MAY	88	8		5	3		3100	99	82	150.310				
336	16	MAY	88	1		1			2200	80	82	150.240				
337	16	MAY	88	12		8	4		4100	113	96	151.304				
338	16	MAY	88	17		5	5	7	2500	112	97	150.120				
339	16	MAY	88	2		1	1		3600	113	97					
340	16	MAY	88	9		5	4		2800	114	97					
341	16	MAY	88	1		1			2500	109	99					
342	16	MAY	88	3		2	1		2200	106	97					
343	16	MAY	88	17		2	2	13	2600	107	100	150.020				
344	16	MAY	88	2		1	1		2700	107	99					
345	16	MAY	88	6				6	2900	105	95					
346	16	MAY	88	5				5	3200	106	96					
347	16	MAY	88	6		4	2		3500	107	95	150.170				
348	16	MAY	88	1		1			3800	111	97	151.080				
349	16	MAY	88	10		1		9	1400	93	108	150.860				
350	16	MAY	88	1	1				1200	77	120	151.060				
351	16	MAY	88	8	8				725	66	109	151.530				
352	16	MAY	88	24	15	1		8	825	68	109	150.340				
353	16	MAY	88	5				5	750	69	110					
354	16	MAY	88	8				8	2200	112	99					
355	16	MAY	88	1		1			2700	112	85	150.520				
356	16	MAY	88	2		1	1		3600	112	95					
357	16	MAY	88	5				5	1600	105	101					
358	19	MAY	88	1		1		?	2700	112	85	150.520				
359	19	MAY	88	2		1	1		3100	117	92					
360	19	MAY	88	29		19	10		3400	116	99					
361	19	MAY	88	7		4	3		3600	113	99					
362	19	MAY	88	10		5	5		3700	113	97					
363	19	MAY	88	5		3	2		3100	113	94					
364	19	MAY	88	69		41	28		3500	108	95	151.080	151.304	150.170		
365	19	MAY	88	14		8	6		3000	108	94					
366	19	MAY	88	2		1	1		3000	107	94					
367	19	MAY	88	18		14	4		3200	106	96					
368	19	MAY	88	4		3	1		2300	104	98	150.120	(WITH CALF)			
369	19	MAY	88	3		2	1		2700	105	98	150.020				
370	19	MAY	88	1		1			3000	107	99					
371	19	MAY	88	2		1	1		2500	115	101					
372	19	MAY	88	11	5			6	1200	73	101	151.530				
373	23	MAY	88	10		5	5		3100	103	87	151.625				
374	23	MAY	88	13		7	6		3600	99	84	150.310				
375	23	MAY	88	4		2	2		3700	113	78					
376	23	MAY	88	11		7	4		3500	115	80					
377	23	MAY	88	2		1	1		3400	115	83					
378	23	MAY	88	4		2	2		3400	115	84					
379	23	MAY	88	2		1	1		2900	114	87					
380	23	MAY	88	2		1	1		3400	112	88	150.520				
381	23	MAY	88	5		1		4	2500	111	88					
382	23	MAY	88	4		2	2		2700	98	92					
383	23	MAY	88	19		3	3	13	2300	95	88	151.304				
384	23	MAY	88	3		2	1		2600	94	79					
385	23	MAY	88	2		1	1		3000	94	75					



Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncs.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
386	23	MAY	88	9				9	750	59	106					
387	25	MAY	88	1		1			2800	97	73					
388	25	MAY	88	43		30	13		2600	95	85	151.304	150.310			
389	25	MAY	88	35		13	13	9	2600	99	92	150.170				
390	25	MAY	88	1		1		?	3500	97	85	151.625				
391	25	MAY	88	1		1		?	3400	100	88	150.020				
392	25	MAY	88	10	10				1000	66	76	150.240				
393	25	MAY	88	5	3		0	2	1650	88	110	151.530				
394	25	MAY	88	4			0	4	1800	97	101					
395	25	MAY	88	7		1	0	6	1800	96	102	150.860				
396	25	MAY	88	2	2				1900	97	101					
397	25	MAY	88	18				18	2500	104	98					
398	25	MAY	88	4	4				650	72	127	151.060				
399	25	MAY	88	13			0	13	1050	76	118	150.340				



Appendix II. Observations of Kilbuck caribou by month and by year, southwest Alaska, September 1985 - May 1988.

Summary - Years 1985 - 1988.

	Total	Males	Females	Calves	Unclass.	Groups	Avg size	Std	Avg elev	Std	% Calves
JAN	1250	53	132	27	1038	11	114	120	2206	584	2.2%
FEB	1383	51	30	4	1298	30	46	68	2322	589	0.3%
MAR	840	41	20	2	777	22	38	44	2625	652	0.2%
APR	608	17	31	2	558	38	16	21	1500	499	0.3%
MAY	820	58	309	191	262	109	8	10	2631	904	23.3%
JUN	172	12	68	47	45	20	9	13	2051	390	27.3%
JUL	642	78	125	101	338	46	14	12	2603	630	15.7%
AUG	93	25	12	9	47	14	7	7	2358	206	9.7%
SEP	402	95	113	30	164	52	8	9	1976	453	7.5%
OCT	845	129	410	48	258	22	38	43	1340	279	5.7%
NOV	583	95	383	65	40	25	23	27	1354	205	11.1%
DEC	909	141	444	54	270	10	91	71	1675	297	5.9%
TOTAL	8547	795	2077	580	5095	399					

Summary - Year 1985.

	Total	Males	Females	Calves	Unclass.	Groups	Avg size	Std	Avg elev	Std	% Calves
JAN	0	0	0	0	0	0	0	0	0	0	0.0%
FEB	0	0	0	0	0	0	0	0	0	0	0.0%
MAR	0	0	0	0	0	0	0	0	0	0	0.0%
APR	0	0	0	0	0	0	0	0	0	0	0.0%
MAY	0	0	0	0	0	0	0	0	0	0	0.0%
JUN	0	0	0	0	0	0	0	0	0	0	0.0%
JUL	0	0	0	0	0	0	0	0	0	0	0.0%
AUG	0	0	0	0	0	0	0	0	0	0	0.0%
SEP	59	19	8	3	29	8	7	8	2085	215	5.1%
OCT	0	0	0	0	0	0	0	0	0	0	0.0%
NOV	0	0	0	0	0	0	0	0	0	0	0.0%
DEC	0	0	0	0	0	0	0	0	0	0	0.0%
TOTAL	59	19	8	3	29	8					

Summary - Year 1986.

	Total	Males	Females	Calves	Unclass.	Groups	Avg size	Std	Avg elev	Std	% Calves
JAN	0	0	0	0	0	0	0	0	0	0	0%
FEB	57	2	7	2	46	2	29	18	2268	474	4%
MAR	96	1	2	0	93	2	48	45	2008	44	0%
APR	98	2	4	2	90	6	16	11	2171	574	2%
MAY	124	6	59	40	19	22	6	5	2854	743	32%
JUN	56	10	25	11	10	11	5	5	1984	482	20%
JUL	62	3	4	10	45	4	16	11	2442	137	16%
AUG	93	25	12	9	47	14	7	7	2358	206	10%
SEP	188	61	16	15	96	27	7	8	2262	449	8%
OCT	160	0	0	0	160	1	160	0	1600	0	0%
NOV	0	0	0	0	0	0	0	0	0	0	0%
DEC	0	0	0	0	0	0	0	0	0	0	0%
TOTAL	934	110	129	89	606	89					



## Appendix II. Continued.

Summary - Year 1987.

	Total	Males	Females	Calves	Unclas.	Groups	Avg size	Std	Avg elev	Std	% Calves
JAN	0	0	0	0	0	0	0	0	0	0	0%
FEB	441	3	0	0	438	5	88	99	1924	346	0%
MAR	391	20	1	0	370	5	78	58	2651	393	0%
APR	402	3	22	0	377	25	16	25	1428	253	0%
MAY	119	2	20	6	91	17	7	8	2365	974	5%
JUN	116	2	43	36	35	9	13	18	2083	332	31%
JUL	580	75	121	91	293	42	14	12	2620	659	16%
AUG	0	0	0	0	0	0	0	0	0	0	0%
SEP	155	15	89	12	39	17	9	9	1587	291	8%
OCT	685	129	410	48	98	21	33	34	1279	118	7%
NOV	583	95	383	65	40	25	23	27	1354	205	11%
DEC	909	141	444	54	270	10	91	71	1675	297	6%
TOTAL	4381	485	1533	312	2051	176					

**Summary - Year 1988.**

[illegible]



Appendix III. Observations of radio-collared Kilbuck caribou, southwest Alaska, March 1987 - May 1988.

Collar frequency - 151.304				Female		Captured - 25 March 1987				Home range = 1136km sq.		N = 26				
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
106	25	MAR	87	100				100	3100	100	88	151.304				
107	26	MAR	87	1		1			1500	92	71	151.304				
108	1	APR	87	1		1			1200	87	87	151.304				
109	6	APR	87	1		1			1750	86	98	151.304				
110	7	APR	87	12		1		11	1650	86	100	151.304				
112	13	APR	87	3		1		2	1750	86	100	151.304				
118	15	APR	87	8		1		7	1500	83	107	151.304				
124	24	APR	87	9		1		8	1150	82	102	151.304				
137	7	MAY	87	35		1		34	3300	116	99	151.304				
143	15	MAY	87	10		2	1	7	3200	117	98	151.304	150.120			
150	10	JUN	87	3		1		2	2400	95	89	151.304				
162	9	JUL	87	28		8	8	12	1600	116	82	151.625	151.304	150.860		
172	31	JUL	87	15		2	2	11	4300	99	74	151.304				
201	8	SEP	87	5		5			1400	89	90	151.304				
218	26	OCT	87	109	27	39	10	33	1450	80	83	151.304				
243	16	NOV	87	17	3	13	1		1250	88	82	151.304				
269	16	DEC	87	148	40	94	9	5	1250	83	92	151.304	150.020	151.625		
277	15	JAN	88	157		2		155	1300	87	81	151.304	150.020			
283	27	JAN	88	181	21	53	10	97	1700	92	105	151.304	150.020			
305	29	FEB	88	2		2			2500	108	96	151.304	150.020			
313	22	MAR	88	53		2		51	3800	108	97	151.304	150.020			
329	25	APR	88	14		1		13	950	68	87	151.304				
337	16	MAY	88	12		8	4		4100	113	96	151.304				
364	19	MAY	88	69		41	28		3500	108	95	151.080	151.304	150.170		
383	23	MAY	88	19		3	3	13	2300	95	88	151.304				
388	25	MAY	88	43		30	13		2600	95	85	151.304	150.310			

Collar frequency - 151.360				Male		Captured - 13 April 1987				Home range = 902km sq.			N = 17			
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
114	13	APR	87	100	1	1		98	1500	104	93	151.360				
115	15	APR	87	15	1			14	1750	93	120	151.360				
132	24	APR	87	24	1			23	1500	79	92	151.360				
136	7	MAY	87	9	1			8	1400	91	110	151.360				
149	15	MAY	87	8	1			7	1000	79	101	151.360				
151	10	JUN	87	6	1	1		4	2000	97	117	151.360				
158	11	JUN	87	4	1	3			1500	96	105	151.360				
159	9	JUL	87	4	1	3			1800	95	120	151.360				
173	31	JUL	87	1	1				1500	91	117	151.360				
215	11	SEP	87	1	1				1750	91	121	151.360				
249	16	NOV	87	17	9	5	3		1100	78	90	151.360				
270	16	DEC	87	3	1	2			1000	84	100	151.360				
280	15	JAN	88	19	6	11		2	2100	93	72	151.360				
284	27	JAN	88	73		2		71	3200	97	72	151.080	151.360			
300	29	FEB	88	22	2	1		19	2700	96	73	151.360	150.240			
320	22	MAR	88	28	2	5	2	19	3000	96	91	151.360				
330	3	MAY	88	1	1				1750	72	88	151.360				



## Appendix III. Continued.

Collar frequency - 150.120				Female		Captured - 15 April 1987				Home range = 661km sq.				N = 18		
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
117	15	APR	87	12		1		11	1250	88	92	150.120				
125	24	APR	87	1		1			1000	77	89	150.120				
139	7	MAY	87	2		2			3600	115	96	150.120	151.080			
143	15	MAY	87	10		2	1	7	3200	117	98	151.304	150.120			
152	10	JUN	87	17		6	6	5	2700	109	100	150.120				
168	9	JUL	87	9	2	1		6	1650	117	87	150.120				
174	31	JUL	87	9	1	1		7	2400	108	100	150.120				
202	8	SEP	87	32		20	6	6	1600	92	102	150.860	151.080	150.120		
219	26	OCT	87	111	10	64	6	31	1400	92	98	150.120	150.310			
245	16	NOV	87	65	18	41	6		1300	89	78	150.310	150.120			
268	16	DEC	87	216	43	161	12		1600	97	100	150.120	150.310	150.860	150.170	
275	15	JAN	88	317		5		312	2300	104	97	150.860	150.170	150.310	151.625	150.120
282	27	JAN	88	360	21	30	11	298	2800	95	81	150.860	150.120	150.170	150.310	151.625
301	29	FEB	88	108		1		107	2700	96	78	150.120				
310	21	MAR	88	2		2			2600	96	90	150.120	151.080			
315	22	MAR	88	101	1	2		98	2900	96	84	150.240	150.120	151.080		
338	16	MAY	88	17		5	5	7	2500	112	97	150.120				
368	19	MAY	88	4		3	1		2300	104	98	150.120	(WITH CALF)			

Collar frequency - 150.860				Female		Captured - 15 April 1987				Home range = 912km sq.			N = 17			
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
119	15	APR	87	60		3		57	1300	91	73	150.170	150.860	150.310		
127	24	APR	87	11		1		10	1250	88	93	150.860				
135	7	MAY	87	9		1		8	1400	82	91	150.860				
145	15	MAY	87	1		1			1400	88	95	150.860				
154	10	JUN	87	7		3	3	1	1500	98	109	150.860				
162	9	JUL	87	28		8	8	12	1600	116	82	151.625	151.304	150.860		
175	31	JUL	87	7		1		6	2400	100	71	150.860				
202	8	SEP	87	32		20	6	6	1600	92	102	150.860	151.080	150.120		
220	26	OCT	87	100	25	68	7		1250	79	83	150.860	150.170	151.080		
252	16	NOV	87	9	3	4	2		1000	72	76	150.860				
268	16	DEC	87	216	43	161	12		1600	97	100	150.120	150.310	150.860	150.170	
275	15	JAN	88	317		5		312	2300	104	97	150.860	150.170	150.310	151.625	150.120
282	27	JAN	88	360	21	30	11	298	2800	95	81	150.860	150.120	150.170	150.310	151.625
311	21	MAR	88	22		1		21	3700	100	83	150.860				
327	25	APR	88	11		1		10	1100	85	90	150.860				
349	16	MAY	88	10		1		9	1400	93	108	150.860				
395	25	MAY	88	7		1	0	6	1800	96	102	150.860				



## Appendix III. Continued.

Collar frequency - 150.170				Female		Captured - 15 April 1987				Home range = 811km sq.			N = 19			
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
119	15	APR	87	60		3		57	1300	91	73	150.170	150.860	150.310		
126	24	APR	87	1		1			1000	78	84	150.170				
134	7	MAY	87	13		2		11	1150	84	89	150.020	150.170			
147	15	MAY	87	11		1	1	9	2000	109	73	150.170				
153	10	JUN	87	1		1			3000	108	95	150.170				
163	9	JUL	87	18		2	2	14	2600	114	79	150.170				
176	31	JUL	87	4		2	2		2800	96	75	150.170				
203	8	SEP	87	13		11	2		1650	89	102	150.170				
220	26	OCT	87	100	25	68	7		1250	79	83	150.860	150.170	151.080		
239	16	NOV	87	17	4	11	2		900	71	87	150.170				
268	16	DEC	87	216	43	161	12		1600	97	100	150.120	150.310	150.860	150.170	
275	15	JAN	88	317		5		312	2300	104	97	150.860	150.170	150.310	151.625	150.120
282	27	JAN	88	360	21	30	11	298	2800	95	81	150.860	150.120	150.170	150.310	151.625
303	29	FEB	88	188	1	3		184	3300	100	73	151.080	151.625	151.530	150.170	
309	21	MAR	88	36	1	2		33	2400	94	85	150.520	150.310	150.170		
328	25	APR	88	17		1		16	2000	91	89	150.170				
347	16	MAY	88	6		4	2		3500	107	95	150.170				
364	19	MAY	88	69		41	28		3500	108	95	151.080	151.304	150.170		
389	25	MAY	88	35		13	13	9	2600	99	92	150.170				

Collar frequency - 150.310				Female		Captured - 15 April 1987				Home range = 695km sq.			N = 19			
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
119	15	APR	87	60		3		57	1300	91	73	150.170	150.860	150.310		
128	24	APR	87	1		1			2200	91	87	150.310				
133	7	MAY	87	1		1			1350	89	85	150.310				
148	15	MAY	87	1		1			2500	95	79	150.310				
157	11	JUN	87	17		6	6	5	2000	109	108	150.310				
167	9	JUL	87	19		6	6	7	2000	117	78	150.310				
177	31	JUL	87	3		2	1		3000	112	74	150.310				
204	8	SEP	87	1		1			1250	110	87	150.310				
219	26	OCT	87	111	10	64	6	31	1400	92	98	150.120	150.310			
245	16	NOV	87	65	18	41	6		1300	89	78	150.310	150.120			
268	16	DEC	87	216	43	161	12		1600	97	100	150.120	150.310	150.860	150.170	
275	15	JAN	88	317		5		312	2300	104	97	150.860	150.170	150.310	151.625	150.120
282	27	JAN	88	360	21	30	11	298	2800	95	81	150.860	150.120	150.170	150.310	151.625
306	29	FEB	88	1		1			2500	100	85	150.310				
309	21	MAR	88	36	1	2		33	2400	94	85	150.520	150.310	150.170		
316	22	MAR	88	13		1		12	3200	97	84	150.310				
335	16	MAY	88	8		5	3		3100	99	82	150.310				
374	23	MAY	88	13		7	6		3600	99	84	150.310				
388	25	MAY	88	43		30	13		2600	95	85	151.304	150.310			



## Appendix III. Continued.

Collar frequency - 150.020				Female		Captured - 15 April 1987				Home range = 860km sq.			N = 18			
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
120	15	APR	87	1		1			1500	85	80	150.020				
131	24	APR	87	1		1			875	68	80	150.020				
134	7	MAY	87	13		2		11	1150	84	89	150.020	150.170			
146	15	MAY	87	8		1		7	1700	100	110	150.020				
155	10	JUN	87	60		21	21	18	2000	115	101	150.020	151.080			
169	9	JUL	87	19		2	2	15	1950	112	86	150.020				
178	31	JUL	87	33		4	4	25	3100	115	96	150.020				
205	8	SEP	87	11		5		6	2500	109	97	150.020				
221	26	OCT	87	22	6	16			1000	72	75	150.020				
247	16	NOV	87	100	7	85	8		1500	82	83	150.020				
269	16	DEC	87	148	40	94	9	5	1250	83	92	151.304	150.020	151.625		
277	15	JAN	88	157		2		155	1300	87	81	151.304	150.020			
283	27	JAN	88	181	21	53	10	97	1700	92	105	151.304	150.020			
305	29	FEB	88	2		2			2500	108	96	151.304	150.020			
313	22	MAR	88	53		2		51	3800	108	97	151.304	150.020			
343	16	MAY	88	17		2	2	13	2600	107	100	150.020				
369	19	MAY	88	3		2	1		2700	105	98	150.020				
391	25	MAY	88	1		1		?	3400	100	88	150.020				

Collar frequency - 151.080				Female		Captured - 15 April 1987				Home range = 930km sq.			N = 18			
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
121	15	APR	87	6		1		5	1000	74	87	151.080				
129	24	APR	87	13		1		12	1500	90	97	151.080				
139	7	MAY	87	2		2			3600	115	96	150.120	151.080			
141	15	MAY	87	5		3	2		3000	113	94	151.080				
155	10	JUN	87	60		21	21	18	2000	115	101	150.020	151.080			
160	9	JUL	87	18	1	2	2	13	3000	110	98	151.080				
179	31	JUL	87	1		1			2000	111	89	151.080				
202	8	SEP	87	32		20	6	6	1600	92	102	150.860	151.080	150.120		
220	26	OCT	87	100	25	68	7		1250	79	83	150.860	150.170	151.080		
257	19	NOV	87	8		4	4		1400	81	94	151.080				
272	16	DEC	87	129	19	72	8	30	2000	82	108	151.080				
274	15	JAN	88	15		1		14	2300	100	84	151.080				
284	27	JAN	88	73		2		71	3200	97	72	151.080	151.360			
303	29	FEB	88	188	1	3		184	3300	100	73	151.080	151.625	151.530	150.170	
310	21	MAR	88	2		2			2600	96	90	150.120	151.080			
315	22	MAR	88	101	1	2		98	2900	96	84	150.240	150.120	151.080		
348	16	MAY	88	1		1			3800	111	97	151.080				
364	19	MAY	88	69		41	28		3500	108	95	151.080	151.304	150.170		



## Appendix III. Continued.

Collar frequency - 151.625				Female		Captured - 15 April 1987				Home range = 474km sq.			N = 18			
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
123	15	APR	87	1		1			1250	89	93	151.625				
130	24	APR	87	2		2			2500	96	89	151.625				
138	7	MAY	87	1		1			4100	103	84	151.625				
144	15	MAY	87	1		1			3500	104	88	151.625				
156	10	JUN	87	1		1			3000	112	94	151.625				
162	9	JUL	87	28		8	8	12	1600	116	82	151.625	151.304	150.860		
180	31	JUL	87	2		1	1		3500	98	84	151.625				
206	8	SEP	87	1		1			2100	107	80	151.625				
222	26	OCT	87	52	7	41	4		1200	84	89	151.625				
253	19	NOV	87	70	7	48	5	10	1150	85	88	151.625				
269	16	DEC	87	148	40	94	9	5	1250	83	92	151.304	150.020	151.625		
275	15	JAN	88	317		5		312	2300	104	97	150.860	150.170	150.310	151.625	150.120
282	27	JAN	88	360	21	30	11	298	2800	95	81	150.860	150.120	150.170	150.310	151.625
303	29	FEB	88	188	1	3		184	3300	100	73	151.080	151.625	151.530	150.170	
312	21	MAR	88	1		1			2200	98	81	151.625				
332	16	MAY	88	3		2	1		3900	105	86	151.625				
373	23	MAY	88	10		5	5		3100	103	87	151.625				
390	25	MAY	88	1		1		?	3500	97	85	151.625				

Collar frequency - 151.390				Male		Captured - 26 February 1988										
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
291	26	FEB	88	50	1			49	3100	47	23	151.390				
296	29	FEB	88	24	1			23	2400	44	20	151.390				
314	22	MAR	88	11	1			10	2550	46	30	151.390				
331	3	MAY	88	1	1				3000	48	18	151.390				
													MORTALITY MODE			

Collar frequency - 150.225				Male		Captured - 26 February 1988										
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
292	26	FEB	88	8	8				2000	45	17	150.225				
297	29	FEB	88	11	3			8	2800	46	19	150.225				
322	22	MAR	88	1	1				2000	35	58	150.225				
													MORTALITY MODE			

Collar frequency - 151.530				Male		Captured - 25 February 1988										
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
289	25	FEB	88	235	1			234	2050	48	21	151.530				
293	26	FEB	88	12	1			11	2000	44	17	151.530				
303	29	FEB	88	188	1	3		184	3300	51	18	151.080	151.625	151.530	150.170	
308	21	MAR	88	22	1			21	2300	44	21	151.530				
351	16	MAY	88	8	8				725	17	54	151.530				
372	19	MAY	88	11	5			6	1200	24	46	151.530				
393	25	MAY	88	5	3		0	2	1650	39	55	151.530				



## Appendix III. Continued.

Collar frequency - 150.520 Female Captured - 25 February 1988

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
295	26	FEB	88	6		3	2	1	2500	45	31	150.520				
299	29	FEB	88	10		1		9	2300	47	19	150.520				
309	21	MAR	88	36	1	2		33	2400	45	30	150.520	150.310	150.170		
355	16	MAY	88	1		1			2700	63	30	150.520				
358	19	MAY	88	1		1		?	2700	63	30	150.520				
380	23	MAY	88	2		1	1		3400	63	33	150.520				

Collar frequency - 150.300 Male Captured - 25 February 1988

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
286	25	FEB	88	17	2			15	2400	44	27	150.300	151.440			
321	22	MAR	88	1	1				3100	58	44	150.300				MORTALITY MODE

Collar frequency - 150.340 Female Captured - 25 February 1988

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
287	25	FEB	88	50	1	2		47	2600	49	32	150.340	150.240			
318	22	MAR	88	26		1		25	850	12	54	150.340				
323	5	APR	88	26		1		25	1650	18	63	150.340				
326	25	APR	88	20		1		19	750	12	56	150.340				
352	16	MAY	88	24	15	1		8	825	19	54	150.340				
399	25	MAY	88	13			0	13	1050	27	63	150.340				

Collar frequency - 150.240 Male Captured - 25 February 1988

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
287	25	FEB	88	50	1	2		47	2600	49	32	150.340	150.240			
300	29	FEB	88	22	2	1		19	2700	47	18	151.360	150.240			
315	22	MAR	88	101	1	2		98	2900	47	29	150.240	150.120	151.080		
336	16	MAY	88	1		1			2200	31	27	150.240				
392	25	MAY	88	10	10				1000	17	21	150.240				

Collar frequency - 151.440 Male Captured - 25 February 1988

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
286	25	FEB	88	17	2			15	2400	44	27	150.300	151.440			
307	29	FEB	88	1	1				1600	35	43	151.440				MORTALITY MODE

Collar frequency - 151.060 Male Captured - 25 February 1988

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
288	25	FEB	88	9	1			8	2400	44	27	151.060				
304	29	FEB	88	11	11				1050	14	25	151.060				
319	22	MAR	88	12	12				450			151.060				
324	5	APR	88	11	11				300			151.060				
325	25	APR	88	9	1			8	500			151.060				
350	16	MAY	88	1	1				1200	28	65	151.060				
398	25	MAY	88	4	4				650	23	72	151.060				

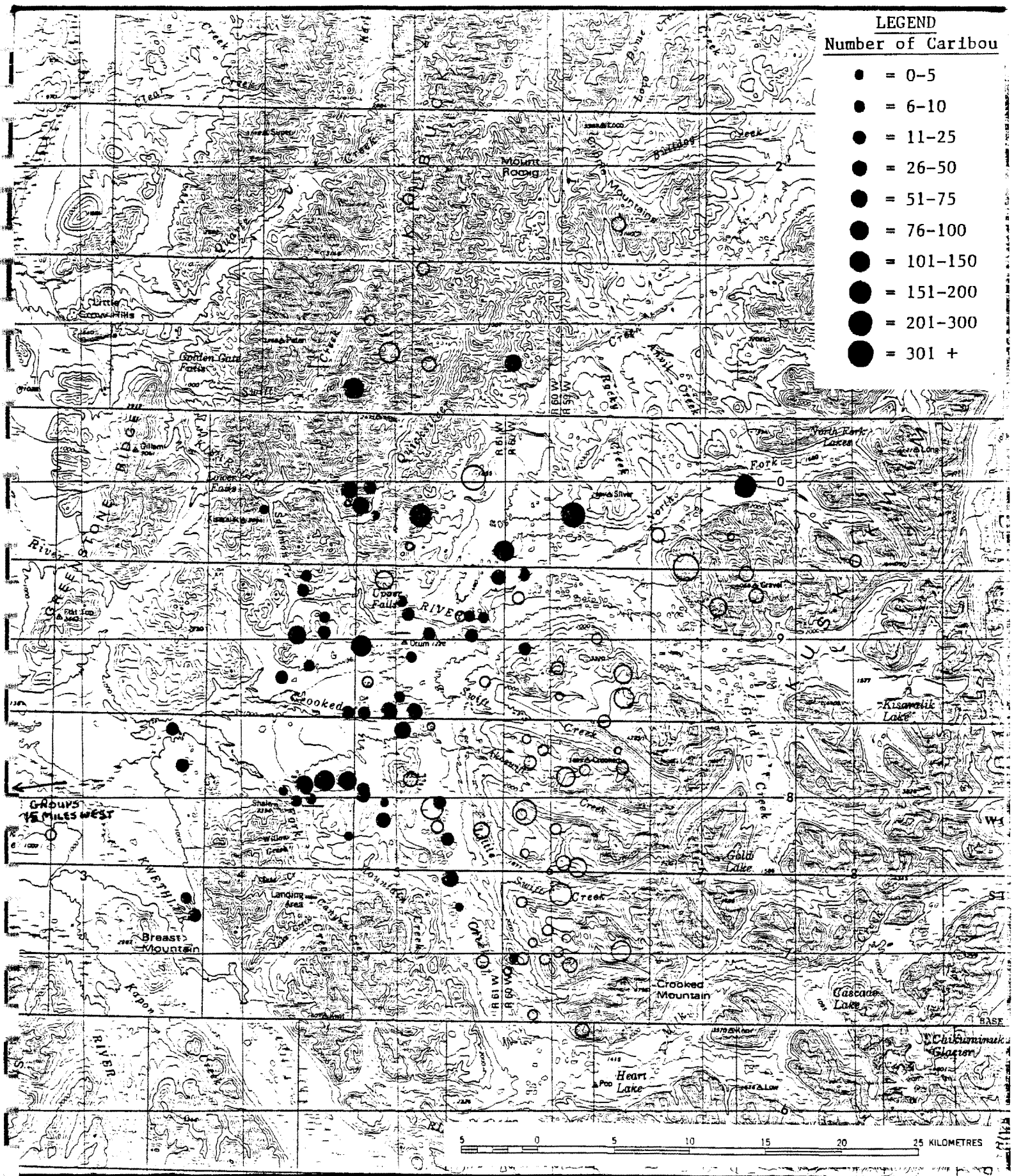


## APPENDIX IV

### Seasonal Distribution of Caribou Kilbuck Mountains, Southwest Alaska Sep. 1985-May 1988

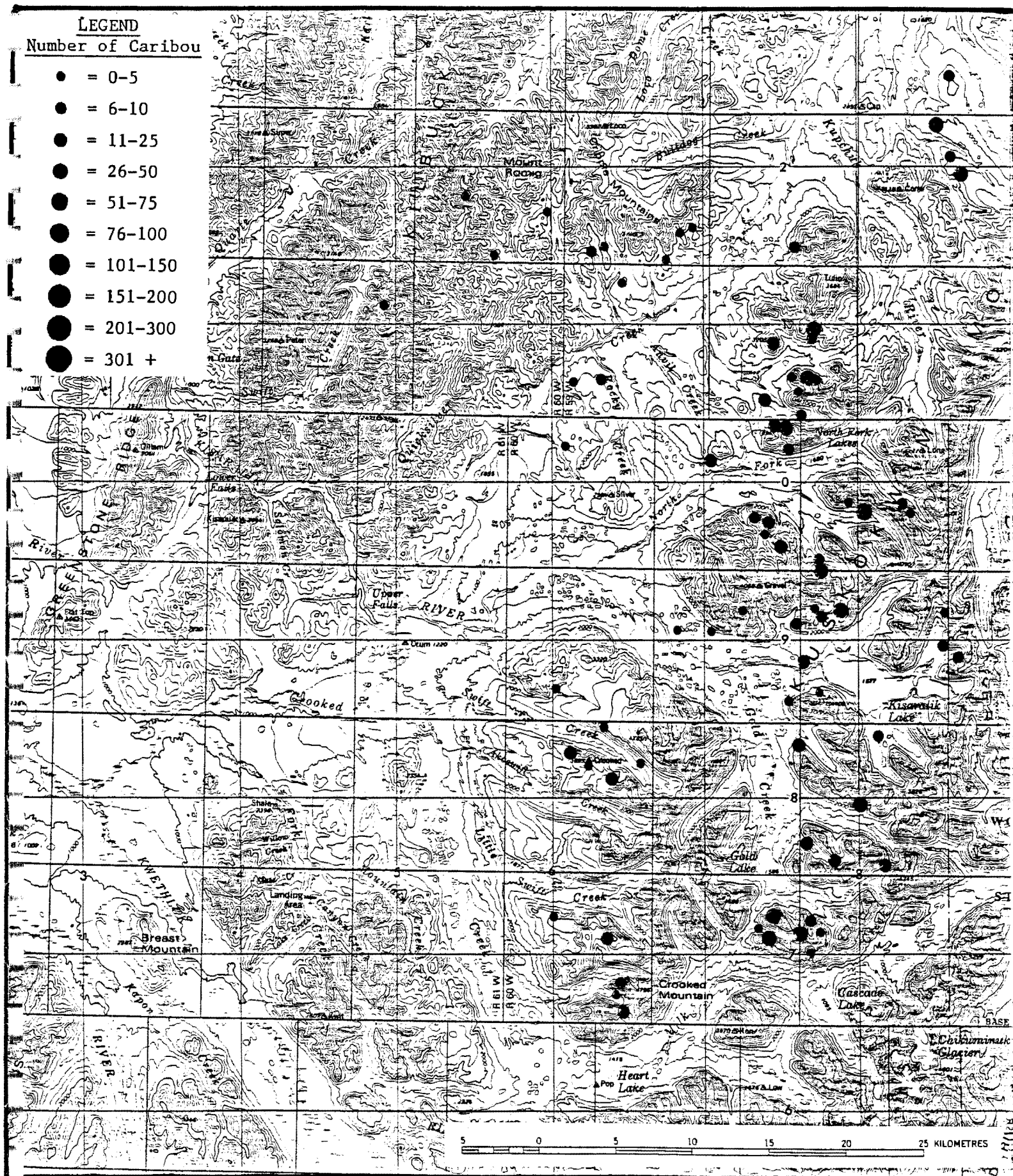
Map 1.....	Winter (Oct-Mar)
Map 2.....	Summer (Jun-Aug)
Map 3.....	Neo-Nate Calves (Mid May)
Map 4.....	January
Map 5.....	February
Map 6.....	March
Map 7.....	April
Map 8.....	May
Map 9.....	June
Map 10.....	July
Map 11.....	August
Map 12.....	September (Fall)
Map 13.....	October
Map 14.....	November
Map 15.....	December





Map 1. Winter distribution of caribou from the Kilbuck herd, southwest Alaska, 1985-1988. Solid circles represent early winter (Oct-Dec) and open circles represent late winter (Jan-Mar).



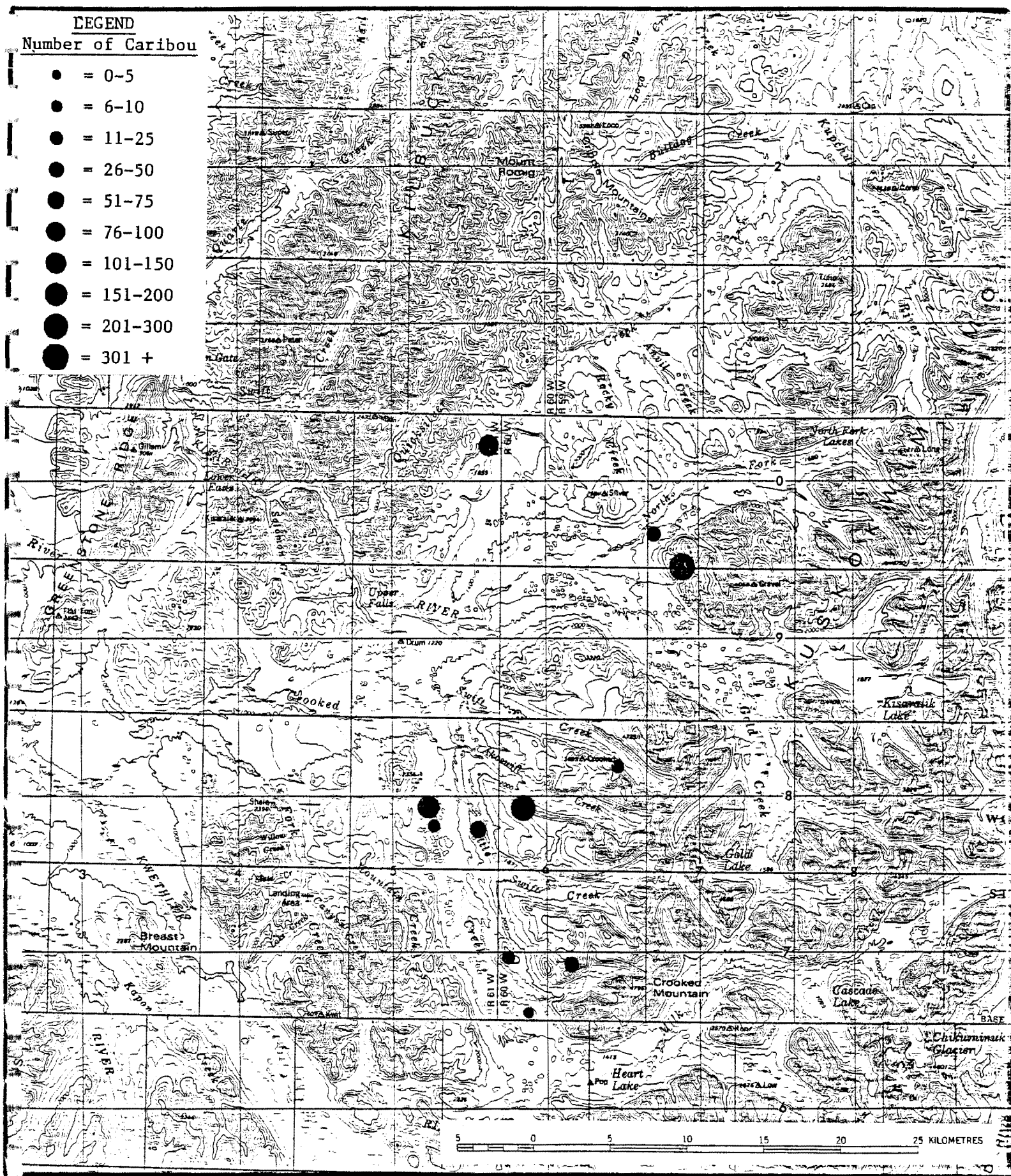


Map 2. Summer distribution (Jun-Aug) of caribou from the Kilbuck herd, southwest Alaska, 1986-1987.



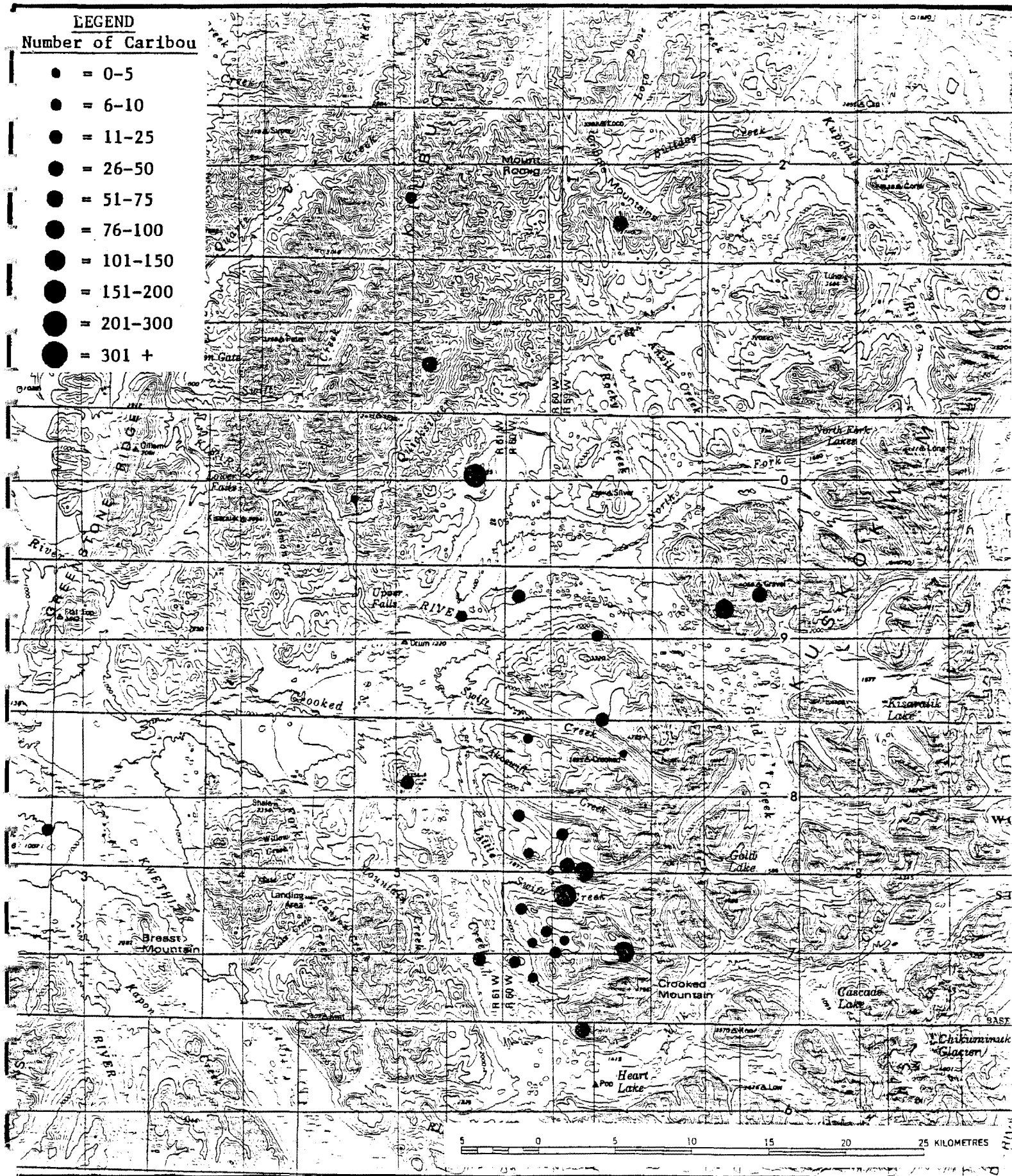






Map 4. January distribution of caribou from the Kilbuck herd, southwest, Alaska, 1988.



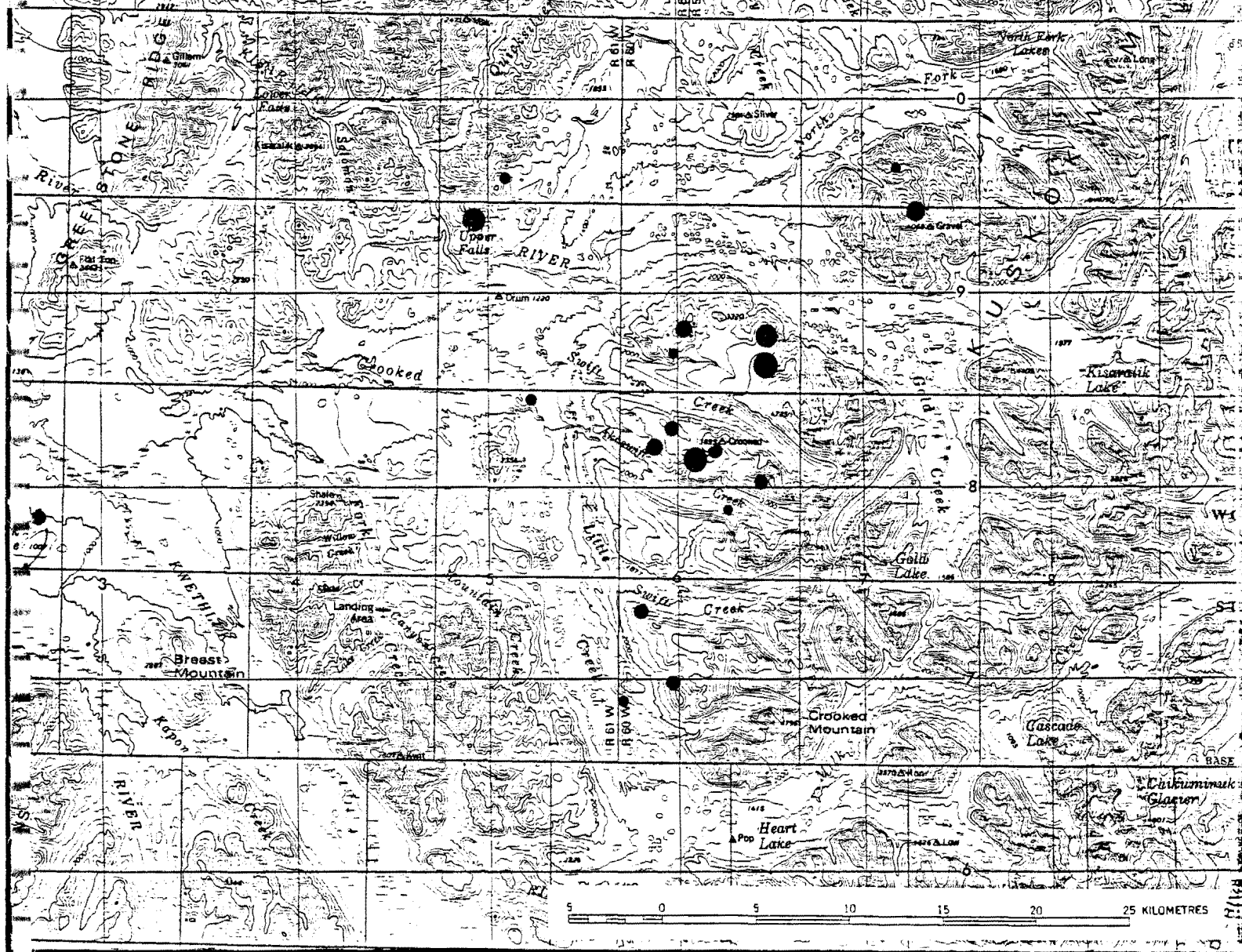


Map 5. February distribution of caribou from the Kilbuck herd, southwest Alaska, 1986-1988.



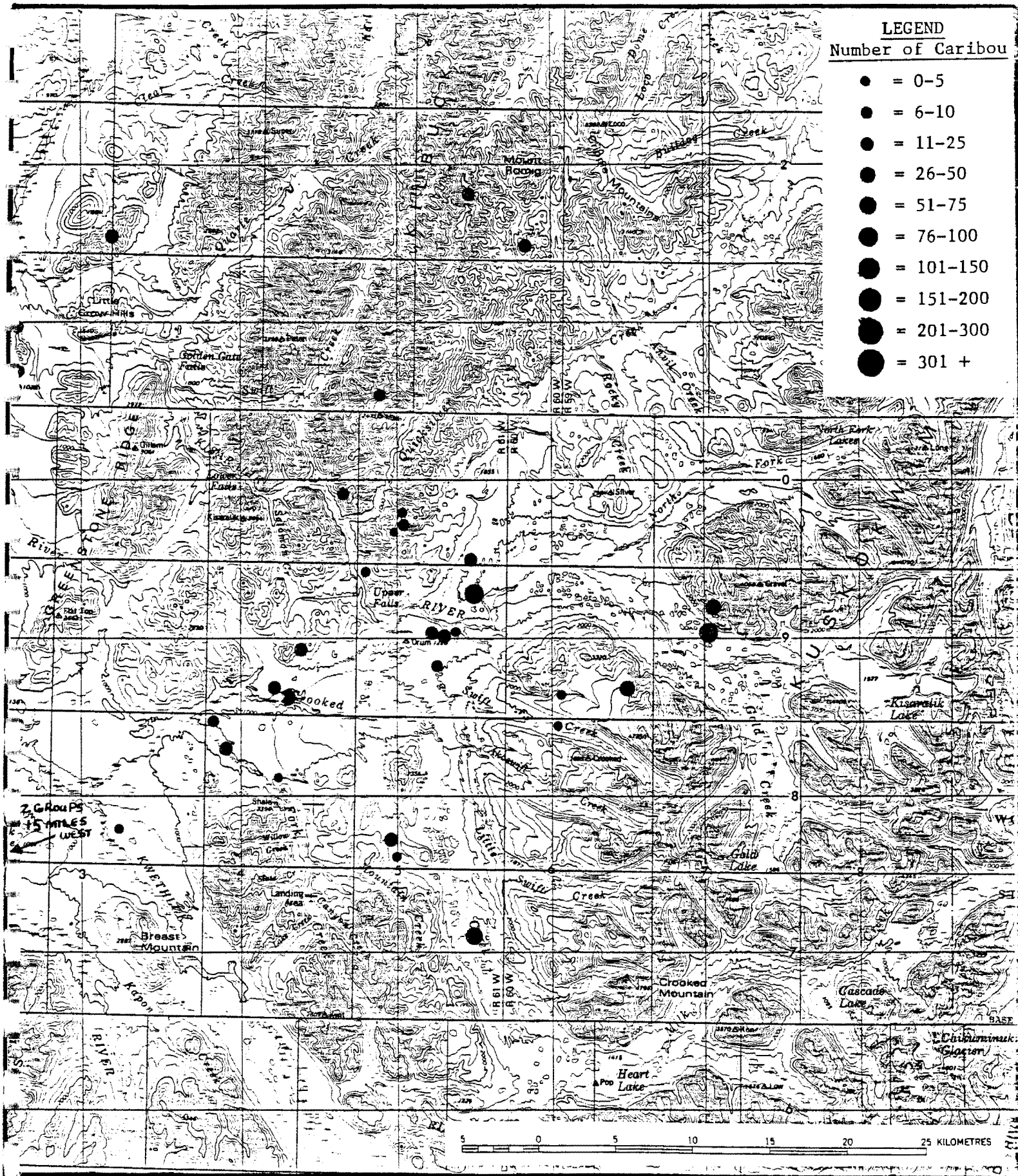
## Number of Caribou

- = 0-5  
 ● = 6-10  
 ● = 11-25  
 ● = 26-50  
 ● = 51-75  
 ● = 76-100  
 ● = 101-150  
 ● = 151-200  
 ● = 201-300  
 ● = 301 +



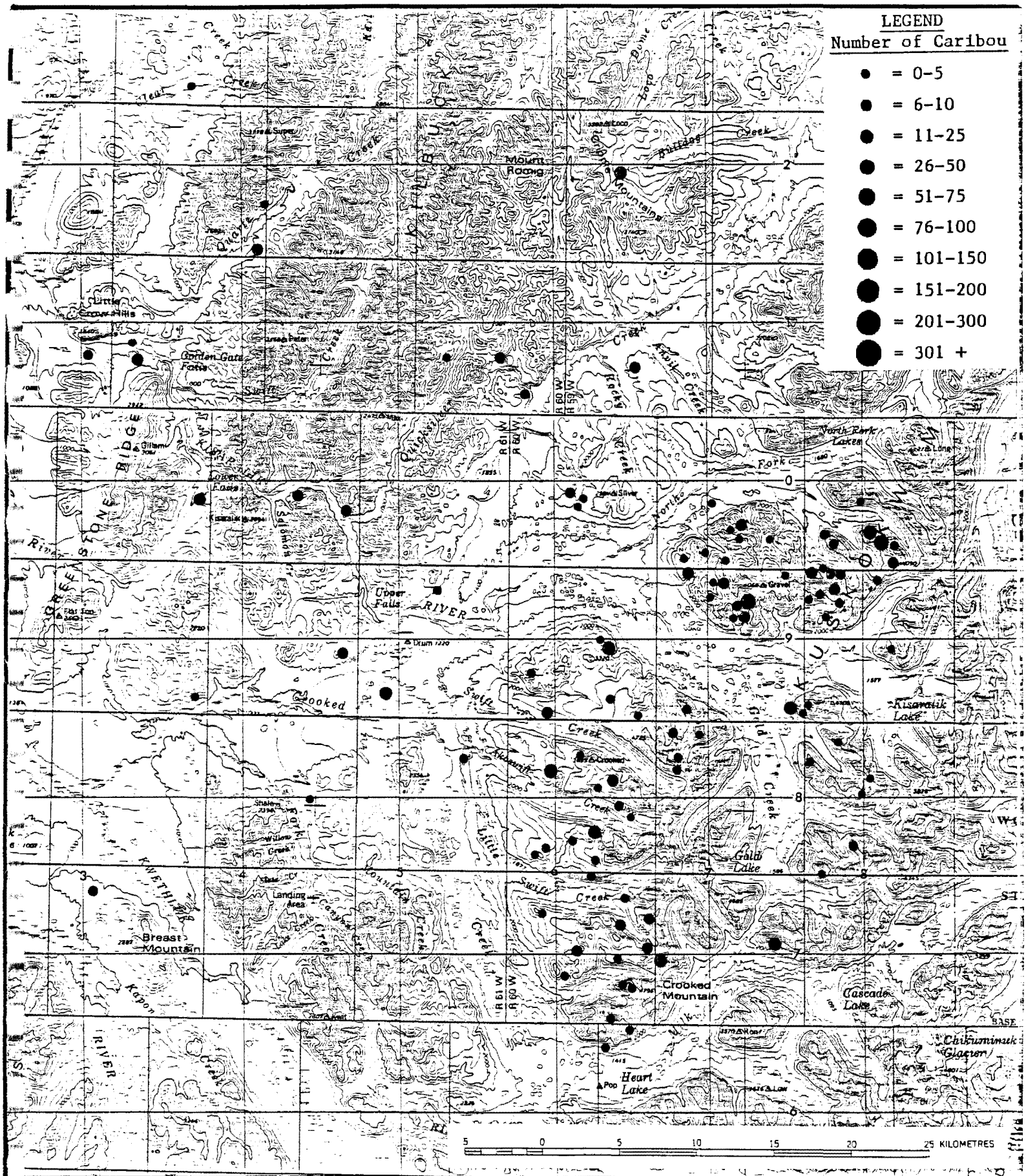
Map 6. March distribution of caribou from the Kilbuck herd, southwest Alaska, 1986-1988.





Map 7. April distribution of caribou from the Kilbuck herd, southwest Alaska, 1986-1988.



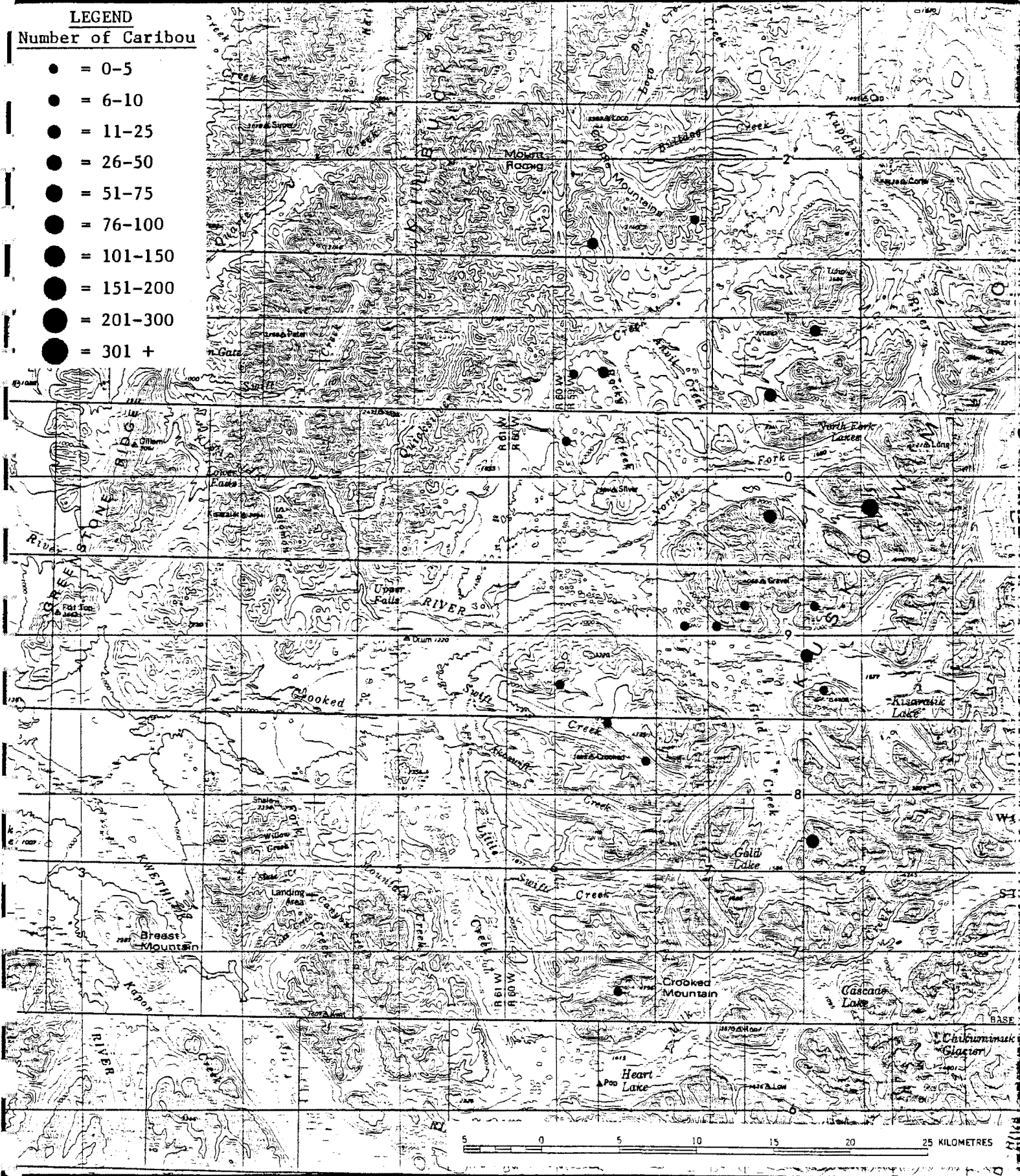


Map 8. May distribution of caribou from the Kilbuck herd, southwest Alaska, 1986-1988.



**LEGEND**  
Number of Caribou

- = 0-5
- = 6-10
- = 11-25
- = 26-50
- = 51-75
- = 76-100
- = 101-150
- = 151-200
- = 201-300
- = 301 +

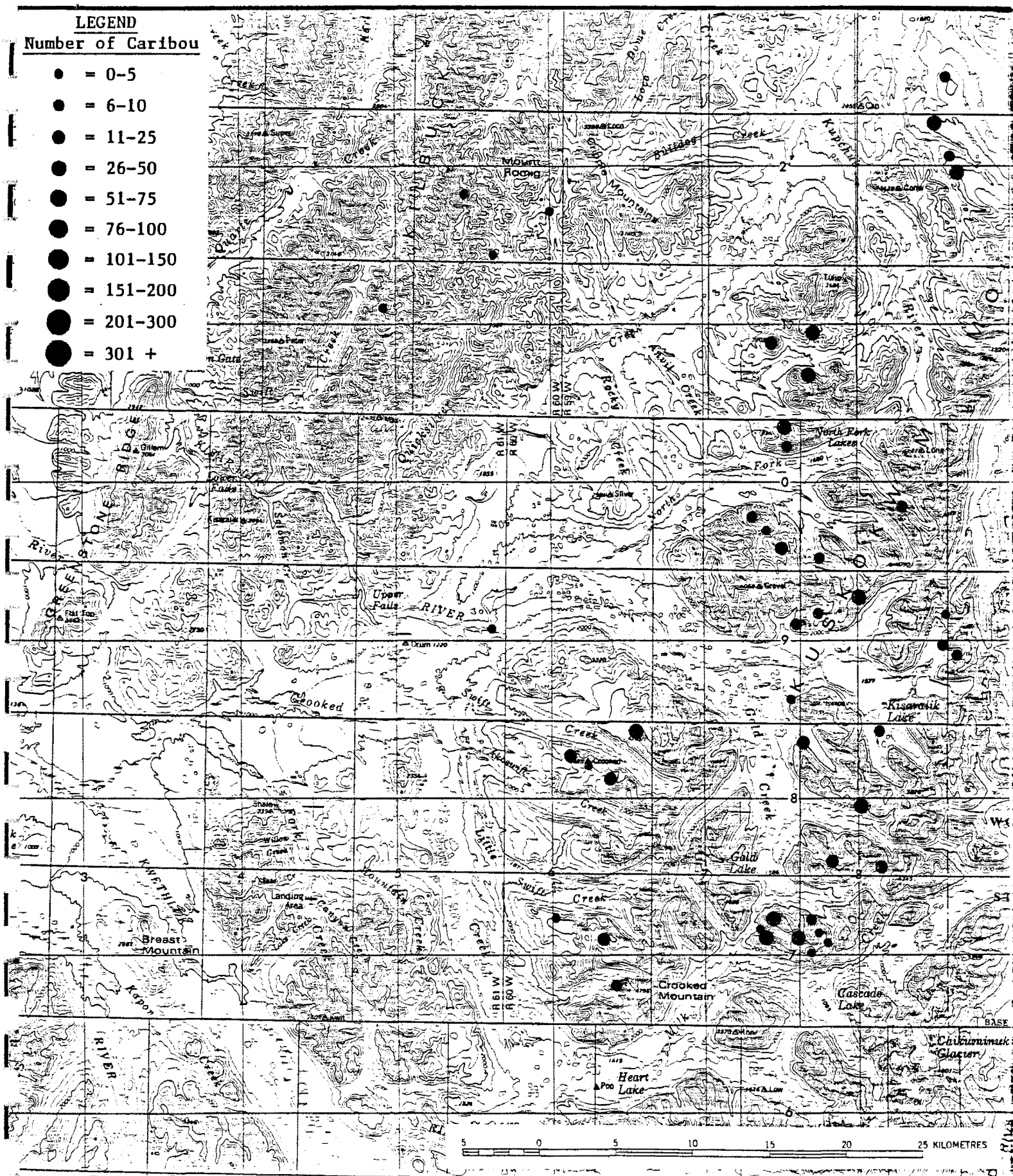


Map 9. June distribution of caribou from the Kilbuck herd, southwest Alaska, 1986-1987.



## Number of Caribou

- = 0-5
- = 6-10
- = 11-25
- = 26-50
- = 51-75
- = 76-100
- = 101-150
- = 151-200
- = 201-300
- = 301 +

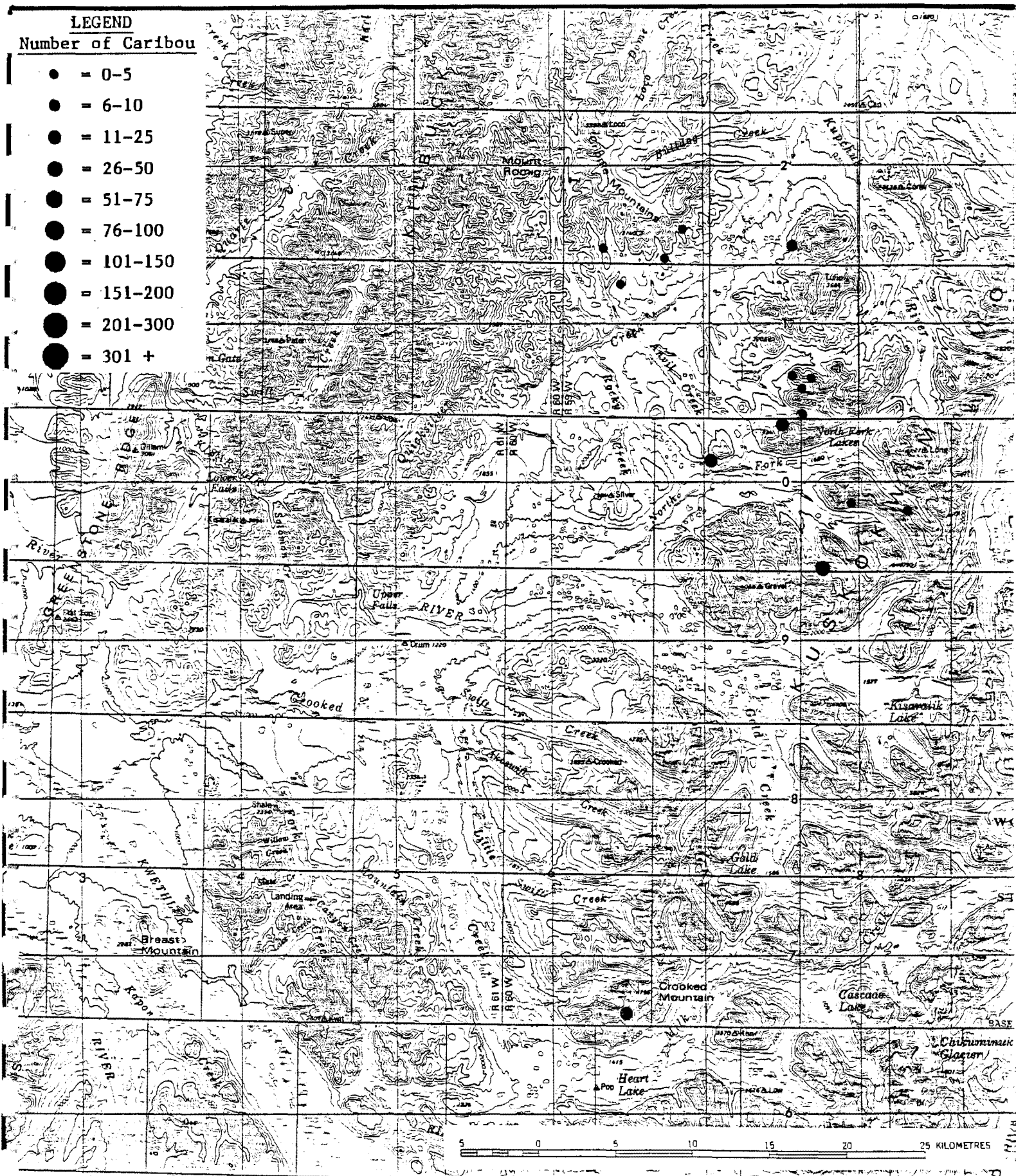


Map 10. July distribution of caribou from the Kilbuck herd, southwest Alaska, 1986-1987.



**LEGEND**  
**Number of Caribou**

- = 0-5
- = 6-10
- = 11-25
- = 26-50
- = 51-75
- = 76-100
- = 101-150
- = 151-200
- = 201-300
- = 301 +

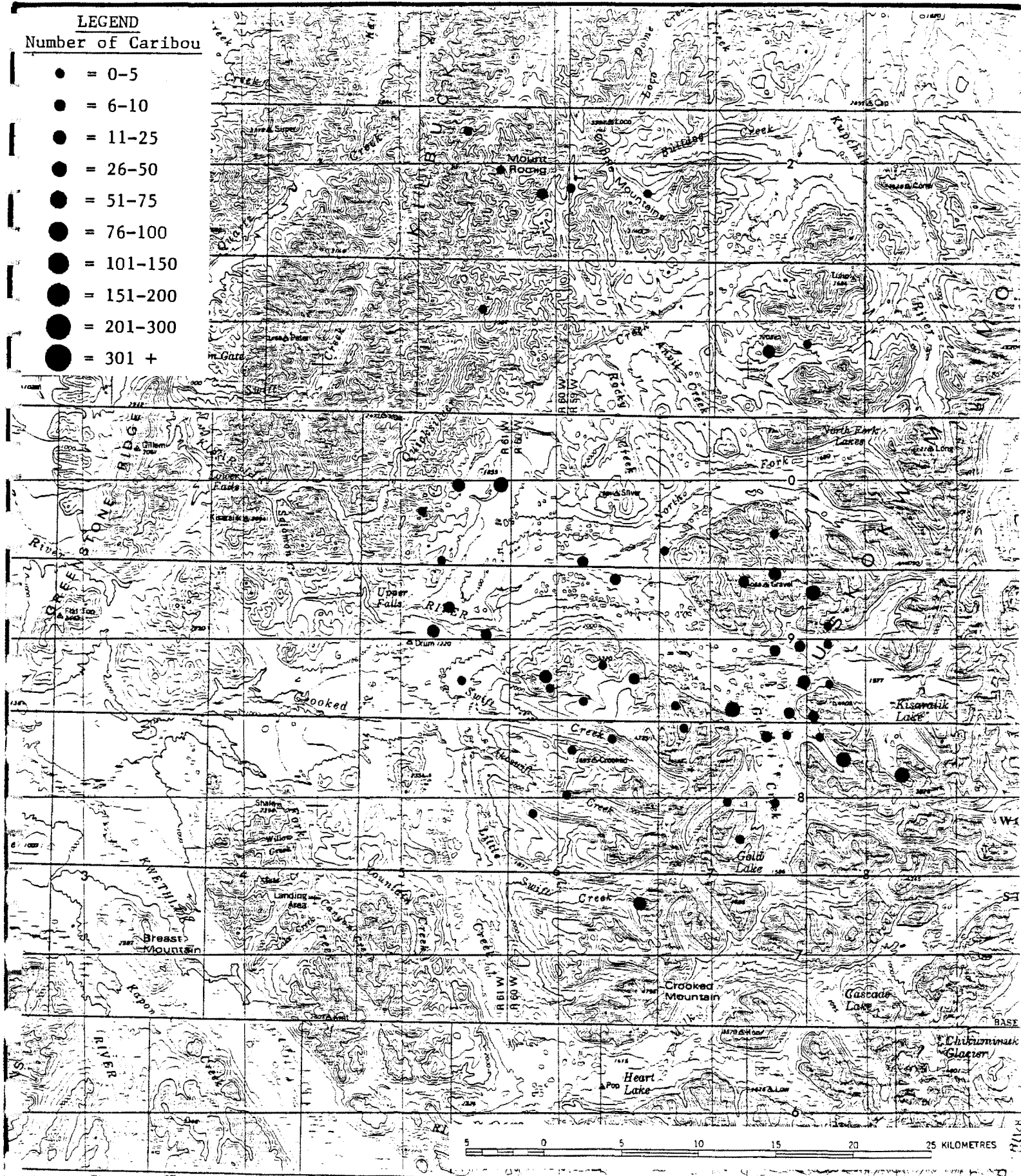


Map 11. August distribution of caribou from the Kilbuck herd, southwest Alaska, 1986-1987.



**LEGEND**  
Number of Caribou

- = 0-5
- = 6-10
- = 11-25
- = 26-50
- = 51-75
- = 76-100
- = 101-150
- = 151-200
- = 201-300
- = 301 +

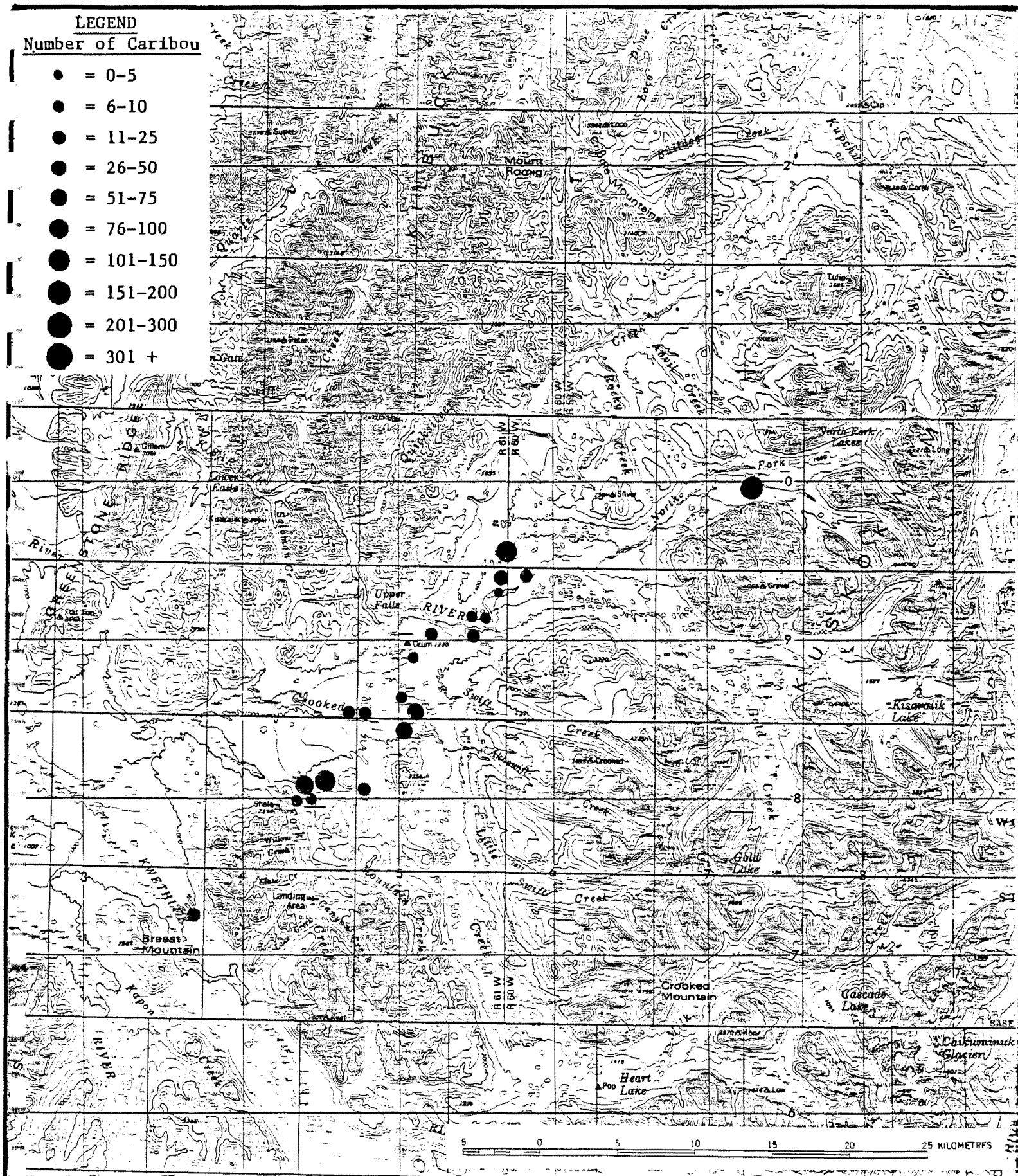


Map 12. September distribution of caribou from the Kilbuck herd, southwest Alaska, 1985-1987.



**LEGEND**  
**Number of Caribou**

- = 0-5
- = 6-10
- = 11-25
- = 26-50
- = 51-75
- = 76-100
- = 101-150
- = 151-200
- = 201-300
- = 301 +



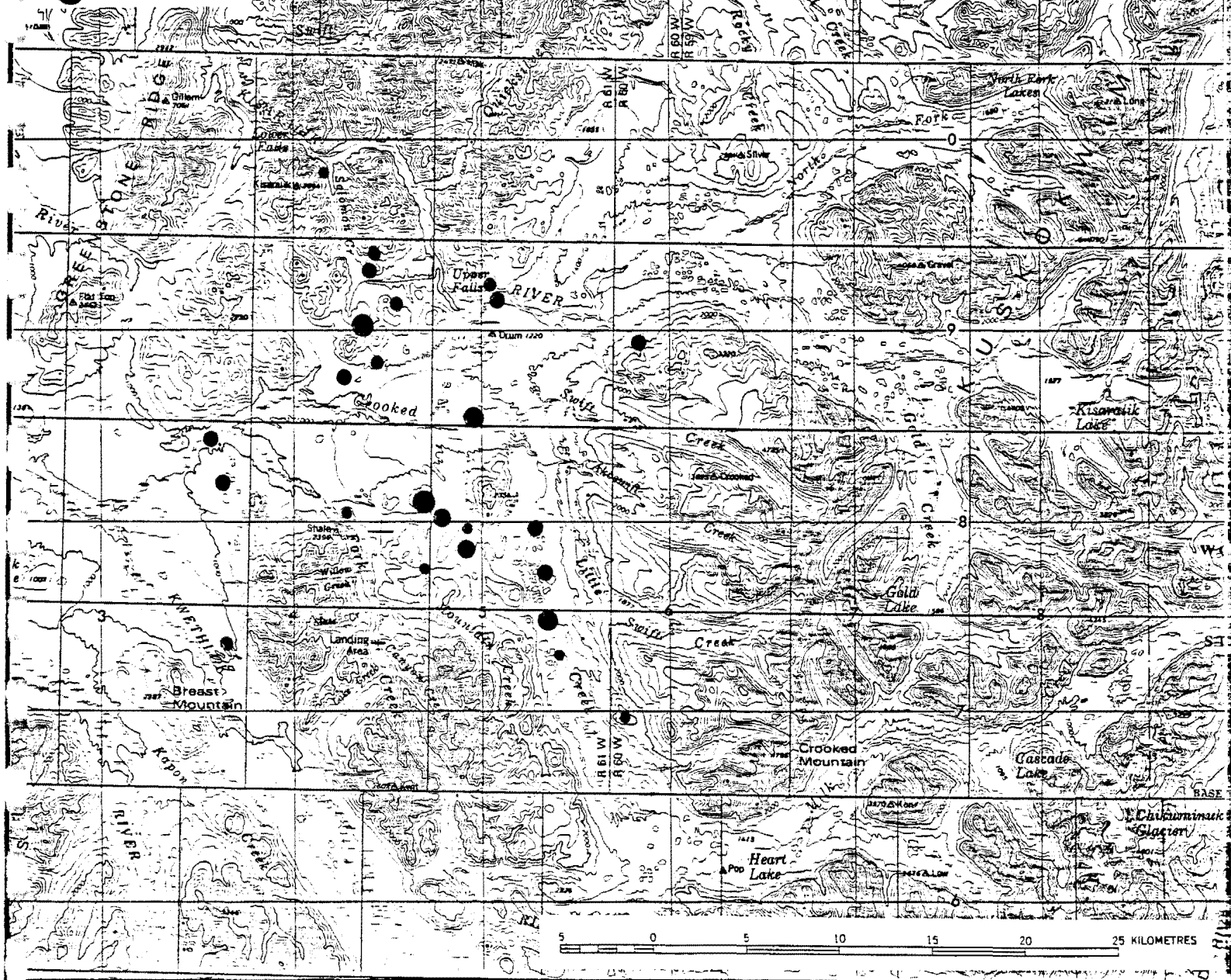
Map 13. October distribution of caribou from the Kilbuck herd, southwest Alaska, 1986-1987.



# **LEGEND**

## **Number of Caribou**

- = 0-5
- = 6-10
- = 11-25
- = 26-50
- = 51-75
- = 76-100
- = 101-150
- = 151-200
- = 201-300
- = 301 +

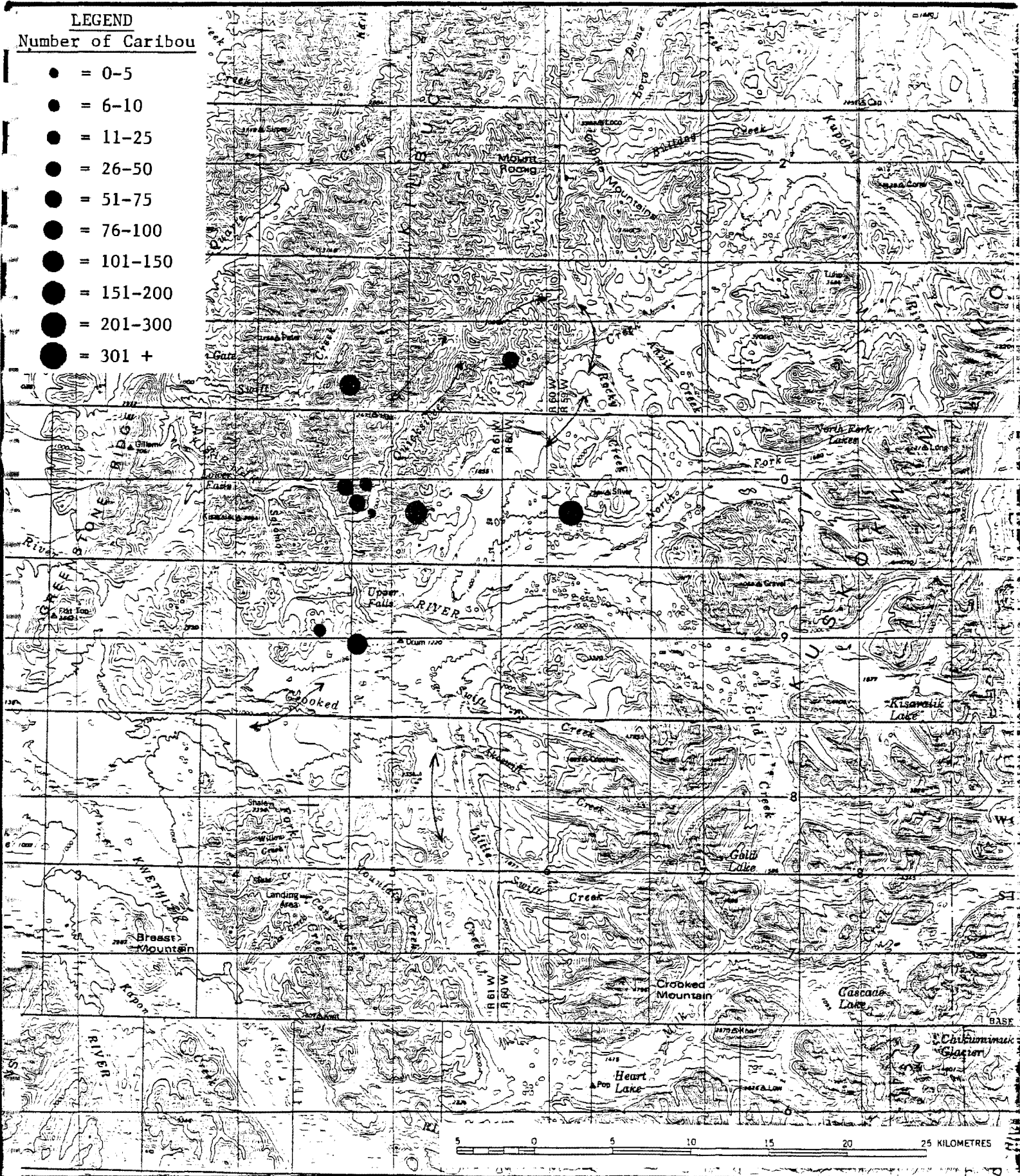


Map 14. November distribution of caribou from the Kilbuck herd, southwest Alaska, 1987.



**LEGEND**  
Number of Caribou

- = 0-5
- = 6-10
- = 11-25
- = 26-50
- = 51-75
- = 76-100
- = 101-150
- = 151-200
- = 201-300
- = 301 +



Map 15. December distribution of caribou from the Kilbuck herd, southwest Alaska, 1987.

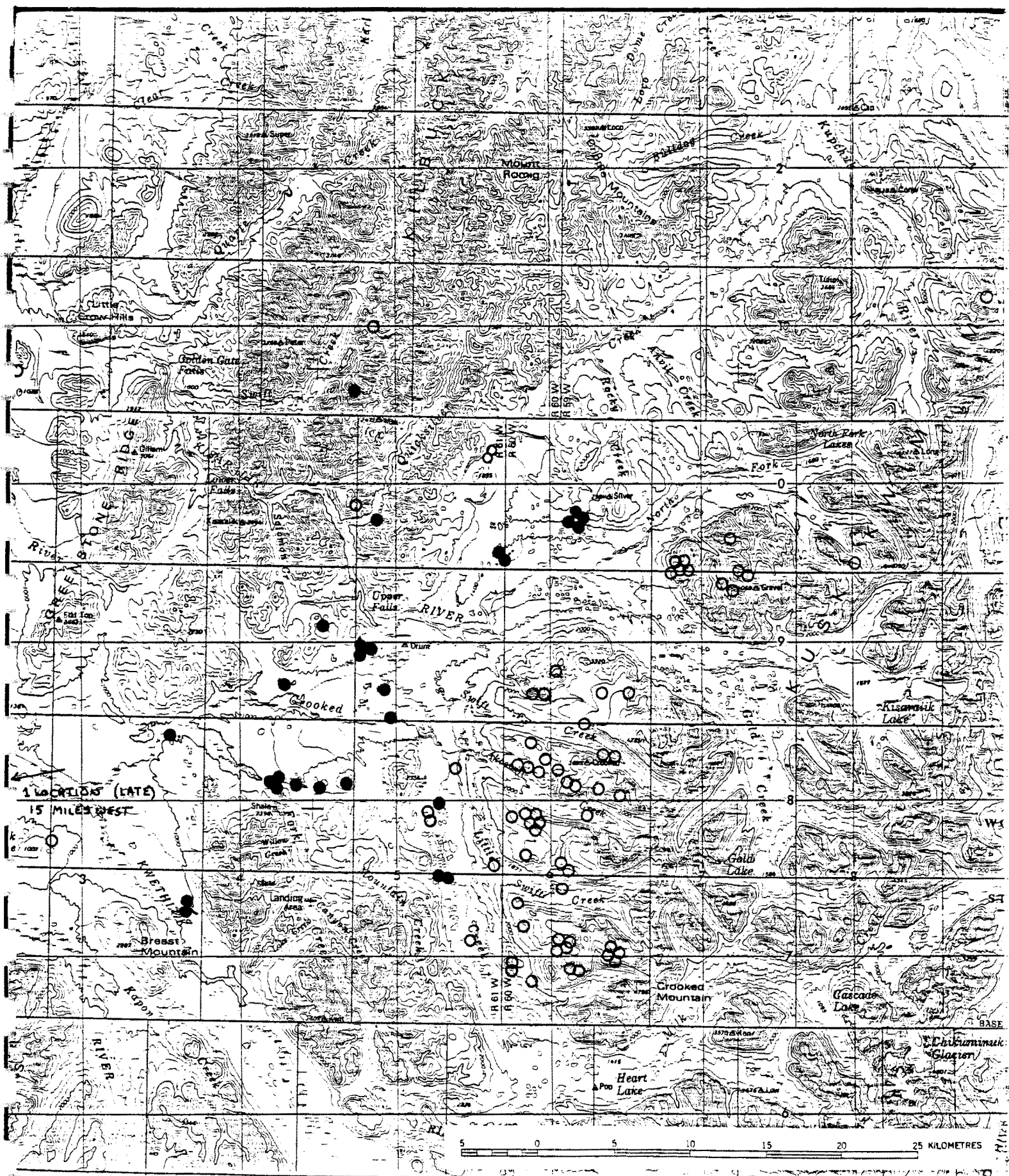


## APPENDIX V

### Distribution and Movements of Radio Collared Caribou Kilbuck Mountains, Southwest Alaska March 1987-May 1988

Map 1.....	Winter (Oct-Mar)
Map 2.....	Summer (Jun-Aug)
Map 3.....	Fall (Sep)
Map 4.....	Spring (Apr)
Map 5.....	Calving(May)
Map 6.....	Frequency 151.304
Map 7.....	Frequency 151.360
Map 8.....	Frequency 150.120
Map 9.....	Frequency 150.860
Map 10.....	Frequency 150.170
Map 11.....	Frequency 150.310
Map 12.....	Frequency 151.080
Map 13.....	Frequency 151.625
Map 14.....	Frequency 150.020
Map 15.....	Frequency 151.060
Map 16.....	Frequency 150.340
Map 17.....	Frequency 151.440
Map 18.....	Frequency 150.300
Map 19.....	Frequency 150.240
Map 20.....	Frequency 151.530
Map 21.....	Frequency 151.390
Map 22.....	Frequency 150.520
Map 23.....	Frequency 150.225



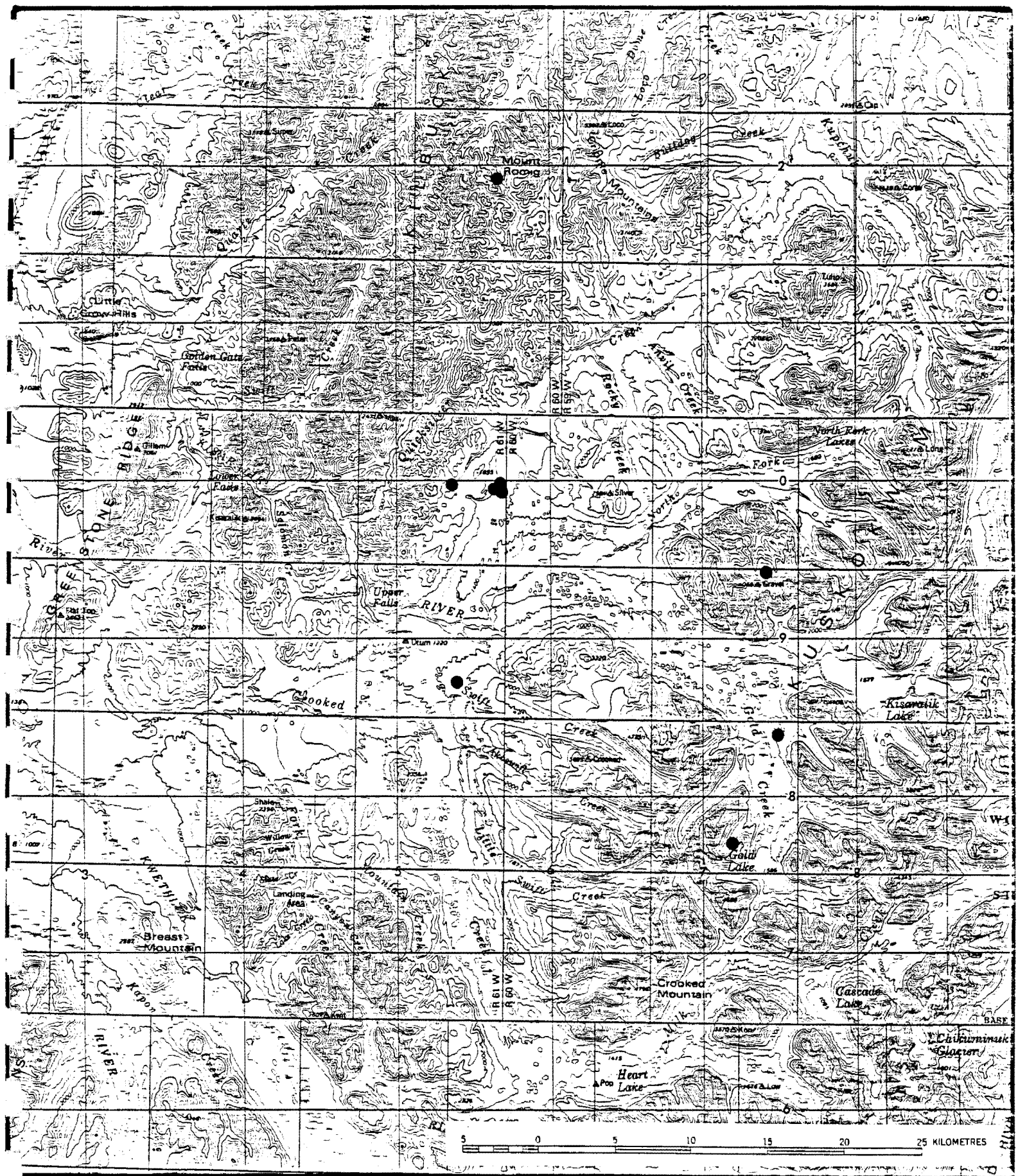


Map 1. Winter distribution of radio collared caribou from the Kilbuck herd, southwest Alaska, 1987-1988. Solid circles represent early winter (Oct-Dec) and open circles represent late winter (Jan-Mar).



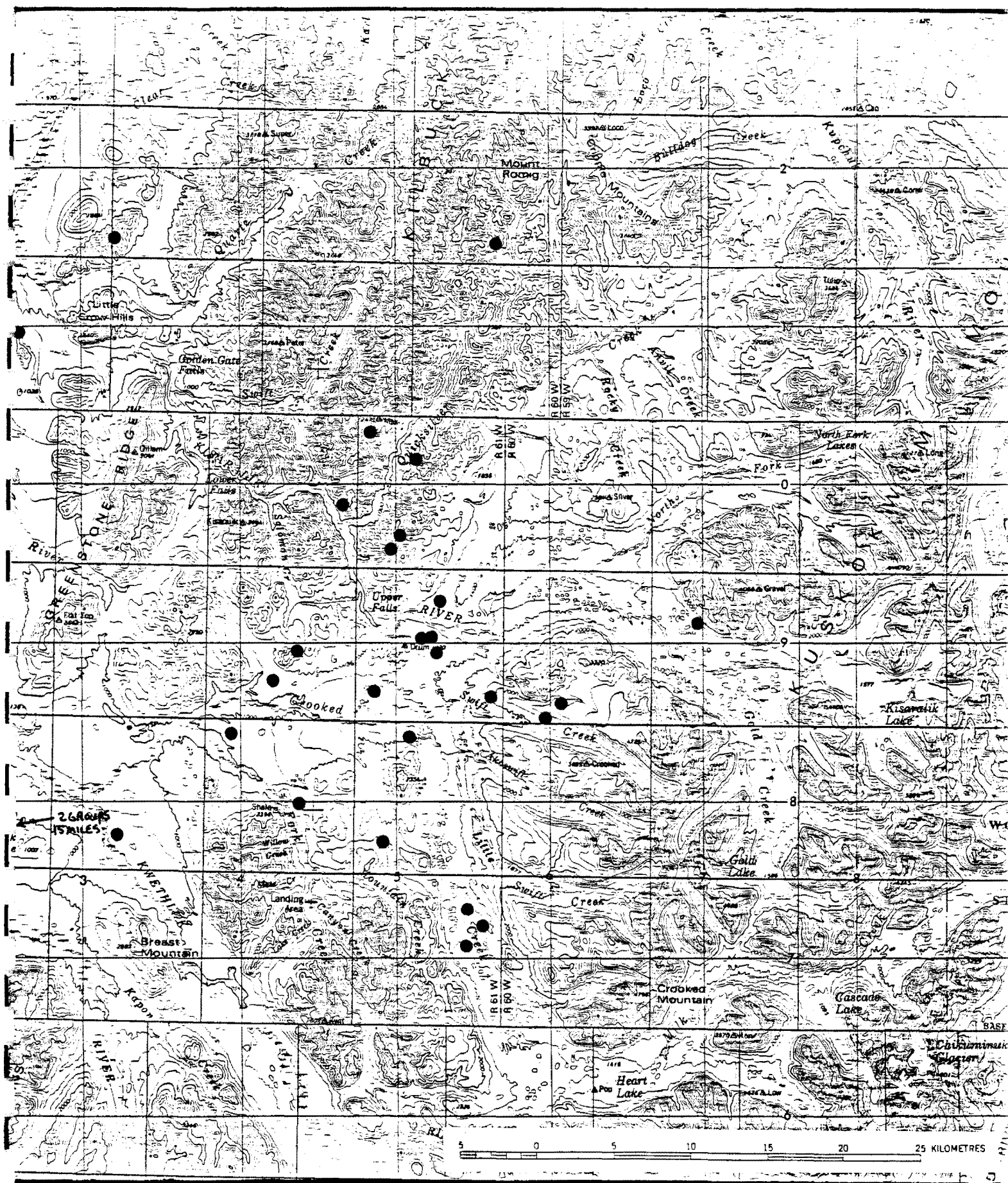






Map 3. Fall (Sep) distribution of radio collared caribou from the Kilbuck herd, southwest Alaska, 1987-1988.



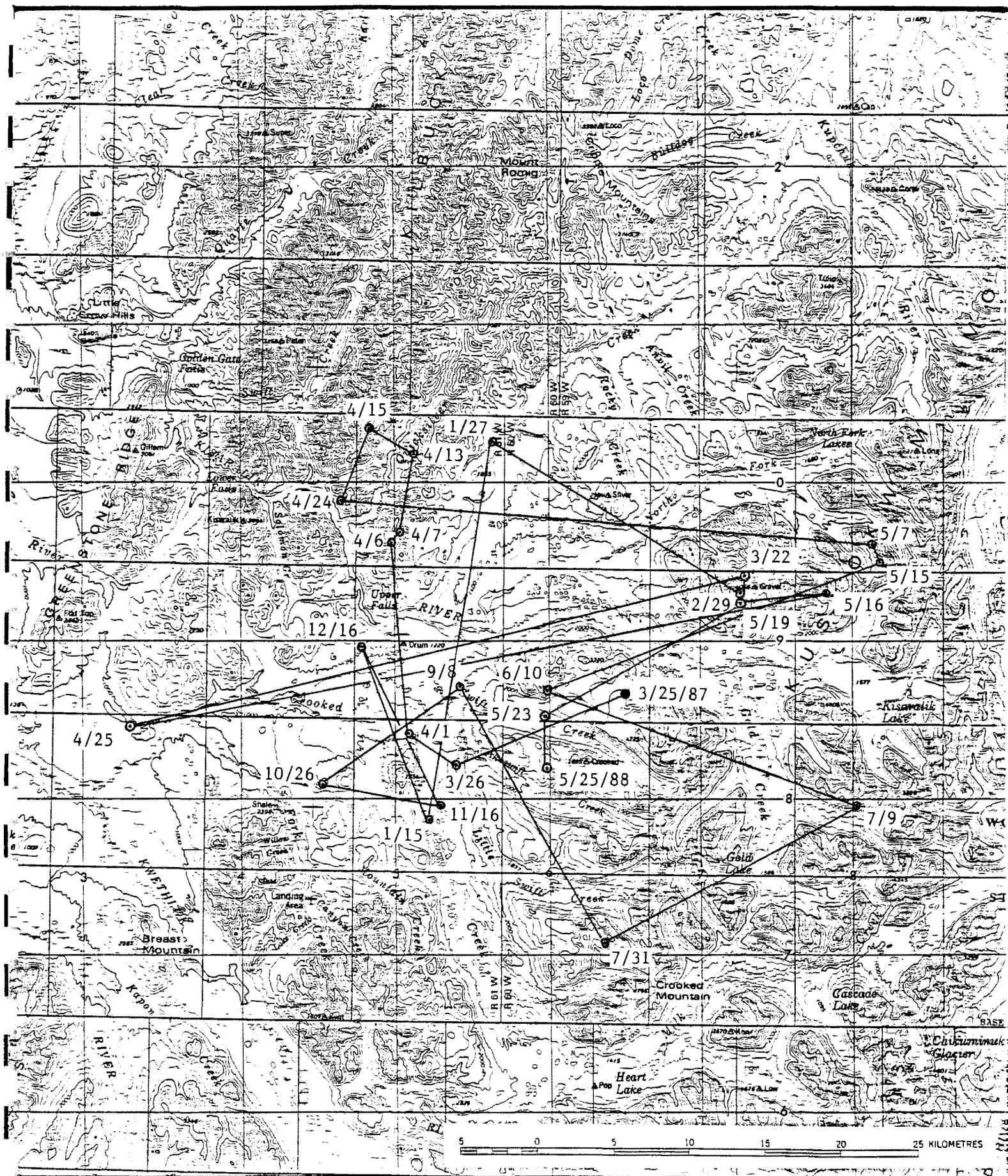


Map 4. Spring (Apr) distribution of radio collared caribou from the Kilbuck herd, southwest Alaska, 1987-1988.







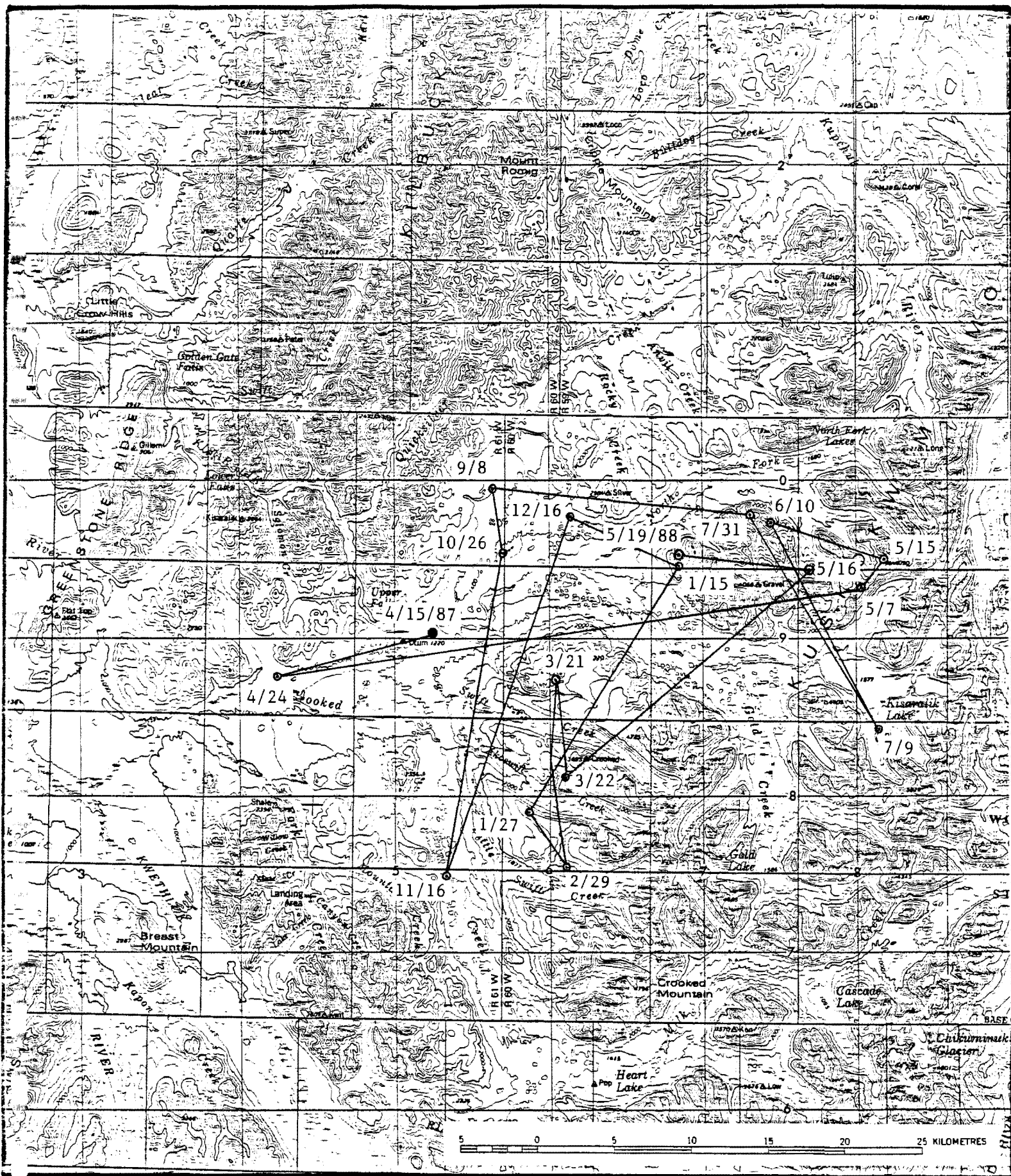


Map 6. Movements of adult female caribou 151.304 from the Kilbuck herd, March 1987 - May 1988.







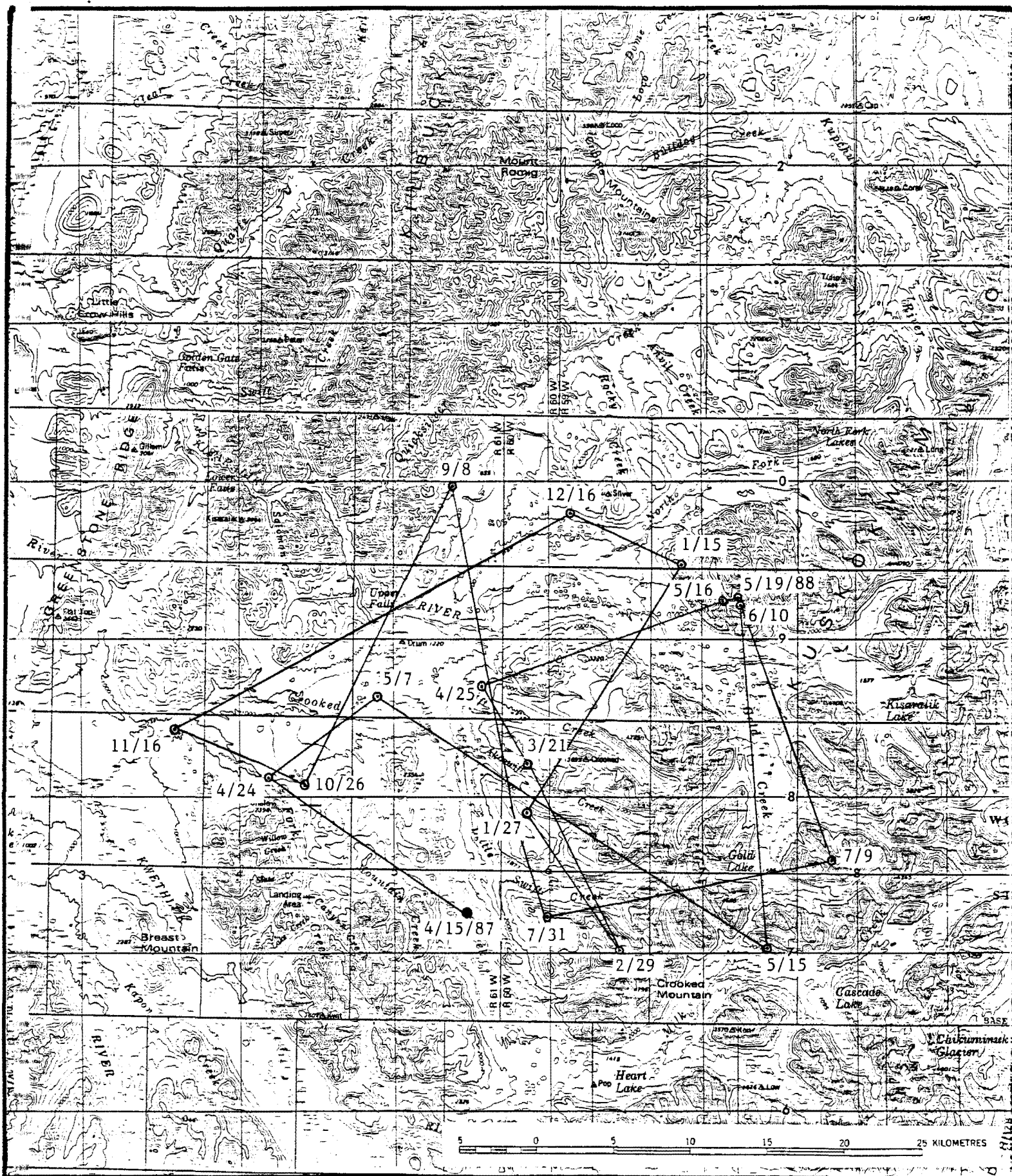


Map 8. Movements of adult female caribou 150.120 from the Kilbuck herd, April 1987 - May 1988.



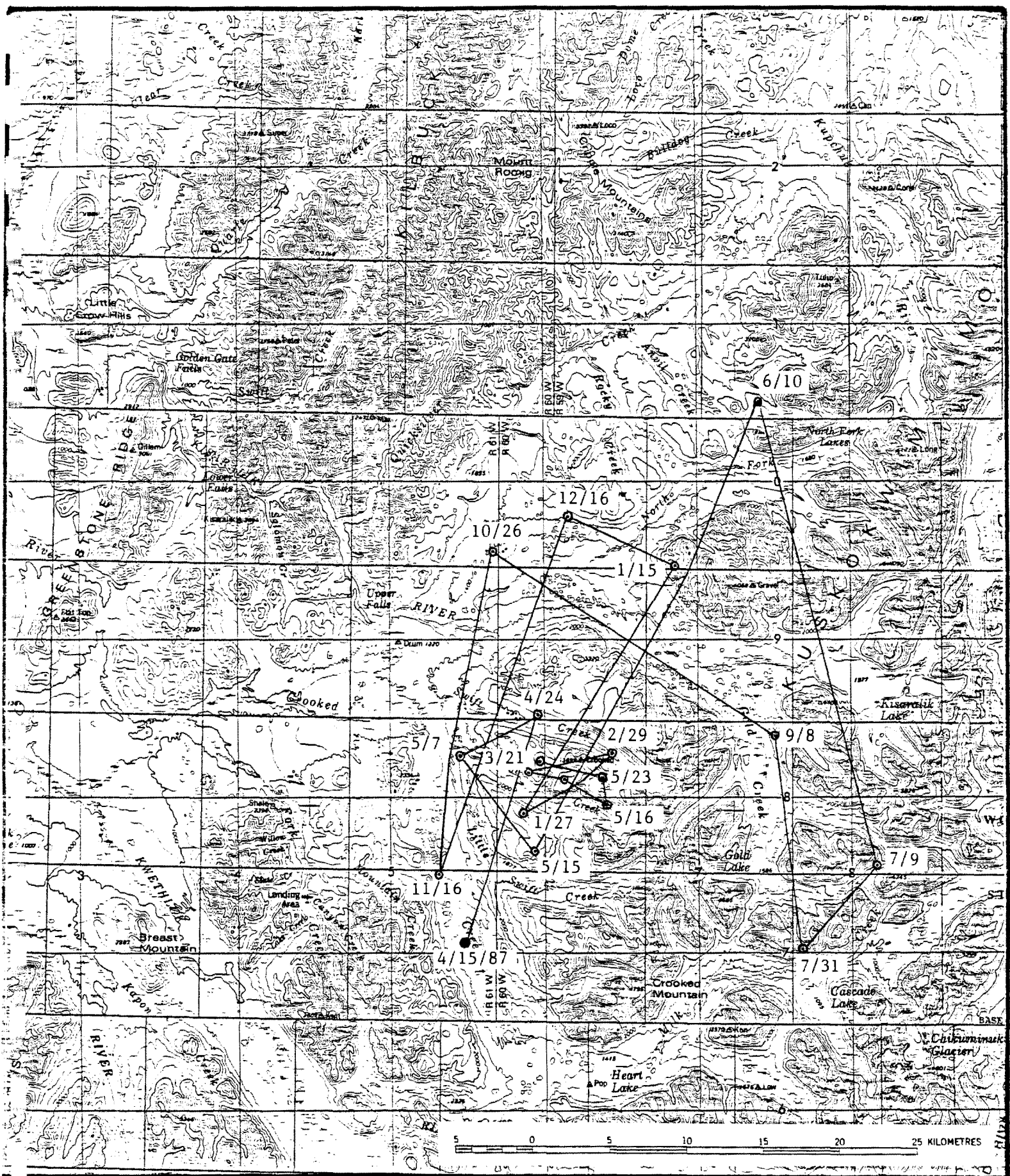






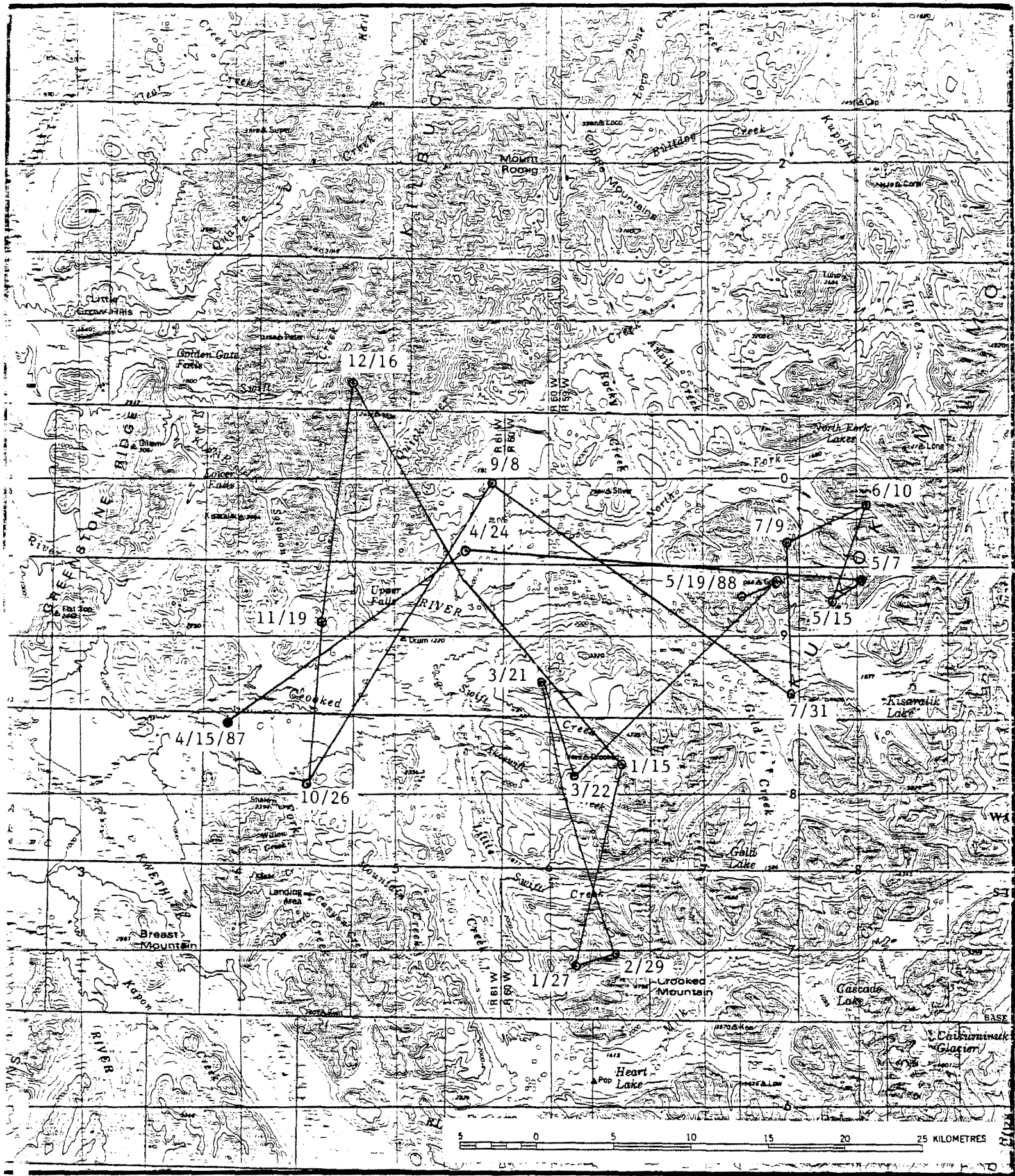
Map 10. Movements of adult female caribou 150.170 from the Kilbuck herd, April 1987 - May 1988.





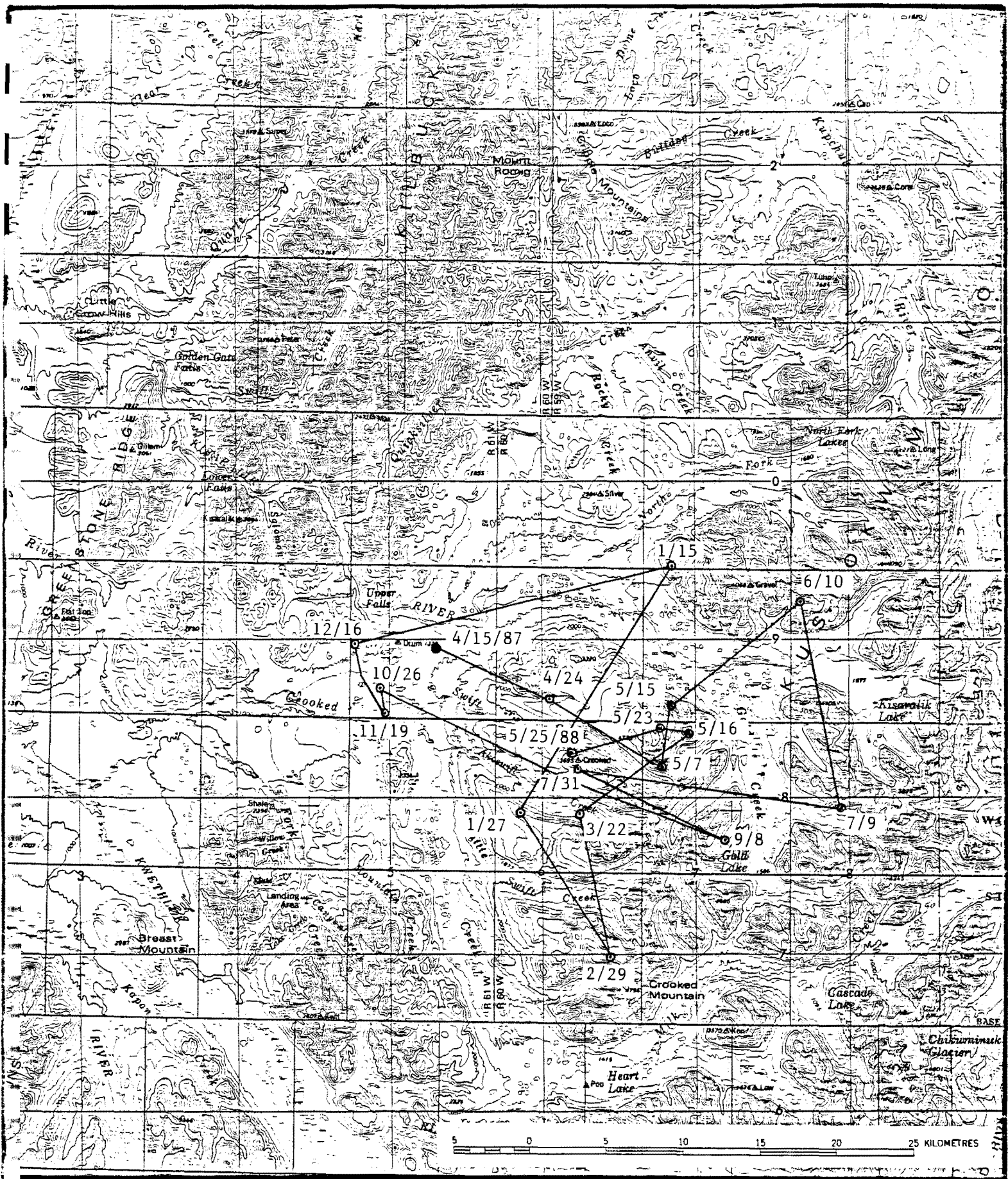
Map 11. Movements of adult female caribou 150.310 from the Kilbuck herd, April 1987 - May 1988.





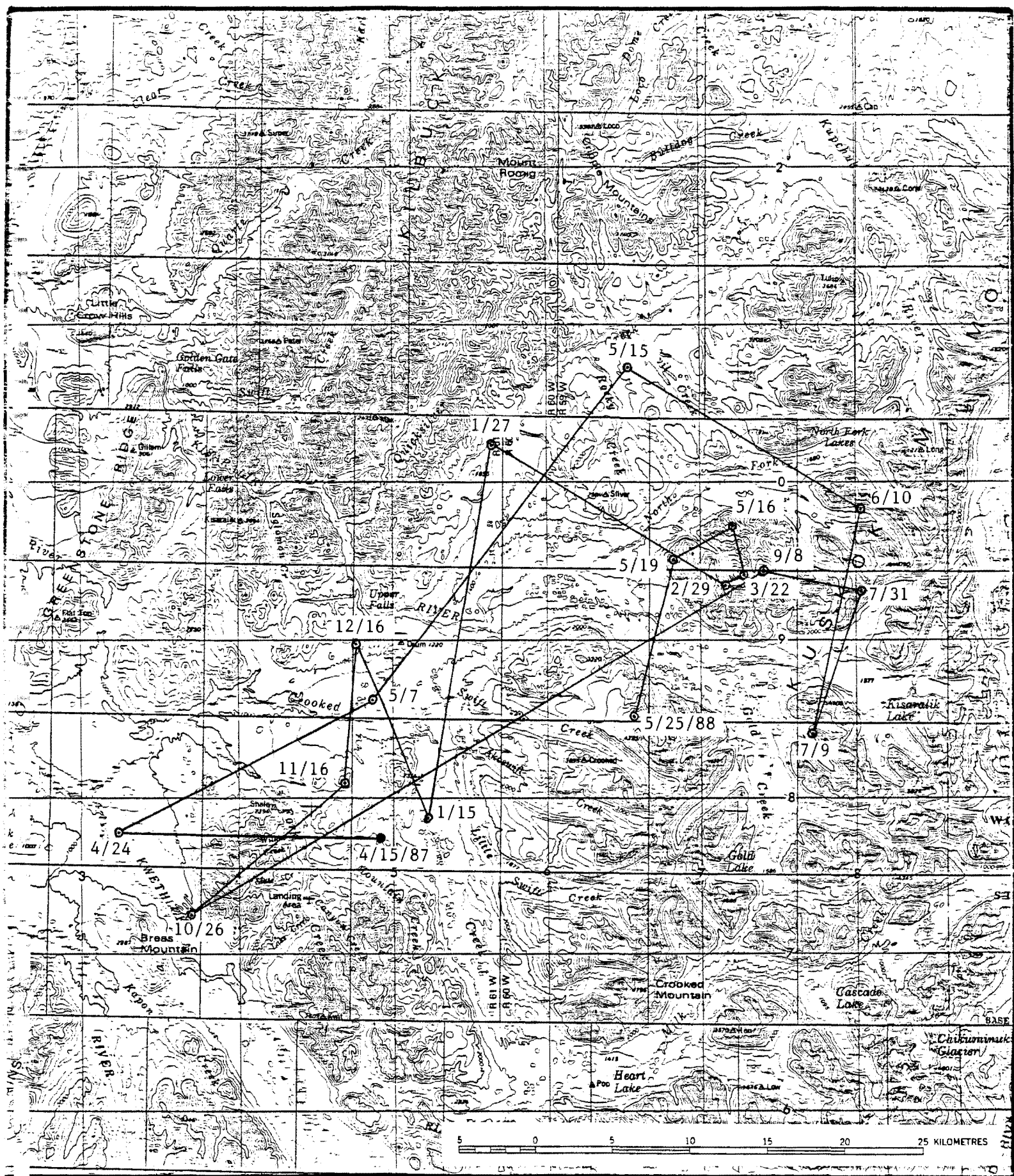
Map 12. Movements of adult female caribou 151.080 from the Kilbuck herd, April 1987 - May 1988.





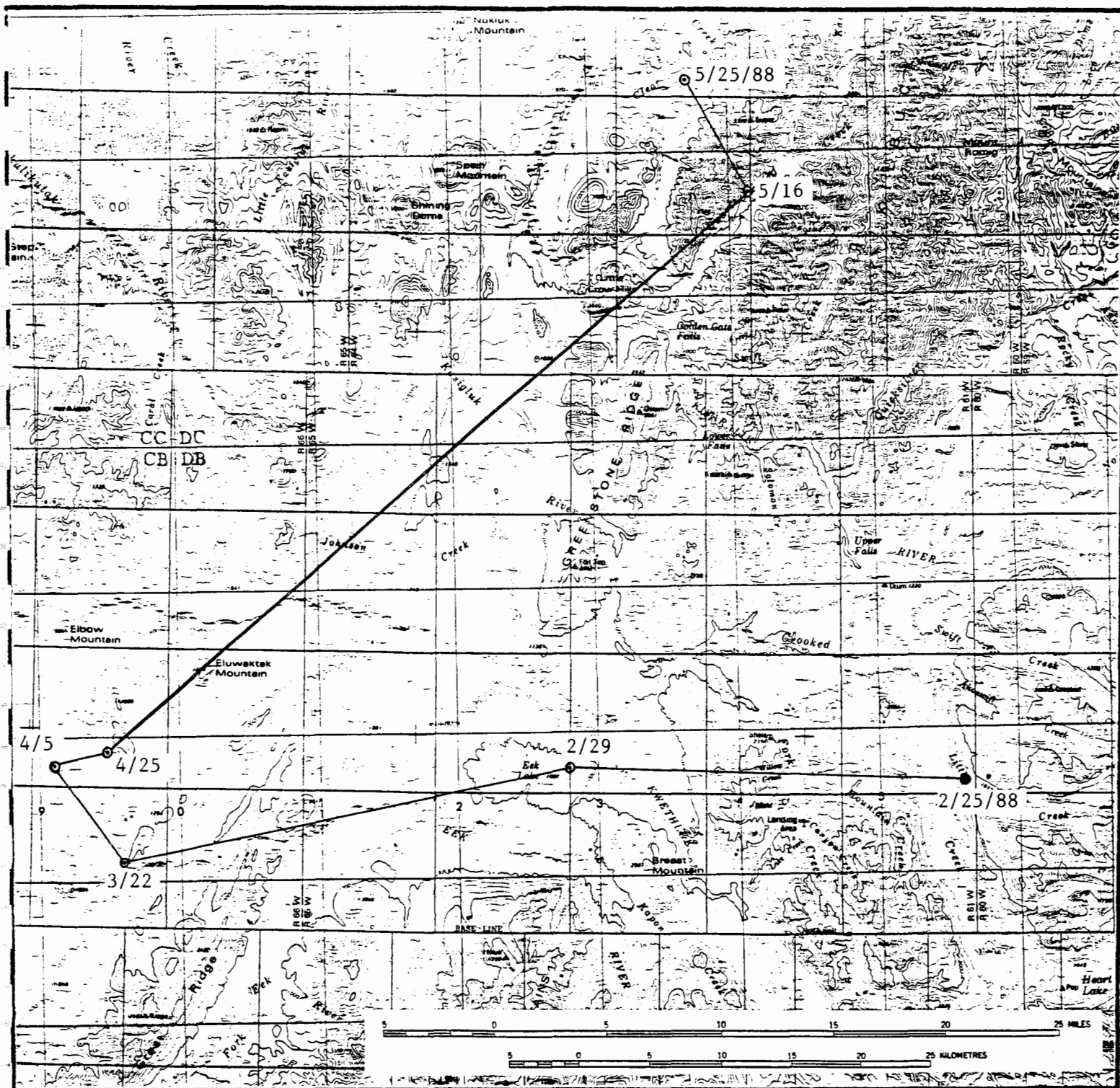
Map 13. Movements of adult female caribou 151.625 from the Kilbuck herd, April 1987 - May 1988.





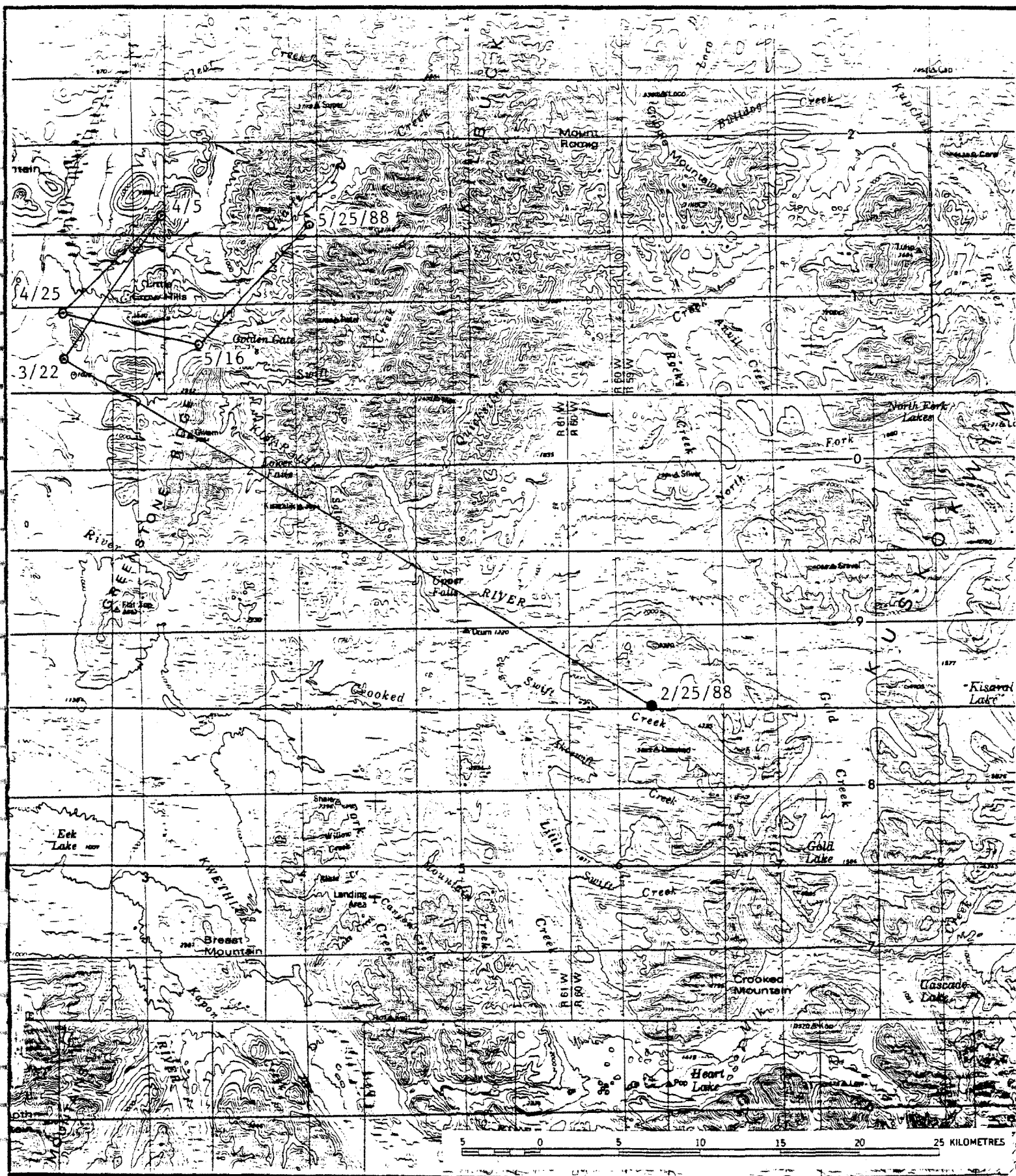
Map 14. Movements of adult female caribou 150.020 from the Kilbuck herd, April 1987 - May 1988.





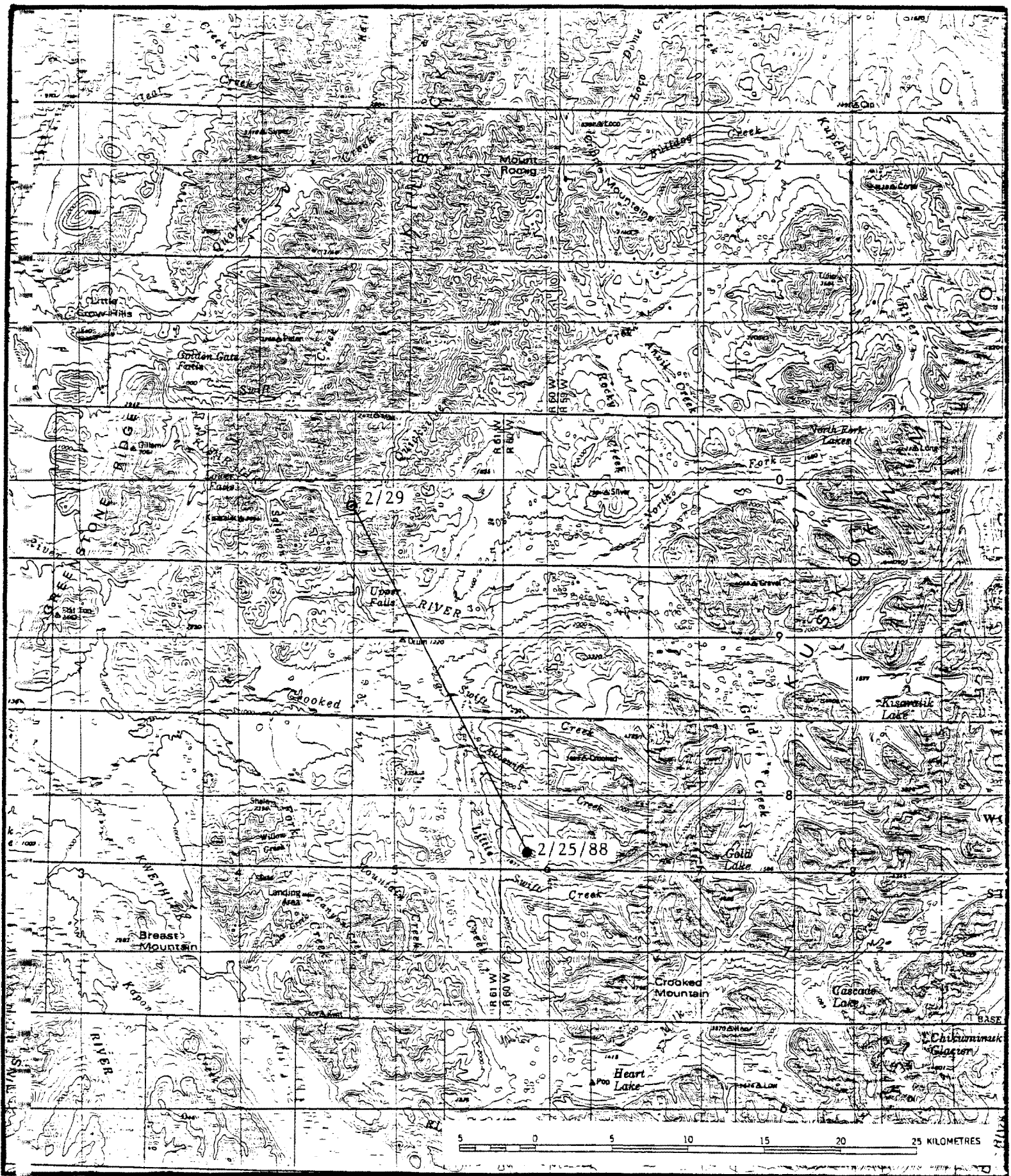
Map 15. Movements of adult male caribou 151.060 from the Kilbuck herd, February 1988 - May 1988.





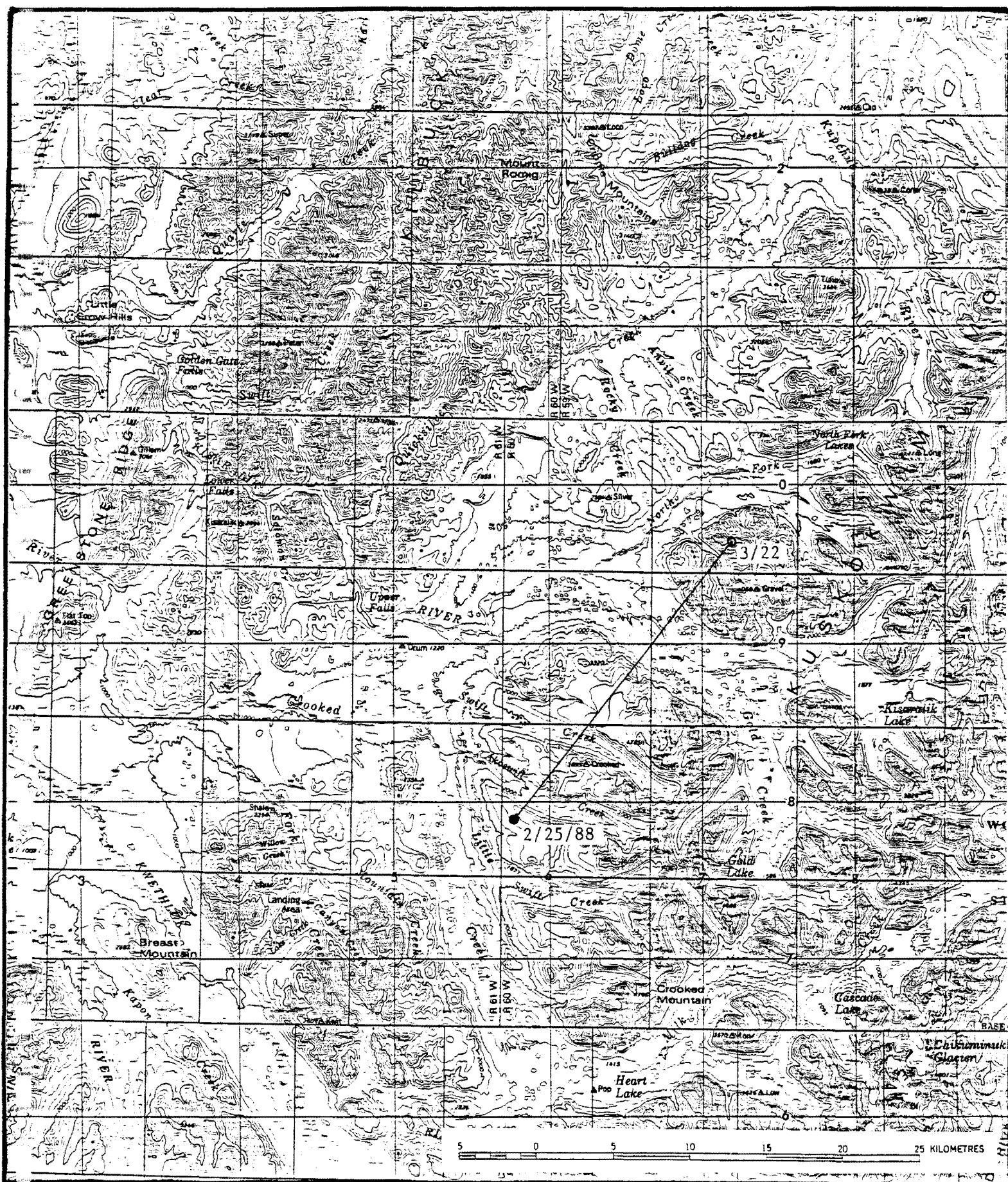
Map 16. Movements of adult female caribou 150.340 from the Kilbuck herd, February 1988 - May 1988.





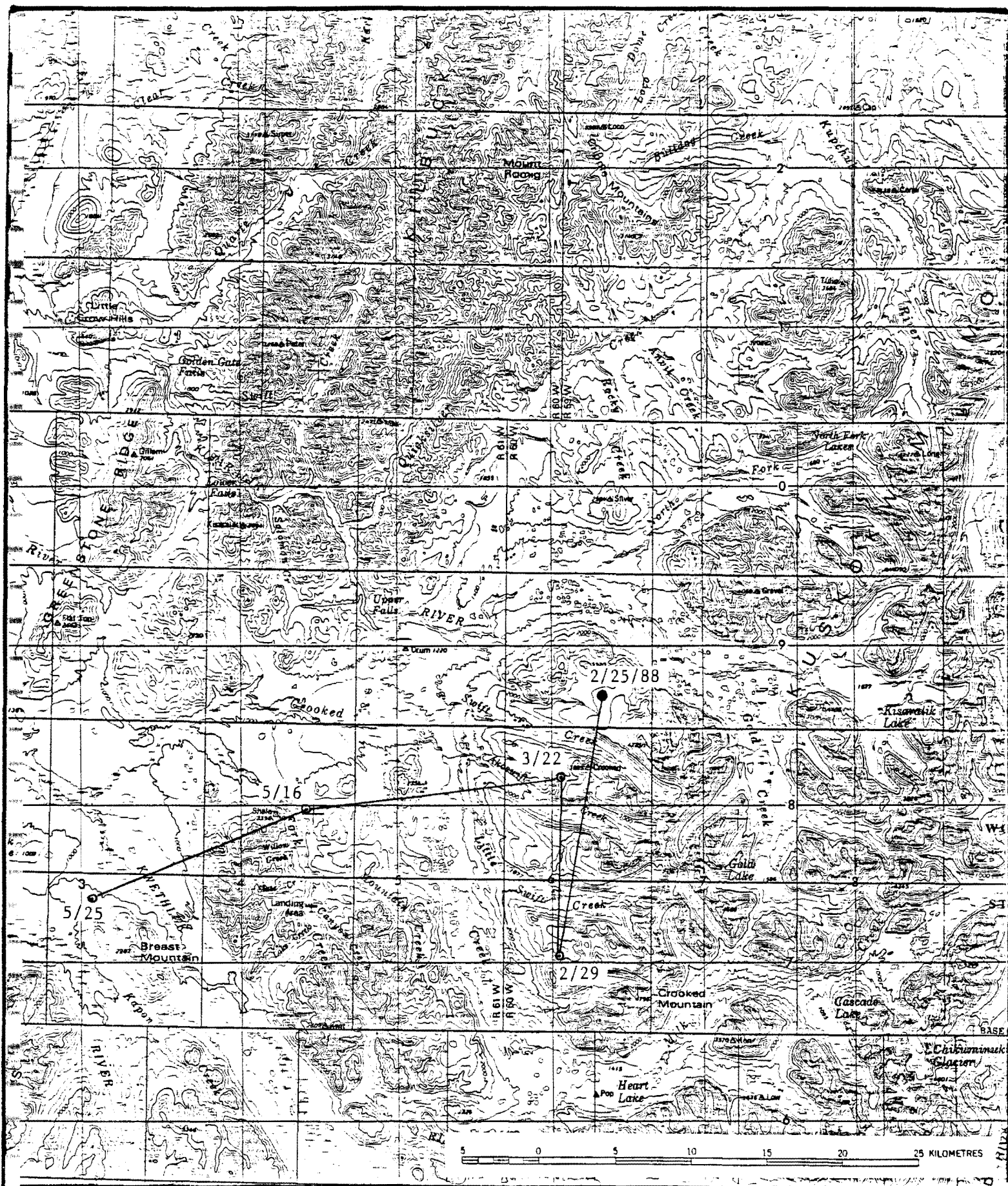
Map 17. Movements of adult male caribou 151.440 from the Kilbuck herd, February 1988.





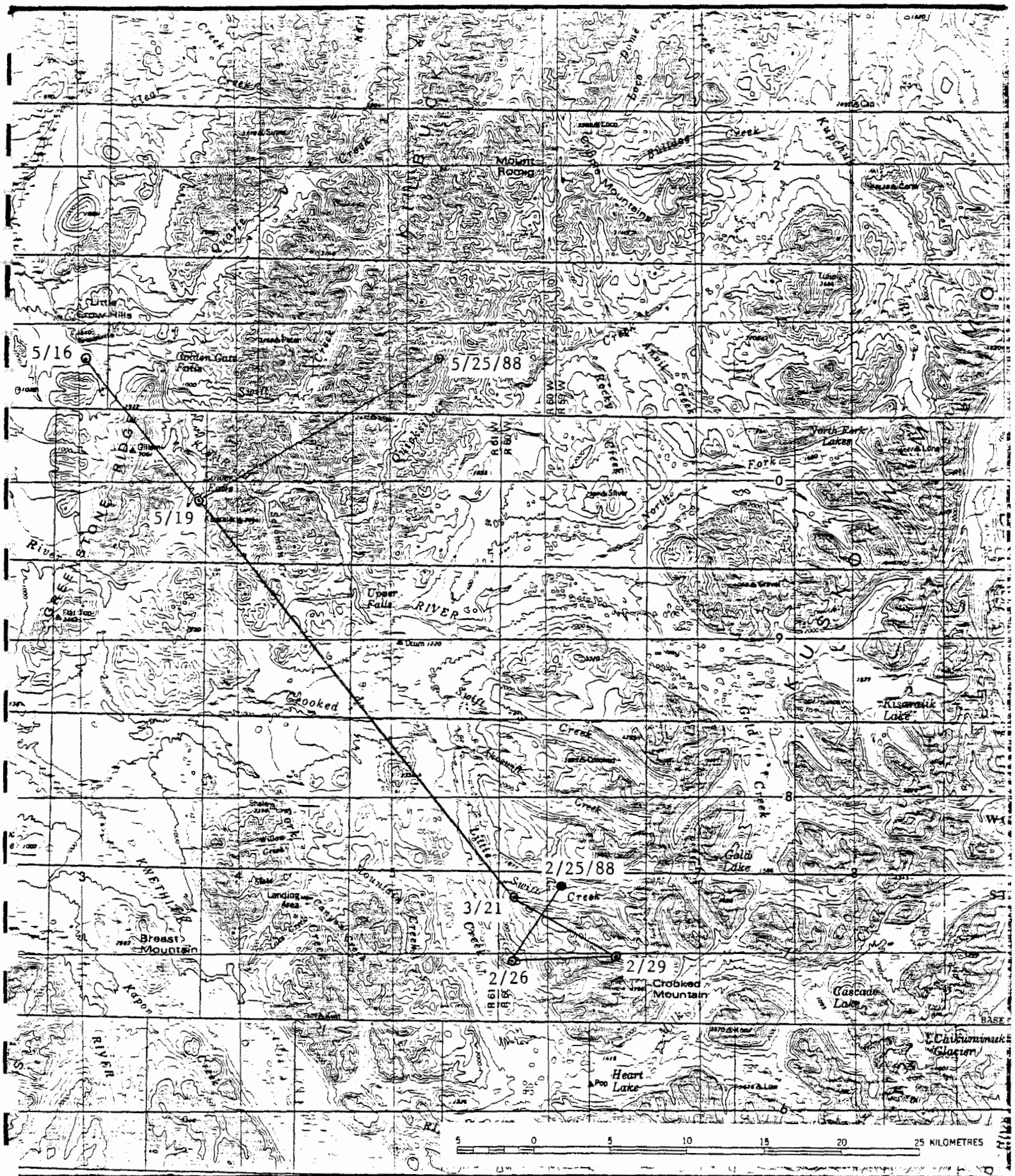
Map 18. Movements of adult male caribou 150.300 from the Kilbuck herd, February 1988 - March 1988.





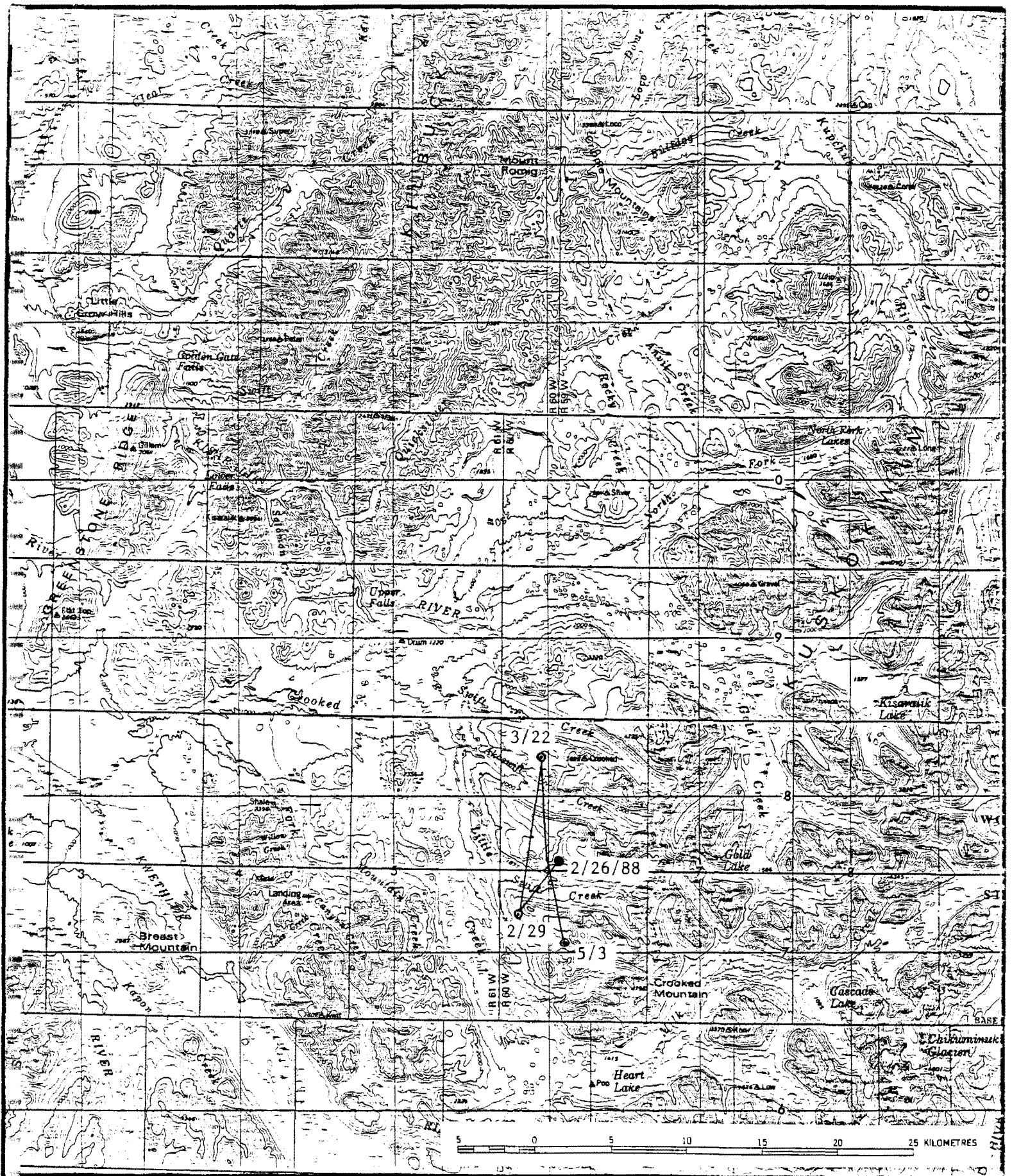
Map 19. Movements of adult male caribou 150.240 from the Kilbuck herd, February 1988 - May 1988.





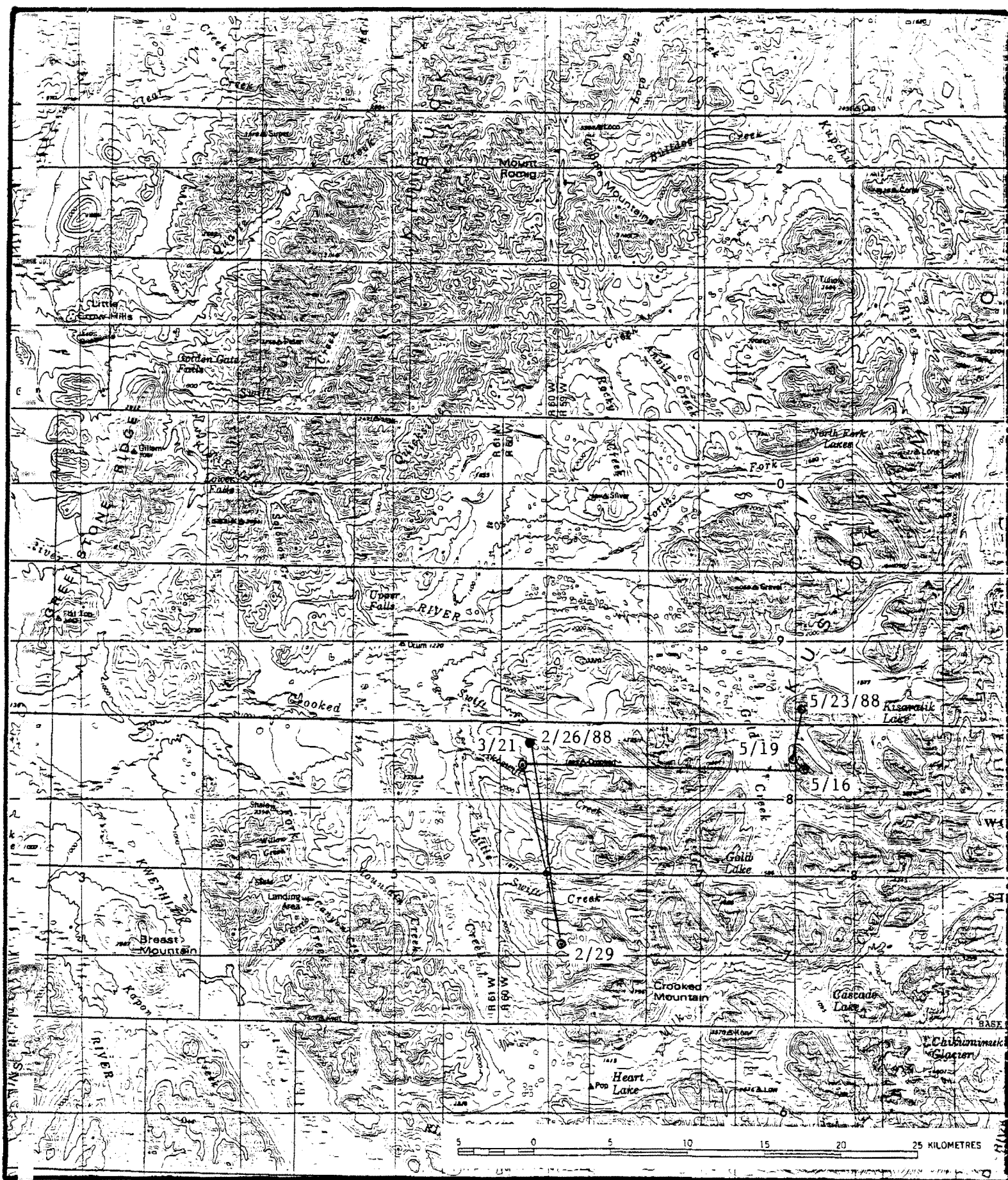
Map 20. Movements of adult male caribou 151.530 from the Kilbuck herd, February 1988 - May 1988.





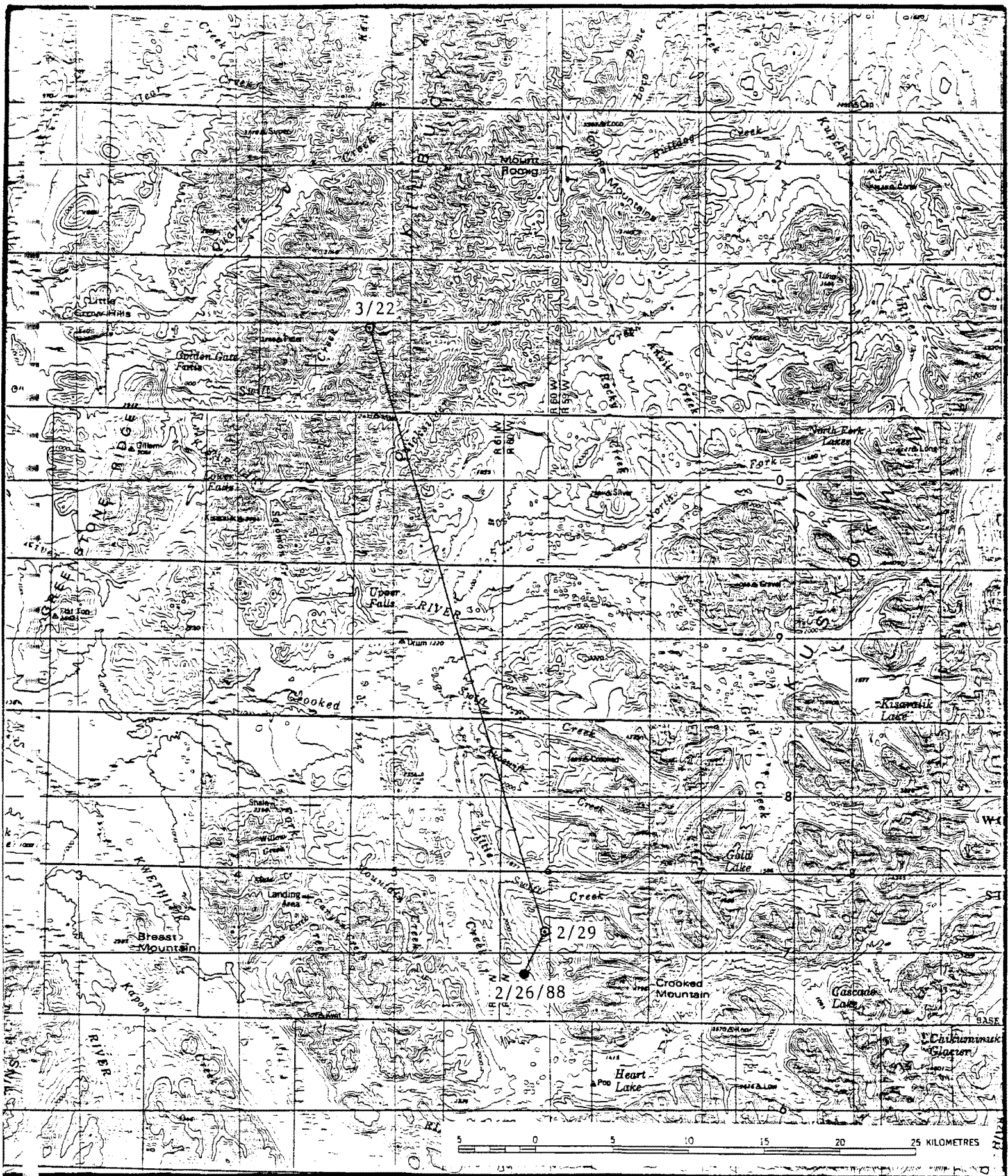
Map 21. Movements of adult male caribou 151.390 from the Kilbuck herd, February 1988 - May 1988.





Map 22. Movements of adult female caribou 150.520 from the Kilbuck herd, February 1988 - May 1988.





May 23. Movements of adult male caribou 150.225 from the Kilbuck herd, February 1988 - March 1988.