

PROGRESS REPORT
KILBUCK CARIBOU STUDY
SEPTEMBER 1985 - MAY 1989

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

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Mortality	Home Range	Productivity

Cooperative Study Between

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Table of Contents

	<u>Page</u>
List of Tables & Figures.....	i
List of Figures.....	i
List of Appendices.....	ii
Summary.....	1
Background.....	1
Objectives.....	2
Study Area.....	2
Procedures.....	2
Results and Discussion.....	2
Herd Identity.....	2
Population Size.....	3
Sex and Age Ratio.....	4
Calf Production and Survival.....	4
Seasonal Distributions and Movements.....	4
Seasonal Changes in Group Size.....	7
Home Range.....	7
Mortality.....	7
Recommendations.....	7
Acknowledgements.....	8
Literature Cited.....	8

SUMMARY

Kilbuck caribou comprise a distinct, resident herd. Evidence supporting this conclusion include the presence of discrete calving areas in the upper Kisaralik River drainage and complete fidelity to the study area by all animals radio-collared the previous 2 years. Recent evidence, however, indicates an association or overlap with the expanding Mulchatna herd.

A minimum of 1,587 caribou were observed during the November 1988 aerial composition survey. This >2-fold increase over the previous year was apparently due, in part, to an influx of caribou from the Mulchatna herd. It is believed that only a portion of these animals are year-round residents, with the remainder being seasonal migrants that may not return each year. The current population estimate for Kilbuck caribou is 900-1,000 resident animals.

Calf production was 66 calves:100 cows and 67 calves:100 cows in 1988 and 1989, respectively. Survival rates for calves was 39% from May to November 1988, and 65% from November 1988 to May 1989. Grizzly bear predation may be an important cause of calf mortality during calving.

Distribution and movements of Kilbuck caribou (June 1988-May 1989) were similar to previous years. During early winter (Oct-Dec), caribou concentrated along the lower flats and foothills of the Kilbuck and western and central Kuskokwim Mountains. In late winter (Jan-Mar), they moved to high, wind-blown slopes and ridgetops in the western Kuskokwim Mountains. Peak calving occurred mid-May among the higher, rugged mountain tops and ridges of the western Kuskokwim Mountains. The majority of caribou spent the summer (Jun-Aug) in the western Kuskokwim Mountains, overlapping little with their winter range. As rut approached, Kilbuck caribou returned to their winter range.

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

BACKGROUND

A small population of caribou occur in the Kilbuck and Kuskokwim Mountains and occupy the eastern edge of Game Management Unit (GMU) 18 and the western edge of GMU 19B and 17B in southwest Alaska. Their range includes the eastern portion of the Yukon Delta National Wildlife Refuge and the northern edge of the Togiak Wildlife Refuge. These animals were once considered to be a western extension of the expanding Mulchatna herd. However, cooperative studies initiated in 1985 indicate that Kilbuck caribou comprise a distinct, resident population deserving of special management consideration.

The purpose of this progress report is to summarize data collected from June 1988-May 1989, compare the results with previous years, and report interim findings on herd identity, numbers, productivity, movements and seasonal distribution.

OBJECTIVES

To estimate herd identity, population size, age and sex composition, and seasonal distribution of caribou from the Kilbuck herd, southwest Alaska.

STUDY AREA

The study area is approximately 6,400 km² and includes the southern half of the Kilbuck Mountains and the western and central portions of the southern end of the Kuskokwim Mountains (Fig. 1). It is located 80 km east of Bethel on the eastern boundary of Yukon Delta National Wildlife Refuge, and includes portions of Togiak National Wildlife Refuge and Wood-Tikchik State Park.

PROCEDURES

Hinkes (1988) described the field methodology and analytical procedures used to determine herd identity, population size, age and sex composition, and seasonal distribution. No additional caribou were radio-collared.

RESULTS AND DISCUSSION

Twenty-three aerial surveys and/or radio-tracking flights (104.8 hrs) were conducted in the study area from June 1988-May 1989. A total of 9,087 caribou in 355 groups were observed.

In comparison, 17,634 caribou in 754 groups have been observed since this project was initiated (Sep 1985). This includes 417 radio-collared caribou relocations. Appendix I lists all observations made during the study to date. Appendix II summarizes caribou data by month and by year. Also included is mean group size and mean elevation of observations. Caribou observations by radio-collar frequency are summarized in Appendix III.

Herd Identity

The contention that Kilbuck caribou comprise a distinct resident herd is supported by the study's findings. Kilbuck caribou continue to use a discrete calving area in the upper Kisaralik drainage, a factor used in defining a distinct herd (Skoog 1968). In addition, with one exception, all radio-collared caribou have remained on the study area in the western and central Kuskokwim

and southern Kilbuck Mountains (Appendix V). One radio-collared bull (150.240), moved south off the study area in spring 1988, but returned to the core area by August.

Although the Kilbuck caribou represent a distinct, resident herd, there is evidence to suggest some association or range overlap between Kilbuck animals and the Mulchatna herd to the east. Caribou estimates from the composition survey conducted in November 1988 more than doubled from 1987, and are probably the result of movement into the area by Mulchatna animals. In addition, a radio-collared female (150.571) from the Mulchatna herd moved onto the study area in February-April 1989. Furthermore, approximately 2,000 caribou appeared south of Aniak, along the northern end of the Kilbuck Mountains. These animals were present from November 1988 to January 1989 and were believed to be part of the Mulchatna herd.

The expanding Mulchatna herd is estimated at >60,000 animals and has shown some unusual movements, including expansion into range not used for many years (Taylor 1988). Although Mulchatna caribou overlapped the range of the Kilbuck herd this past winter, it is unknown if this overlap will be repeated in future years. This is an important consideration in the management of caribou in Unit 18, particularly as it relates to determining harvest levels and the time of year hunting is permitted.

Population Size

A minimum of 1,587 caribou were observed during the November 1988 composition count. The count was conducted using 2 Cessna aircraft and covered approximately 90% of the core study area. Large groups of caribou concentrated primarily along the lowlands between the southern Kilbuck and Kuskokwim Mountains. Counts of groups >30 were verified with black and white 35mm photography. Aerial estimates were within 1% of the actual count derived from photography.

The November count represents a >2-fold increase in caribou numbers from the 1987 count; an increase reproductively unlikely. The 1988 survey was more intensive and covered a larger area. However, it is not believed that large numbers of caribou were missed in 1987, because caribou were concentrated in the same areas both years. It appears the increase in caribou was caused by an influx from the Mulchatna herd.

It is believed that only a portion of the caribou observed in November are resident animals, and the remainder were seasonal migrants which may not return each year. Indirect evidence suggest that most of the seasonal migrants had moved east by spring. The radio-collared Mulchatna caribou relocated 175 km east in the Mosquito Hills where it was originally collared and where it is believed to have calved (Twitchel NPS, pers.

commun.). Trails were observed crossing the Aniak River towards Nishlik Lake in March. Twenty miles east during this same time, 100+ caribou were observed moving east along a well used trail previously used by numerous animals. In addition, an intensive survey of the calving grounds during May 1989 revealed 304 cows present, compared to >700 cows estimated during the November count.

Assuming the cows observed during calving represented 80% of the Kilbuck herd's female component (20% missed or not calving), and using composition ratios from the November count, the pre-calving estimate is 800-900 animals. If calves are considered (assuming 30-50% survival), it is reasonable to assume the resident herd presently numbers 900-1,000.

Sex and Age Ratio

Sex and age composition was collected during the November 1988 aerial survey. A total of 845 caribou were classified, either visually (groups ≤ 20) or using black and white 35mm photography taken during low level passes. Results were: 29.6% bulls, 46.8% cows, 12.2% calves and 11.4% unclassified (yearlings). Ratios included 63 bulls:100 cows, 24 yearlings:100 cows, and 26 calves:100 cows.

Calf Production and Survival

Calving was observed 10-25 May 1989 with the peak occurring the week of the 15th. Intensive calving surveys were conducted 24-25 May. This was later than desired due to weather, and many cow/calf pairs had formed larger groups. These groups were photographed with 35mm color slides to determine calf numbers and cow/calf ratio. A total of 213 calves were estimated for a ratio of 67 calves:100 cows. This compares to 66 calves:100 cows observed in May 1988.

The ratio of short yearlings during the May 1989 survey was 17 yearlings:100 cows. When compared to the November 1988 (26 calves:100 cows) and May 1988 (66 calves:100 cows) calf:cow ratios, the first 6 months following calving are the most critical (39% survival). Survival rates improved the latter half (65% survival) of the first year.

Seasonal Distributions and Movements

Seasonal distributions of Kilbuck caribou were similar to previous years. With a full year of data on radio-collared bulls, a better understanding of male versus female distribution was established. Seasonal distributions of all caribou observations are illustrated in Appendix IV (Maps 1-3). Appendix V (Maps 1-20) illustrates the seasonal distribution and movements of individual radio-collared animals. Although distribution is

based on information dating from September 1985, approximately 95% of all observations made since February 1987. In general, individual radio-collared animals and herd distribution and movements were similar.

Winter (Oct-Mar). Caribou distribution differed between early (Oct-Dec) and late winter (Jan-Mar) (Appendix IV, Map 1). In early winter, caribou were located between the southern Kilbuck and Kuskokwim Mountains in the lower flats and foothills along the Kisaralik River, Crooked Creek and Quicksilver Creek drainages. During late winter, some caribou remained in the same area as early winter, however, most moved east to the upper mountain slopes and ridgetops along the southwestern portion of the Kuskokwim Mountains. During this period, little separation occurred between sexes with the exception of some bulls moving to the western portion of the southern Kilbucks (Appendix V, Map 1).

The differences in distribution between early and late winter appear to be snow-related. Snowfall was greatest and snow cover most complete during early winter. As winter progressed, strong winds hard-packed snow at lower elevations and made cratering more difficult. These same winds, however, swept many of the mountain tops and ridges free of snow and allow easy access to lichen-rich areas. Snow-free areas were common at higher elevations along the southwestern portion of the Kuskokwim and southern Kilbuck Mountains where caribou were most often observed during late winter.

Spring Movement (Apr-May) and Calving. In April, most caribou moved west, out of the Kuskokwim Mountains and onto the flats and foothills occupied during early winter (Appendix V, Map 3). This shift in distribution was probably related to snow cover as well as the emergence of new vegetation. Snow cover remained complete in the Kuskokwim Mountains (with the exception of wind swept ridges and mountain tops) throughout April. Lower elevations to the west on the flats and foothills along Crooked Creek, Kisaralik River and Quicksilver Creek were snow-free and new plant growth is expected to occur in these areas first.

Caribou were widely dispersed by May (Appendix V, Map 5). The radio-collared bulls were found well to the west of the calving grounds in the southern Kilbuck Mountains. The rest of the herd, primarily cows 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). Calving has been documented annually in this area since 1984. Selection of high, rugged mountains areas for calving is probably a predator avoidance adaptation. Three known calving areas were the mountain block between Heart Lake and Kisaralik River, the region between Milk Creek and Kisaralik Lake, and between Kisaralik Lake and North Fork Lakes. The latter area contained the highest concentration of neonate calves for the past 2 years. Calving

was also documented for the first time north of North Fork lakes.

Summer (Jun-Aug). The majority of caribou summered in the Kuskokwim Mountains (Appendix IV, Map 2), with many animals moving to the eastern portions of the range between Milk Creek and North Fork Lakes.

Bulls generally remained separate from cows, spending most of the summer in the northern portion of their range along the upper Kipchuk River and Quicksilver Creek. Although some cows were present, the majority of caribou north of North Fork Lakes were bulls. One exception was bull 150.240 which was located 45 km south of the study area during the summer, but returned in September.

Fall Movement (Sep) and Rut. Fall was a period of transition with some caribou (primarily cows) remaining on the summer range near Kisaralik Lake while others moved into the lowlands and foothills to the west (Appendix V, Map 4). Although some radio-collared cows made this shift in late August, all radio-collared cows were again located on the summer range throughout September. During this time, radio-collared bulls moved south from the upper Kipchuk River drainage, and by October both bulls and cows were concentrated on the rutting grounds at lower elevations along Crooked Creek, Kisaralik River and Quicksilver Creek.

Elevational Changes. Elevational changes in seasonal distribution and movements were similar to previous years (Fig. 2). The lowest mean elevation used by caribou occurred during the rut and post-rut aggregation in October-November. At this time, the range of elevations used was also low. As winter progressed, mean elevation increased with a peak in March as caribou used high, wind-blown mountain and ridge tops. By early spring (Apr), mean elevation used declined as many caribou moved to the snow-free lowlands where green vegetation first appeared. By May, coincident with calving, mean elevation increased again. Some cow/calf pairs were located above 4,000' on rugged mountain tops. During May, there was a significant difference in mean elevation between radio-collared bulls and cows ($P < 0.001$) because bulls remained at lower elevations to the west.

Post-calving and throughout the summer, caribou remained at higher elevations where they were often observed on snow fields. This behavior may have been an attempt to reduce insect harassment. After July 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 (≥ 1) functioning as a unit. Seasonal changes in mean group size continued to be dramatic (Fig. 3). Maximum group size occurred in winter. Average group size decreased steadily through May as cows broke into smaller groups or became solitary prior to calving. Mean group size remained low through September when group size again increased with the onset of rut.

Home Range

Total range of Kilbuck caribou determined from all observations was 5,900 km². Mean home ranges of radio-collared female and male caribou were significantly different ($P < 0.003$). Mean home range for 10 female and 4 male radio-collared female and male caribou was 1,184 km² (559-1,787 km²) and 2,024 km² (1,376-2,382 km²) respectively. Number of relocations from which individual home ranges were calculated ranged from 16-38 and covered a period of 15-26 months (Mar 1987-May 1989).

Mortality

Little information is available on natural mortality for the Kilbuck caribou. One radio-collared caribou was poached and a second died of unknown cause. Caribou predation by wolves was documented February 1988, (1 cow killed by a pack of 7 wolves) and a suspected but unconfirmed second instance November 1988 (individual killed by 2 wolves). Moose densities are low in the area and caribou may become an important component of wolf diet as the Kilbuck herd continues to grow.

Grizzly bears were common throughout the study area. Two grizzly bears were seen on the calving grounds in May 1988 and 9 observed in May 1989. One kill site may have been observed but close examination was not possible. These bears were likely searching newborn calves, and may be a significant factor in calf mortality.

RECOMMENDATIONS

Kilbuck caribou comprise a distinct, resident population that is increasing in numbers and possibly expanding in range. The current study should continue to document population parameters, movements and distribution. The association between Kilbuck and the expanding Mulchatna herd needs further investigation. Specific recommendations include:

1. Capture and radio-collar additional bulls in 1990 to supplement the 3 collars still transmitting. If possible, 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 continued each fall using black and white 35mm photography to facilitate classification and verify accuracy of aerial estimates.
3. Continue to conduct an aerial survey during calving to determine calf production and recruitment rates (short yearling count).
4. Initiate the development of a study plan to investigate caribou and predator (e.g., wolf and grizzly bear) relationships for the Kilbuck caribou herd.
5. Continue coordination with the National Park Service and Alaska Department of Fish and Game - Dillingham on the Mulchatna caribou study. This includes monitoring radio-collared Mulchatna animals as their movements bring them closer to the Kilbuck study area.

ACKNOWLEDGMENTS

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Table 1. Deployment and current status of radio collars on adult caribou in the Kilbuck Mountains, southwest Alaska, March 1987 - May 1989.

Collar Frequency	Visual Collar	Sex	Capture Date	Capture Method	Drugs Used	Comments and current status
	None	M	25Mar87	Dart gun	Carfentanil Naloxone	Died 25Mar87; capture mortality collar recovered 16Apr87
151.304	None	F	25Mar87	Dart gun	Carfentanil Naloxone	Mortality mode - Aug88; assumed dead
	None	F	25Mar87	Dart gun	Carfentanil Naloxone	Died 25Mar87; capture mortality collar recovered 15Apr87
151.360	None	M	13Apr87	Dart gun	Carfentanil Naloxone	Still alive; transmitting
	None	F	13Apr87	Dart gun	Otrophine Diprenorphine	Died 13Apr87; capture mortality collar recovered 15Apr87
150.120	None	F	15Apr87	Dart gun	Carfentanil Naloxone	Still alive; transmitting
150.860	None	F	15Apr87	Dart gun	Carfentanil Naloxone	Still alive; transmitting
150.170	None	F	15Apr87	Dart gun	Carfentanil Naloxone	Still alive; transmitting
150.310	None	F	15Apr87	Dart gun	Carfentanil Naloxone	Still alive; transmitting
150.020	None	F	15Apr87	Dart gun	Carfentanil Naloxone	Still alive; transmitting
151.080	None	F	15Apr87	Dart gun	Carfentanil Naloxone	Still alive; transmitting
151.625	None	F	15Apr87	Dart gun	Carfentanil Naloxone	Poached Mar88
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

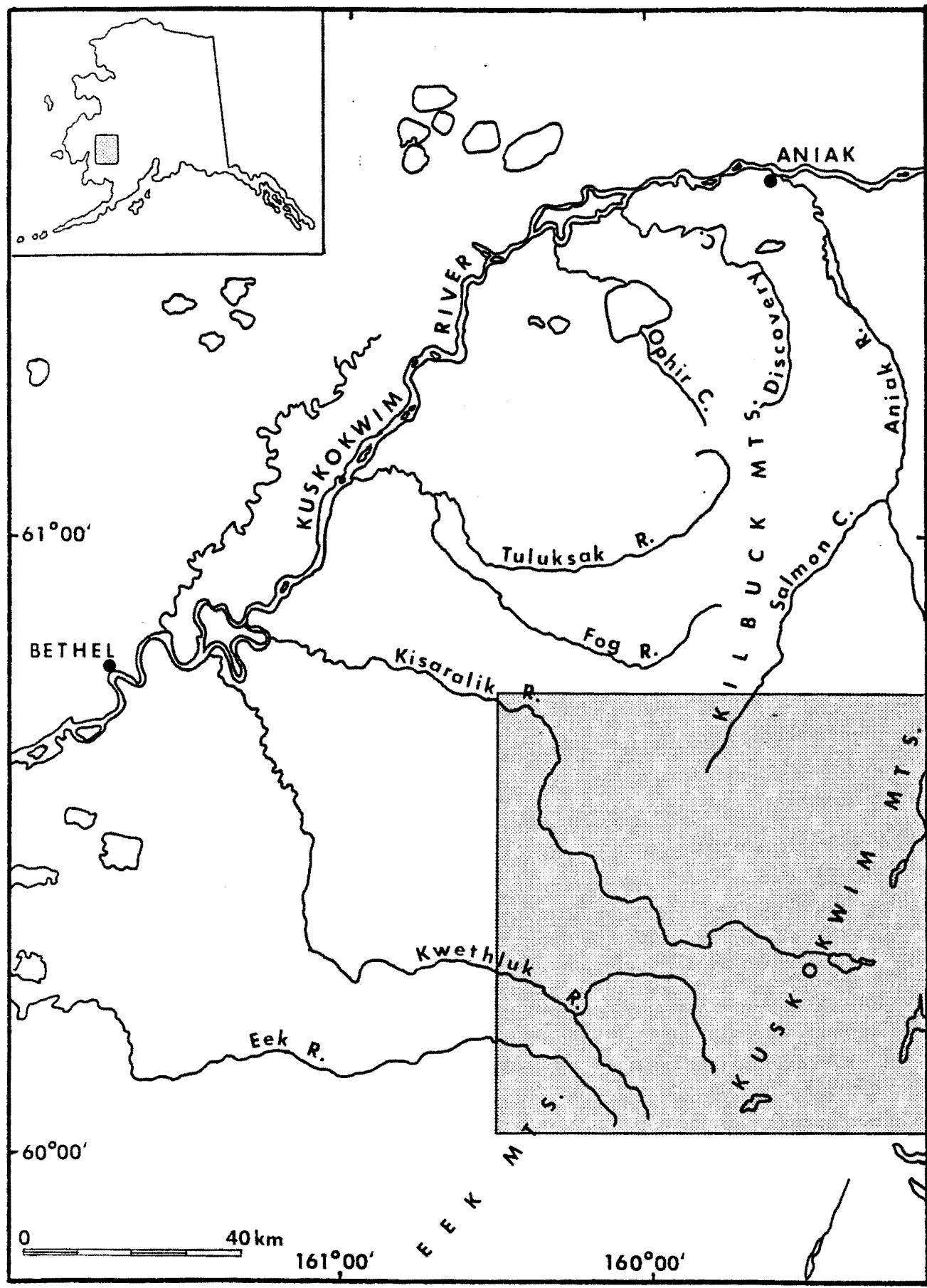


Figure 1. Location of the Kilbuck caribou study area, southwest Alaska.

Figure 2. Mean elevation of caribou observations ($n = 17,634$) from the Kilbuck herd, southwest Alaska, September 1985 - May 1989.

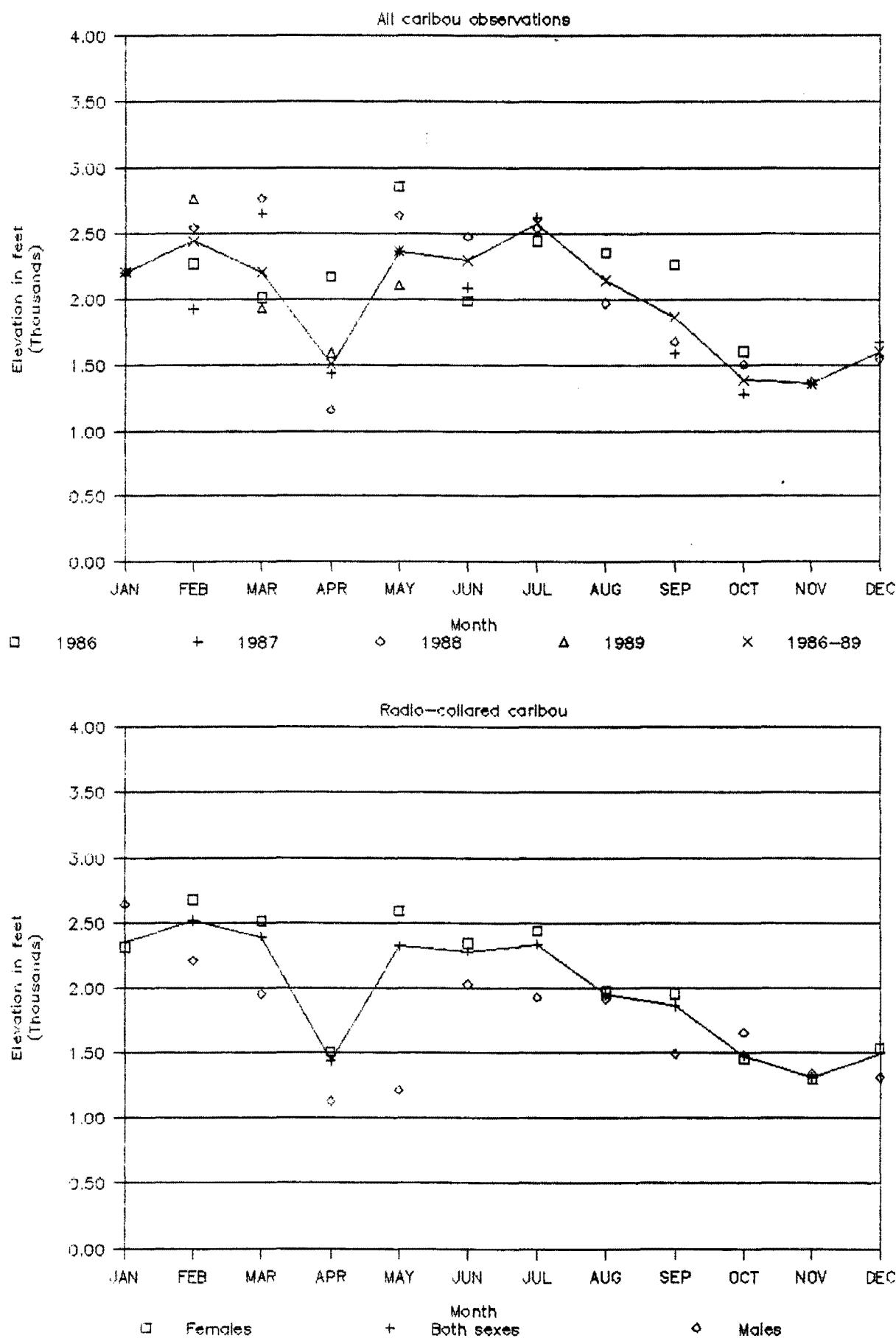
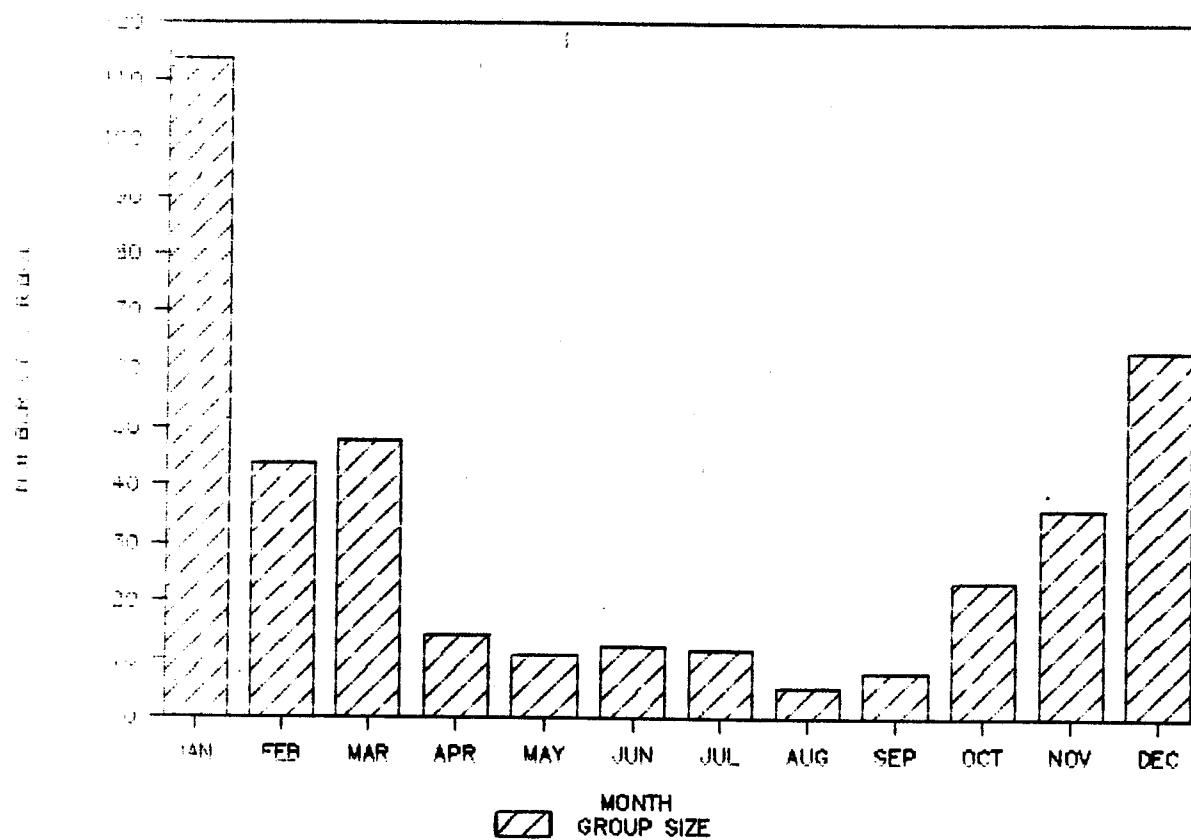


Figure 2. Mean group size ($n = 754$) of Kilbuck caribou, southwest Alaska, September 1985 - May 1989.



Appendix I. Observations of Kilbuck caribou, southwest Alaska, September 1985 - May 1989.

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	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					

Appendix I. Continued.

Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
55	30	JUL 86	25			3	22	2500	109	111					
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		3			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	25	MAR 87	1		1				1500	92	71	151.304			
108	1	APR 87	1		1				1200	87	87	151.304			

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
109	6	APR	87	1		1			1750	86	98	151.304				
110	7	APR	87	12		1		11	1650	86	100	151.304				
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		

Appendix I. Continued.

Obs #	Day Mon Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
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			
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	8 SEP 87	7	4	3				1400		99	96			
210	8 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			

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
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		
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				

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
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
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		MORTALITY MODE		
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		MORTALITY MODE		
322	22	MAR	88	1	1				2000	84	113	150.225		MORTALITY MODE		
323	5	APR	88	26		1		25	1650	67	118	150.340				
324	5	APR	88	11	11				300	49	55	151.060				

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
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				
331	3	MAY	88	1	1				3000	97	73	151.390				MORTALITY MODE
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				

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
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				
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		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			
400	17	JUN	88	4	1					3	1900	115	116	151.530		
401	17	JUN	88	40			16	16	8	2200	100	117	150.520	150.860		
402	17	JUN	88	1			1		?	1900	110	94	151.304			
403	17	JUN	88	35			15	15	5	1800	111	85	150.310			
404	17	JUN	88	1			1		0	1500	107	93	150.170			
405	17	JUN	88	11	7				4	1500	103	94				
406	17	JUN	88	75			25	25	25	2700	106	96	151.080	151.625	150.020	
407	17	JUN	88	5			1	1	3	2700	107	98				
408	17	JUN	88	30			10	10	10	3500	109	97	150.120			
409	17	JUN	88	1	1				?	2700	111	113	151.060			
410	8	JUL	88	1	1					1600	106	118	151.060			
411	8	JUL	88	1	1				?	1700	115	116	150.340			
412	8	JUL	88	11	8	3				2400	121	114	151.530			
413	8	JUL	88	1	1					1800	116	114				
414	8	JUL	88	5	5					1700	118	110				
415	8	JUL	88	2	2					2300	121	119				
416	8	JUL	88	3	2		1			2100	122	117				
417	8	JUL	88	2	2					2000	120	121				
418	8	JUL	88	6	4		2			1800	120	119				
419	8	JUL	88	2				2		2000	122	116				
420	15	JUL	88	13			9	4		2800	116	84	150.120	151.080		
421	15	JUL	88	14			8	6		2800	116	84				
422	15	JUL	88	2			1	1		2800	113	87				
423	15	JUL	88	1			1			2400	114	87				
424	15	JUL	88	9			7	2		1800	122	89				
425	15	JUL	88	7			7			2000	122	89				
426	15	JUL	88	18			12	6		2300	122	89				
427	15	JUL	88	32			21	11		2400	122	89	151.304			
428	15	JUL	88	5			5			2800	124	87				
429	15	JUL	88	10			7	3		3000	114	76				
430	15	JUL	88	75			46	29		2700	114	79	151.625	150.310		
431	15	JUL	88	1	1					2900	107	96				
432	15	JUL	88	3			2	1		3300	109	97				

Appendix I. Contined.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
433	15	JUL	88	1	1				1800	110	109					
434	15	JUL	88	1		1		0	1800	109	109	150.340				
435	15	JUL	88	4	2			2	3500	117	98					
436	15	JUL	88	8		5	3		2700	119	98					
437	15	JUL	88	1		1			3500	119	98					
438	15	JUL	88	7		4	3		3800	119	98					
439	15	JUL	88	6		4	2		3000	120	99					
440	15	JUL	88	15	5	1	1	8	2800	112	106					
441	15	JUL	88	32	32				2600	114	110					
442	15	JUL	88	1	1				2300	117	111					
443	15	JUL	88	10	10				1900	118	112	151.530				
444	15	JUL	88	1	1				1800	120	114					
445	15	JUL	88	1		1			1600	118	114					
446	15	JUL	88	5	4	1			2200	115	114	151.060				
447	15	JUL	88	12	8			4	3400	99	84					
448	15	JUL	88	29		9	9	11	3300	104	84	150.860				
449	15	JUL	88	1		1			2000	107	82	150.520				
450	18	JUL	88	6		3	3		2100	125	90	150.170	150.020			
451	18	JUL	88	3				3	1700	122	90					
452	18	JUL	88	12		1	1	10	3200	117	105					
453	18	JUL	88	2				2	2200	121	108					
454	18	JUL	88	3	3				2200	123	117					
455	18	JUL	88	75	75				2100	122	117					
456	18	JUL	88	32	32				2300	125	119					
457	18	JUL	88	14	14				2800	124	117					
458	18	JUL	88	1	1				2700	123	115					
459	18	JUL	88	3	3				2700	122	114					
460	18	JUL	88	1	1				2100	122	114	151.360				
461	24	AUG	88	1				1	3200	100	88					
462	24	AUG	88	5		1		4	2700	100	85	151.625				
463	24	AUG	88	4		2	2		1200	85	90	150.860				
464	24	AUG	88	4		3	1		2550	94	90	150.020				
465	24	AUG	88	1		1			1900	88	102	150.520				
466	24	AUG	88	2	2				2100	97	117	151.060				
467	24	AUG	88	1	1				2100	97	116					
468	24	AUG	88	2		1		1	2500	115	85	151.304				
469	24	AUG	88	1		1		?	2000	117	79	150.310				
470	26	AUG	88	13		2	2	9	1500	91	101					
471	26	AUG	88	16	4	9	3		1500	91	100	151.080				
472	26	AUG	88	4		2	2		1500	91	100					
473	26	AUG	88	2	2				2000	113	117					
474	26	AUG	88	9	9				2100	104	113					
475	26	AUG	88	5	5				2000	116	113					
476	26	AUG	88	4	4				2000	115	114	151.530				
477	26	AUG	88	20		6	6	8	2800	97	91					
478	26	AUG	88	1		1			1250	89	93	150.170				
479	30	AUG	88	3	2	1	0		1700	110	64	150.120				
480	30	AUG	88	1		1		?	2400	97	123	150.340				
481	30	AUG	88	1		1		?	2300	96	122	151.360				
482	31	AUG	88	1	1				1250	48	31	150.240				
483	31	AUG	88	7				7	1400	80	78					
484	31	AUG	88	4		3	1		1300	80	83					
485	21	SEP	88	2		2			1300	99	97					
486	21	SEP	88	1	1				1300	97	98	151.530				

MORTALITY MODE - ASSUMED DEAD

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
487	21	SEP	88	22	13	9		1	1700	94	102					
488	21	SEP	88	5	1	3	1		1700	101	109					
489	21	SEP	88	11	4	4	3		1600	106	110	151.060				
490	21	SEP	88	2	2				1600	107	111					
491	21	SEP	88	2	2				1600	105	112					
492	21	SEP	88	10	5	5			1600	101	110					
493	21	SEP	88	9	4	5			1700	104	111					
494	21	SEP	88	18	6	12			1500	102	112					
495	21	SEP	88	1		1			2500	144	88	151.080				
496	21	SEP	88	2		2			2500	93	76					
497	21	SEP	88	1	1				1300	87	87	150.240				
498	21	SEP	88	2		2			1300	90	82					
499	21	SEP	88	1	1				2000	103	102					
500	21	SEP	88	17	5	7	5		2700	96	91	150.020				
501	22	SEP	88	2	1	1			1150	72	84					
502	22	SEP	88	11	6	5			1700	91	88					
503	22	SEP	88	22	5	14	3		1200	88	87					
504	22	SEP	88	3	1	2			1250	86	95					
505	22	SEP	88	5	1	2	2		1500	84	102	150.520				
506	22	SEP	88	12	3	6	3		1750	86	104					
507	22	SEP	88	1		1			?	2500	113	86	151.304			
508	22	SEP	88	1		1			?	2200	112	80	150.860			
509	22	SEP	88	25			25		1700	112	82					
510	22	SEP	88	1		1			?	2200	107	80	151.625			
511	22	SEP	88	1		1			?	2000	107	78	150.120			
512	22	SEP	88	31	7	7	5	12	1600	104	96					
513	22	SEP	88	1		1			1900	105	99	150.170				
514	22	SEP	88	26	3	12	5	6	1600	107	102					
515	14	OCT	88	12	4				8	1300	88	89				
516	14	OCT	88	1		1				1250	85	89	151.304			
517	14	OCT	88	11	3	7	1		1200	89	85					
518	14	OCT	88	36	12	3	3	18	1200	89	86	150.860	150.170			
519	14	OCT	88	11	3	5	3		1200	86	90					
520	14	OCT	88	2		2				1350	87	91				
521	14	OCT	88	5	1	3	1		1600	91	101					
522	14	OCT	88	3		2	1		1600	92	102					
523	14	OCT	88	26	3	19	4		1650	93	101	151.625				
524	14	OCT	88	35	6	23	6		1400	104	102					
525	14	OCT	88	11	4	5	2		1400	91	98					
526	14	OCT	88	2	2				1750	90	115	151.060				
527	14	OCT	88	3	3				1600	104	112					
528	14	OCT	88	18	7	9	1	1	1	1550	104	113	150.120			
529	14	OCT	88	8				8	1800	96	121					
530	14	OCT	88	1	1					1800	96	122	151.530			
531	14	OCT	88	1		1				1500	102	91				
532	14	OCT	88	7	3	4				1400	102	92	150.240			
533	14	OCT	88	4		2	2			1600	109	104				
534	14	OCT	88	4		3	1			1600	106	104	150.310			
535	14	OCT	88	35				35	1500	104	102					
536	14	OCT	88	9				9	2100	86	103	150.520				
537	14	OCT	88	25	6			19	1700	104	95	151.080				
538	14	OCT	88	10	3	5	2		1700	100	115	150.340				
539	14	OCT	88	12	1	10	1		1500	99	114					
540	14	OCT	88	4		4			1700	102	115					

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
541	14	OCT	88	11	1	7	2	1	1800	99	104	150.020				
542	15	NOV	88	27	3			24	1500	88	98					
543	15	NOV	88	50	3			47	1500	86	98					
544	15	NOV	88	20				20	1500	86	98					
545	15	NOV	88	17	17				1500	86	98					
546	15	NOV	88	10				10	1650	86	99					
547	15	NOV	88	15		3	3	9	1850	86	99					
548	15	NOV	88	43	4			39	1850	87	99					
549	15	NOV	88	11				11	1750	87	100					
550	15	NOV	88	96	11	28	9	48	1300	88	95					
551	15	NOV	88	56	3	33	4	16	1300	88	95					
552	15	NOV	88	79	12	31	9	27	1150	91	94					
553	15	NOV	88	26	4	13	3	6	1350	91	97					
554	15	NOV	88	12	2	5	1	4	1400	88	96					
555	15	NOV	88	42	8	11	2	21	1400	88	96					
556	15	NOV	88	83	22	23	4	34	1400	90	97					
557	15	NOV	88	57	7	18	4	28	1450	90	98					
558	15	NOV	88	22				22	1450	91	98					
559	15	NOV	88	21				21	1400	92	98					
560	15	NOV	88	45				45	1350	93	97					
561	23	NOV	88	12	1	7	2	2	1400	90	98					
562	23	NOV	88	148	18	25	5	100	1450	92	98	151.530	151.060			
563	23	NOV	88	14		6	1	7	1550	95	103					
564	23	NOV	88	59	6	23	4	26	1600	95	104					
565	23	NOV	88	30	2	4		24	1400	81	92					
566	23	NOV	88	2	1	1			1250	79	96					
567	23	NOV	88	46	12	15	3	16	1200	74	96					
568	23	NOV	88	116	33	32	4	47	1150	75	93	150.340	150.520			
569	23	NOV	88	5		4	1		900	67	86					
570	23	NOV	88	16				16	1200	81	91					
571	23	NOV	88	44				44	1200	82	91					
572	23	NOV	88	14				14	1150	83	91					
573	23	NOV	88	104				104	1150	85	90					
574	23	NOV	88	30				30	1150	84	90					
575	23	NOV	88	30				30	1150	85	89					
576	23	NOV	88	166				166	1150	85	89					
577	23	NOV	88	2				2	1200	88	89					
578	23	NOV	88	18				18	1200	88	89					
579	23	NOV	88	67	3			64	1150	86	87					
580	23	NOV	88	7				7	1150	84	88					
581	23	NOV	88	5				5	1200	83	88					
582	23	NOV	88	34	6	8	3	17	1300	90	89					
583	23	NOV	88	20				20	1150	75	83					
584	23	NOV	88	48	7	3	3	35	1150	75	83					
585	23	NOV	88	21	6	4		11	1150	73	84					
586	23	NOV	88	30	4			26	1050	73	83					
587	23	NOV	88	59	7	1	1	50	1150	73	83					
588	23	NOV	88	31				31	1200	74	83					
589	23	NOV	88	87				87	1050	74	81					
590	23	NOV	88	10				10	1000	73	79					
591	23	NOV	88	9				9	1000	72	81					COUNT
592	23	NOV	88	9				9	1150	71	82					COUNT
593	23	NOV	88	77				77	1150	73	79					COUNT
594	25	NOV	88	26	4	13	4	5	1900	102	107					COUNT

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5	
595	25	NOV	88	7	2	5			1550	102	105						COUNT
596	25	NOV	88	9		5		4	2000	97	105						COUNT
597	25	NOV	88	24	7	13	1	3	1750	93	102						COUNT
598	25	NOV	88	73	13	37	10	13	1500	99	100						COUNT
599	25	NOV	88	36	12	16	3	5	1400	91	92	151.530					COUNT
600	25	NOV	88	236	68	121	24	23	1600	93	91	150.310					COUNT
601	25	NOV	88	6				6	1300	90	93						COUNT
602	25	NOV	88	3		1	2		1700	92	90						COUNT
603	25	NOV	88	3		2	1		1250	88	88						COUNT
604	25	NOV	88	46	11	24	4	7	1400	82	92						COUNT
605	25	NOV	88	53	18	21	9	5	1400	81	91						COUNT
606	25	NOV	88	25	9	8	8		1300	90	86	151.080					COUNT
607	25	NOV	88	22				22	1250	88	86						COUNT
608	25	NOV	88	23				23	1300	90	87						COUNT
609	25	NOV	88	355	103	158	50	44	1500	90	84	151.304	150.240	150.860	151.625		COUNT
610	25	NOV	88	49				49	1300	88	83						COUNT
611	25	NOV	88	12	1	5	4	2	1100	83	87						COUNT
612	25	NOV	88	42	18	16	1	7	1100	85	87	150.020	151.060				COUNT
613	25	NOV	88	49	4	27	7	11	1200	82	86						COUNT
614	25	NOV	88	65	20	39	3	3	1200	80	85						COUNT
615	25	NOV	88	111	46	49	10	6	1200	79	85						COUNT
616	25	NOV	88	17				17	1150	78	84						COUNT
617	25	NOV	88	29				29	1350	80	84						COUNT
618	25	NOV	88	3		2	1		1000	76	88						COUNT
619	25	NOV	88	8	1	4	3		1150	76	83						COUNT
620	25	NOV	88	16	4	11	1		1250	74	82						COUNT
621	25	NOV	88	20	1	16	3		1250	73	81						COUNT
622	25	NOV	88	11				11	1350	73	80						COUNT
623	25	NOV	88	2				2	1100	72	81						COUNT
624	25	NOV	88	29				29	900	70	81						COUNT
625	25	NOV	88	4	3	1			800	62	86						COUNT
626	25	NOV	88	9	5			4	1750	90	107						COUNT
627	25	NOV	88	33	5			28	1700	88	103						COUNT
628	25	NOV	88	7	5			2	1800	90	106						COUNT
629	25	NOV	88	10		5	2	3	2100	88	105						COUNT
630	25	NOV	88	24	2	7	2	13	1850	87	104						COUNT
631	26	NOV	88	57	14	29	5	9	1400	76	95						COUNT
632	26	NOV	88	5	3	1	1		1100	75	94						COUNT
633	26	NOV	88	17	4	7	3	3	1400	82	93						COUNT
634	26	NOV	88	12	4	5	2	1	1400	85	82						COUNT
635	26	NOV	88	94	39	33	10	12	1900	84	79						COUNT
636	26	NOV	88	19	19				1700	82	81						COUNT
637	26	NOV	88	7		4	3		1500	83	81						COUNT
638	26	NOV	88	23	7	10	4	2	1800	83	79						COUNT
639	26	NOV	88	28	6	6		16	2400	94	85						COUNT
640	12	DEC	88	154	18	2		134	1600	107	116	150.340	151.304				COUNT
641	12	DEC	88	8	3			5	1500	106	114						COUNT
642	12	DEC	88	96	5	1		90	1500	103	114	150.170					COUNT
643	12	DEC	88	54	12			42	1500	101	112						COUNT
644	12	DEC	88	8	2			6	1500	101	112						COUNT
645	12	DEC	88	95	17			78	1400	99	112						COUNT
646	12	DEC	88	35		1		34	1800	107	114	151.080					COUNT
647	12	DEC	88	11	2			9	1800	107	112						COUNT
648	12	DEC	88	47				47	1600	106	112						COUNT

Appendix I. Contined.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
649	12	DEC	88	52					52	1700	107	112				
650	12	DEC	88	110	22	1			87	1600	106	110	150.520			
651	12	DEC	88	25	4	1			20	1700	106	110	150.310			
652	12	DEC	88	67					67	1900	110	110				
653	12	DEC	88	82	11	1			70	1500	94	100	151.625	151.530		
654	12	DEC	88	140			1		139	1400	87	90	150.120			
655	12	DEC	88	12	4				8	1400	88	91				
656	12	DEC	88	27	8				19	1400	82	83	151.060			
657	12	DEC	88	20	20					1300	80	83	150.240			
658	12	DEC	88	52			1		51	1300	90	77	150.860			
659	12	DEC	88	10	10					1400	88	77				
660	12	DEC	88	6					6	1400	88	73				
661	12	DEC	88	1		1				1400	109	91	150.020			
662	12	FEB	89	95			1		94	3000	95	72	150.310			
663	12	FEB	89	18	2		2	2	12	2000	86	100	151.060			
664	12	FEB	89	177			3		174	3100	96	84	151.625	150.020	150.170	
665	12	FEB	89	19					19	3400	97	85				
666	12	FEB	89	25			2		23	2600	110	99	150.120	150.340		
667	12	FEB	89	9			1		8	2000	118	110	150.520			
668	12	FEB	89	11			1		10	1900	117	112	150.860			
669	12	FEB	89	62			1		61	2500	117	111	151.080			
670	12	FEB	89	1			1		?	2300	118	107	151.304			
671	12	FEB	89	9					9	2100	118	109				
672	12	FEB	89	18					18	2000	118	111				
673	12	FEB	89	41					41	2500	124	120	151.571			
674	12	FEB	89	11	2				9	1750	80	128	150.240	151.530		
675	10	MAR	89	25			1		24	2000	114	111	151.571			
676	10	MAR	89	28					28	2300	117	112				
677	10	MAR	89	10					10	2400	111	109				
678	10	MAR	89	15					15	1950	108	109				
679	10	MAR	89	3					3	2100	109	111				
680	10	MAR	89	63					63	1300	127	119				
681	11	MAR	89	118			1		117	2500	104	96	150.120			
682	11	MAR	89	16			1		15	1400	102	97	150.340			
683	11	MAR	89	37					37	2800	110	99				
684	11	MAR	89	42			1		41	2100	112	100	151.304			
685	11	MAR	89	18			1		17	2200	112	100	151.080			
686	11	MAR	89	9			1		8	2200	115	99	150.860			
687	11	MAR	89	40			1		39	3600	99	74	151.625			
688	11	MAR	89	23			1		22	3000	96	75	150.170			
689	11	MAR	89	186			1		185	2100	97	83	150.020			
690	11	MAR	89	10					10	2050	94	83				
691	11	MAR	89	182			1		181	2400	94	80	150.310			
692	11	MAR	89	26					26	2300	93	81				
693	11	MAR	89	26	1				25	2300	92	89	151.060			
694	11	MAR	89	334			1		333	1000	129	118	150.520			
695	11	MAR	89	29					29	2000	83	78				
696	11	MAR	89	15	15					1350	79	131	151.530	150.240		
697	12	APR	89	1			1			2100	94	84	151.625		MORTALITY MODE - POACHED	
698	12	APR	89	21			1		20	1350	92	93	150.170			
699	12	APR	89	25					25	1350	98	98				
700	12	APR	89	7	1				6	1600	103	100	151.060			
701	12	APR	89	7		1			6	1950	105	105	151.304			
702	12	APR	89	9			1		8	1700	104	104	150.860			

Appendix I. Continued.

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
703	12	APR	89	4		1		3	1550	104	101	150.120				
704	12	APR	89	1		1		?	1700	104	100	150.310				
705	12	APR	89	15		1		14	2700	111	96	151.080				
706	12	APR	89	5		1		4	1550	106	90	150.020				
707	12	APR	89	20		1		19	1700	119	119	150.520				
708	12	APR	89	1		1		?	1500	113	121	150.340				
709	12	APR	89	1		1		?	2600	125	119	151.571				
710	12	APR	89	18	2			16	900	65	105	151.530	150.240			
711	10	MAY	89	5	2		1	2	1050	77	120	150.340				
712	10	MAY	89	1		1		?	2600	102	87	150.520				
713	10	MAY	89	13		10		3	1500	106	92	150.310				
714	10	MAY	89	2		2			2600	118	98	150.860				
715	10	MAY	89	1		1			2600	114	97	151.304				
716	10	MAY	89	3				3	2600	113	85					
717	10	MAY	89	8			2	2	3100	116	99					
718	10	MAY	89	22			5	5	12	3100	117	98	150.120			
719	10	MAY	89	16			14		2	1600	117	90	150.020			
720	10	MAY	89	4			3		1	1650	117	91				
721	10	MAY	89	11			9		2	1650	116	91				
722	10	MAY	89	9			1		8	2700	107	98	151.080			
723	10	MAY	89	3	3					1750	72	89	150.240			
724	10	MAY	89	6	6						650	54	109	151.530		
725	10	MAY	89	9	9						800	69	123	151.060		
726	24	MAY	89	8			4	4		3300	107	95				
727	24	MAY	89	2			1	1		3300	106	94				
728	24	MAY	89	2			1	1		3100	104	97				
729	24	MAY	89	2			1	1		3200	108	99				
730	24	MAY	89	226			124	86	16	2500	113	102	150.860	151.304		
731	24	MAY	89	2			1	1		3200	117	98				
732	24	MAY	89	2			1	1		3500	109	97				
733	24	MAY	89	2			1	1		3100	120	99				
734	24	MAY	89	3			3			2400	113	103				
735	24	MAY	89	213			117	81	15	1700	112	104	150.120			
736	24	MAY	89	2			1	1		3000	116	99				
737	24	MAY	89	5			3	2		2200	114	100				
738	24	MAY	89	8			4	4		2700	115	96				
739	24	MAY	89	8			6	2		1400	101	97	150.310			
740	24	MAY	89	8			4	4		3100	114	95				
741	24	MAY	89	6			4	2		2300	117	82	150.170			
742	24	MAY	89	4			2	2		3000	113	78				
743	24	MAY	89	18			10	8		3300	104	86				
744	24	MAY	89	4			4			1350	99	96	150.080			
745	24	MAY	89	8			4	4		3500	98	78				
746	24	MAY	89	6			3	3		3000	100	75				
747	24	MAY	89	3			2	1		3200	100	70				
748	25	MAY	89	11			6	5		2100	114	100	150.020			
749	25	MAY	89	103			57	34	12	1750	110	103				
750	25	MAY	89	63			35	21	7	1700	107	103				
751	25	MAY	89	1			1			3300	103	86	150.520			
752	25	MAY	89	6			3	3		3000	114	110				
753	25	MAY	89	7	7						850	62	105			
754	25	MAY	89	1	1						900	62	108	151.530		

Appendix II. Observations of Kilbuck caribou by month and by year, southwest Alaska, September 1985 - May 1989.

Summary - Years 1985-1989

	Total	Males	Females	Calves	Unclas.	Groups	Avg Size	S.D.	Avg Elev	S.D.
Jan	1250	53	132	27	1038	11	114	120	2206	588
Feb	1879	55	42	6	1776	43	44	63	2440	584
Mar	2095	57	31	2	2005	44	48	64	2206	755
Apr	743	20	42	2	679	52	14	19	1500	499
May	1667	86	761	471	349	153	11	27	2365	803
Jun	375	21	137	114	103	30	13	18	2294	521
Jul	1153	298	289	186	380	97	12	14	2577	556
Aug	205	55	47	26	77	38	5	6	2147	479
Sep	650	167	219	82	182	82	8	9	1861	458
Oct	1152	192	525	78	357	49	24	33	1383	193
Nov	4444	755	1382	312	1995	123	36	46	1356	235
Dec	2021	279	454	54	1234	32	63	57	1600	238
Total	17634	2038	4061	1360	10175	754				

Summary - Year 1985

	Total	Males	Females	Calves	Unclas.	Groups	Avg Size	S.D.	Avg Elev	S.D.
Jan	0	0	0	0	0	0	0	0	0	0
Feb	0	0	0	0	0	0	0	0	0	0
Mar	0	0	0	0	0	0	0	0	0	0
Apr	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0
Jun	0	0	0	0	0	0	0	0	0	0
Jul	0	0	0	0	0	0	0	0	0	0
Aug	0	0	0	0	0	0	0	0	0	0
Sep	59	19	8	3	29	8	7	8	2085	215
Oct	0	0	0	0	0	0	0	0	0	0
Nov	0	0	0	0	0	0	0	0	0	0
Dec	0	0	0	0	0	0	0	0	0	0
Total	59	19	8	3	29	8				

Summary - Year 1986

	Total	Males	Females	Calves	Unclas.	Groups	Avg Size	S.D.	Avg Elev	S.D.
Jan	0	0	0	0	0	0	0	0	0	0
Feb	57	2	7	2	46	2	29	18	2268	474
Mar	96	1	2	0	93	2	48	45	2008	44
Apr	98	2	4	2	90	6	16	11	2171	574
May	124	6	59	40	19	22	6	5	2854	743
Jun	56	10	25	11	10	11	5	5	1984	482
Jul	62	3	4	10	45	4	16	11	2442	137
Aug	93	25	12	9	47	14	7	7	2358	206
Sep	188	61	16	15	96	27	7	8	2262	449
Oct	160	0	0	0	160	1	160	0	1600	0
Nov	0	0	0	0	0	0	0	0	0	0
Dec	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	S.D.	Avg Elev	S.D.
Jan	0	0	0	0	0	0	0	0	0	0
Feb	441	3	0	0	438	5	88	99	1924	346
Mar	391	20	1	0	370	5	78	58	2651	393
Apr	402	3	22	0	377	25	16	25	1428	253
May	119	2	20	6	91	17	7	8	2365	974
Jun	116	2	43	36	35	9	13	18	2083	332
Jul	580	75	121	91	293	42	14	12	2620	659
Aug	0	0	0	0	0	0	0	0	0	0
Sep	155	15	89	12	39	17	9	9	1587	291
Oct	685	129	410	48	98	21	33	34	1279	118
Nov	583	95	383	65	40	25	23	27	1354	205
Dec	909	141	444	54	270	10	91	71	1675	297
Total	4381	485	1533	312	2051	176				

Summary - Year 1988

	Total	Males	Females	Calves	Unclas.	Groups	Avg Size	S.D.	Avg Elev	S.D.
Jan	1250	53	132	27	1038	11	114	120	2206	584
Feb	885	46	23	2	814	23	38	58	2544	593
Mar	353	20	17	2	314	15	24	25	2765	847
Apr	108	12	5	0	91	7	15	6	1158	564
May	577	50	230	145	152	70	8	11	2637	907
Jun	303	9	69	67	58	10	20	23	2474	577
Jul	511	220	164	85	42	51	10	16	2540	455
Aug	112	30	35	17	30	24	5	5	1970	562
Sep	248	72	106	52	18	30	8	9	1676	345
Oct	307	63	115	30	99	27	11	11	1502	213
Nov	3861	660	999	247	1955	98	39	49	1370	239
Dec	1112	138	10	0	964	22	51	44	1539	150
Total	3527	1373	1905	674	5575	388				

Summary - Year 1989

	Total	Males	Females	Calves	Unclas.	Groups	Avg Size	S.D.	Avg Elev	S.D.
Jan	0	0	0	0	0	0	0	0	0	0
Feb	496	2	2	2	486	13	38	47	2766	584
Mar	1255	16	11	0	1228	22	57	79	1926	686
Apr	135	3	11	0	121	14	10	8	1591	489
May	847	28	452	280	87	44	19	47	2108	587
Jun	0	0	0	0	0	0	0	0	0	0
Jul	0	0	0	0	0	0	0	0	0	0
Aug	0	0	0	0	0	0	0	0	0	0
Sep	0	0	0	0	0	0	0	0	0	0
Oct	0	0	0	0	0	0	0	0	0	0
Nov	0	0	0	0	0	0	0	0	0	0
Dec	0	0	0	0	0	0	0	0	0	0
Total	1132	49	476	282	1922	93				

Appendix III. Observations of radio-collared Kilbuck caribou, southwest Alaska, March 1987 - May 1989.

Collar frequency - 151.304			Female	Captured - 25 March 1987			Home range = 1507km sq. N = 38								
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		
402	17	JUN 88	1		1			?	1900	110	94	151.304			
427	15	JUL 88	32		21	11			2400	122	89	151.304			
468	24	AUG 88	2		1			1	2500	115	85	151.304			
507	22	SEP 88	1		1			?	2500	113	86	151.304			
516	14	OCT 88	1		1				1250	85	89	151.304			
609	25	NOV 88	355	103	158	50		44	1500	90	84	151.304	150.240	150.860	151.625
640	12	DEC 88	154	18	2			134	1600	107	116	150.340	151.304		
670	12	FEB 89	1		1			?	2300	118	107	151.304			
684	11	MAR 89	42		1			41	2100	112	100	151.304			
701	12	APR 89	7		1			6	1950	105	105	151.304			
715	10	MAY 89	1		1				2600	114	97	151.304			
730	24	MAY 89	226		124	86		16	2500	113	102	150.860	151.304		

Collar frequency - 151.360			Male	Captured - 13 April 1987			Home range = 1376km sq. N = 19								
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			

Appendix III. Continued.

315	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		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
460	18 JUL 88	1	1				2100	122	114 151.360
481	30 AUG 88	1		1		?	2300	96	122 151.360 MORTALITY MODE - ASSUMED DEAD

Collar frequency - 150.120 Female Captured - 15 April 1987 Home range = 1078km sq. N = 29

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	19	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	35	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
282	27	JAN	88	360	21	30	11		298	2800	95	81	150.860	150.120	150.170	150.310
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 CALP)			
408	17	JUN	88	30			10	10	10	3500	109	97	150.120			
420	15	JUL	88	13		9	4		2800	116	84	150.120	151.080			
479	30	AUG	88	3	2	1	0		1700	110	64	150.120				
511	22	SEP	88	1		1			?	2000	107	78	150.120			
528	14	OCT	88	18	7	9	1	1	1550	104	113	150.120				
654	12	DEC	88	140		1			139	1400	87	90	150.120			
666	12	FEB	89	25		2			23	2600	110	99	150.120	150.340		
681	11	MAR	89	118		1			117	2500	104	96	150.120			
703	12	APR	89	4		1			3	1550	104	101	150.120			
718	10	MAY	89	22		5	5	12	3100	117	98	150.120				
735	24	MAY	89	213		117	81	15	1700	112	104	150.120				

Collar frequency - 150.860 Female Captured - 15 April 1987 Home range = 1309km sq. N = 29

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				

Appendix III. Continued.

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
275	15 JAN 88	317		5		312	2300	104	97	150.860	150.170	150.310
282	27 JAN 88	360	21	30	11	298	2800	95	81	150.860	150.120	150.170
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		
401	17 JUN 88	40		16	16	8	2200	100	117	150.520	150.860	
448	15 JUL 88	29		9	9	11	3300	104	84	150.860		
463	24 AUG 88	4		2	2		1200	85	90	150.860		
508	22 SEP 88	1		1		?	2200	112	80	150.860		
518	14 OCT 88	36	12	3	3	18	1200	89	86	150.860	150.170	
609	25 NOV 88	355	103	158	50	44	1500	90	84	151.304	150.240	150.860
658	12 DEC 88	52		1		51	1300	90	77	150.860		
668	12 FEB 89	11		1		10	1900	117	112	150.860		
686	11 MAR 89	9		1		8	2200	115	99	150.860		
702	12 APR 89	9		1		8	1700	104	104	150.860		
714	10 MAY 89	2		2			2600	118	98	150.860		
730	24 MAY 89	226		124	86	16	2500	113	102	150.860	151.304	

Collar frequency - 150.170 Female Captured - 15 April 1987 Home range - 1242km sq. N = 29

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				
404	17	JUN	88	1		1		0	1500	107	93	150.170				
450	18	JUL	88	6		3	3		2100	125	90	150.170	150.020			
478	26	AUG	88	1		1			1250	89	93	150.170				
513	22	SEP	88	1		1			1900	105	99	150.170				
518	14	OCT	88	36	12	3	3	18	1200	89	86	150.860	150.170			
642	12	DEC	88	96	5	1		90	1500	103	114	150.170				
664	12	FEB	89	177		3		174	3100	96	84	151.625	150.020	150.170		

Appendix III. Continued.

688	11 MAR 89	23		1		22	3000	96	75	150.170
698	12 APR 89	21		1		20	1350	92	93	150.170
741	24 MAY 89	6		4	2		2300	117	82	150.170

Collar frequency - 150.310 Female Captured - 15 April 1987 Home range = 744km sq. N = 30

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			
403	17	JUN	88	35		15	15	5	1800	111	85	150.310				
430	15	JUL	88	75		46	29		2700	114	79	151.625	150.310			
469	24	AUG	88	1		1		?	2000	117	79	150.310				
534	14	OCT	88	4		3	1		1600	106	104	150.310				
600	25	NOV	88	236	68	121	24	23	1600	93	91	150.310				COUNT
651	12	DEC	88	25	4	1		20	1700	106	110	150.310				
662	12	FEB	89	95		1		94	3000	95	72	150.310				
691	11	MAR	89	182		1		181	2400	94	80	150.310				
704	12	APR	89	1		1		?	1700	104	100	150.310				
712	10	MAY	89	13		10		3	1500	106	92	150.310				
739	24	MAY	89	8		6	2		1400	101	97	150.310				

Collar frequency - 150.020 Female Captured - 15 April 1987 Home range = 944km sq. N = 30

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		

Appendix III. Continued.

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	
406	17 JUN 88	75		25	25	25	2700	106	96	151.080	151.625 150.020
450	18 JUL 88	6		3	3		2100	125	90	150.170	150.020
464	24 AUG 88	4		3	1		2550	94	90	150.020	
500	21 SEP 88	17	5	7	5		2700	96	91	150.020	
541	14 OCT 88	11	1	7	2	1	1800	99	104	150.020	
612	25 NOV 88	42	18	16	1	7	1100	85	87	150.020	151.060
661	12 DEC 88	1		1			1400	109	91	150.020	
664	12 FEB 89	177		3		174	3100	96	84	151.625	150.020 150.170
689	11 MAR 89	186		1		185	2100	97	83	150.020	
706	12 APR 89	5		1		4	1550	106	90	150.020	
719	10 MAY 89	16		14		2	1600	117	90	150.020	
748	25 MAY 89	11		6	5		2100	114	100	150.020	
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Collar frequency - 151.080 Female Captured - 15 April 1987 Home range = 1787km sq. N = 29

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	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	
406	17	JUN	88	75		25	25	25	2700	106	96	151.080	151.625	150.020		
420	15	JUL	88	13		9	4			2800	116	84	150.120	151.080		
471	26	AUG	88	16	4	9	3			1500	91	100	151.080			
495	21	SEP	88	1		1				2500	144	88	151.080			
537	14	OCT	88	25	6			19	1700	104	95	151.080				
606	25	NOV	88	25	9	8	8			1300	90	86	151.080			
646	12	DEC	88	35		1				34	1800	107	114	151.080		
669	12	FEB	89	62		1		61	2500	117	111	151.080				
685	11	MAR	89	18		1		17	2200	112	100	151.080				
705	12	APR	89	15		1		14	2700	111	96	151.080				
722	10	MAY	89	9		1		8	2700	107	98	151.080				
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Appendix III. Contined.

Collar frequency - 151.625 Female Captured - 15 April 1987 Home range = 559km sq. N = 28

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
292	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				
406	17	JUN	88	75		25	25	25	2700	106	96	151.080	151.625	150.020		
430	15	JUL	88	75		46	29		2700	114	79	151.625	150.310			
462	24	AUG	88	5		1		4	2700	100	85	151.625				
510	22	SEP	88	1		1		?	2200	107	80	151.625				
523	14	OCT	88	26	3	19	4		1650	93	101	151.625				
609	25	NOV	88	355	103	158	50	44	1500	90	84	151.304	150.240	150.860	151.625	COUNT
653	12	DEC	88	82	11	1		70	1500	94	100	151.625	151.530			
664	12	FEB	89	177		3		174	3100	96	84	151.625	150.020	150.170		
687	11	MAR	89	40		1		39	3600	99	74	151.625				
697	12	APR	89	1		1			2100	94	84	151.625				MORTALITY MODE - POACHED

Collar frequency - 151.530 Male Captured - 25 February 1988 Home range = 2144km sq. N = 21

Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
269	25	FEB	88	235	1				234	2050	97	76	151.530			
393	26	FEB	88	12	1				11	2000	93	72	151.530			
398	29	FEB	88	188	1	3			184	3300	100	73	151.080	151.625	151.530	150.170
308	21	MAR	88	22	1				21	2300	93	76	151.530			
351	16	MAY	88	8	8					725	66	109	151.530			
372	19	MAY	88	11	5				6	1200	73	101	151.530			
393	25	MAY	88	5	3			0	2	1650	88	110	151.530			
400	17	JUN	88	4	1				3	1900	115	116	151.530			
412	8	JUL	88	11	8	3				2400	121	114	151.530			
443	15	JUL	88	10	10					1900	118	112	151.530			
476	26	AUG	88	4	4					2000	115	114	151.530			
486	21	SEP	88	1	1					1300	97	98	151.530			
530	14	OCT	88	1	1					1800	96	122	151.530			
562	23	NOV	88	148	18	25	5	100	1450	92	98	151.530	151.060			
599	25	NOV	88	36	12	16	3	5	1400	91	92	151.530				COUNT
653	12	DEC	88	82	11	1			70	1500	94	100	151.625	151.530		
674	12	FEB	89	11	2				9	1750	80	128	150.240	151.530		
696	11	MAR	89	15	15					1350	79	131	151.530	150.240		

Appendix III. Continued.

710	12 APR 89	18	2	16	900	65	105	151.530	150.240
724	10 MAY 89	6	6		650	54	109	151.530	
754	25 MAY 89	1	1		900	62	108	151.530	

Collar frequency - 150.520 Female Captured - 26 February 1988 Home range = 1306km sq. N = 18

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	94	86	150.520				
299	29	FEB	88	10		1		9	2300	96	74	150.520				
309	21	MAR	88	36	1	2		33	2400	94	85	150.520	150.310	150.170		
355	16	MAY	88	1		1			2700	112	85	150.520				
358	19	MAY	88	1		1		?	2700	112	85	150.520				
380	23	MAY	88	2		1	1		3400	112	88	150.520				
401	17	JUN	88	40		16	16	8	2200	100	117	150.520	150.860			
449	15	JUL	88	1		1			2000	107	82	150.520				
465	24	AUG	88	1		1			1900	88	102	150.520				
505	22	SEP	88	5	1	2	2		1500	84	102	150.520				
536	14	OCT	88	9				9	2100	86	103	150.520				
568	23	NOV	88	116	33	32	4	47	1150	75	93	150.340	150.520			
650	12	DEC	88	110	22	1		87	1600	106	110	150.520				
667	12	FEB	89	9		1		8	2000	118	110	150.520				
694	11	MAR	89	334		1		333	1000	129	118	150.520				
707	12	APR	89	20		1		19	1700	119	119	150.520				
712	10	MAY	89	1		1		?	2600	102	87	150.520				
751	25	MAY	89	1		1			3300	103	86	150.520				

Collar frequency - 150.340 Female Captured - 25 February 1988 Home range = 1359km sq. N = 16

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	98	87	150.340	150.240			
318	22	MAR	88	26		1		25	850	61	109	150.340				
323	5	APR	88	26		1		25	1650	67	118	150.340				
326	25	APR	88	20		1		19	750	61	111	150.340				
352	16	MAY	88	24	15	1		8	825	68	109	150.340				
399	25	MAY	88	13			0	13	1050	76	118	150.340				
411	8	JUL	88	1	1			?	1700	115	116	150.340				
434	15	JUL	88	1		1		0	1800	109	109	150.340				
480	30	AUG	88	1		1		?	2400	97	123	150.340				
538	14	OCT	88	10	3	5	2		1700	100	115	150.340				
568	23	NOV	88	116	33	32	4	47	1150	75	93	150.340	150.520			
640	12	DEC	88	154	18	2		134	1600	107	116	150.340	151.304			
666	12	FEB	89	25		2		23	2600	110	99	150.120	150.340			
682	11	MAR	89	16		1		15	1400	102	97	150.340				
708	12	APR	89	1		1		?	1500	113	121	150.340				
711	10	MAY	89	5	2	1		2	1050	77	120	150.340				

Collar frequency - 150.240 Male Captured - 25 February 1988 Home range = 2382km sq. N = 14

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	98	87	150.340	150.240			

Appendix III. Continued.

309	19 FEB 88	22	2	1		19	2700	96	73	151.360	150.240		
315	22 MAR 88	101	1	2		98	2900	96	84	150.240	150.120	151.080	
336	16 MAY 88	1		1			2200	80	82	150.240			
392	25 MAY 88	10	10				1000	66	76	150.240			
482	31 AUG 88	1	1				1250	48	31	150.240			
497	21 SEP 88	1	1				1300	87	87	150.240			
532	14 OCT 88	7	3	4			1400	102	92	150.240			
609	25 NOV 88	355	103	158	50	44	1500	90	84	151.304	150.240	150.860	151.625 COUNT
657	12 DEC 88	20	20				1300	80	83	150.240			
674	12 FEB 89	11	2			9	1750	80	128	150.240	151.530		
696	11 MAR 89	15	15				1350	79	131	151.530	150.240		
710	12 APR 89	18	2			16	900	65	105	151.530	150.240		
723	10 MAY 89	3	3				1750	72	89	150.240			

Collar frequency - 151.060 Male Captured - 25 February 1988 Home range = 2194km sq. N = 20

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	93	82	151.060					
304	29	FEB	88	11	11				1050	63	80	151.060					
319	22	MAR	88	12	12				450	49	55	151.060					
324	5	APR	88	11	11				300	49	55	151.060					
325	25	APR	88	9	1			8	500	49	55	151.060					
350	16	MAY	88	1	1				1200	77	120	151.060					
398	25	MAY	88	4	4				650	72	127	151.060					
409	17	JUN	88	1	1			?	2700	111	113	151.060					
410	8	JUL	88	1	1				1600	106	118	151.060					
446	15	JUL	88	5	4	1			2200	115	114	151.060					
466	24	AUG	88	2	2				2100	97	117	151.060					
489	21	SEP	88	11	4	4	3		1600	106	110	151.060					
526	14	OCT	88	2	2				1750	90	115	151.060					
562	23	NOV	88	148	18	25	5	100	1450	92	98	151.530	151.060				
612	25	NOV	88	42	18	16	1	7	1100	85	87	150.020	151.060	COUNT			
656	12	DEC	88	27	8				19	1400	82	83	151.060				
663	12	FEB	89	18	2	2	2	12	2000	86	100	151.060					
690	11	MAR	89	26	1				25	2300	92	89	151.060				
709	12	APR	89	7	1			6	1600	103	100	151.060					
725	10	MAY	89	9	9				800	69	123	151.060					

Muchatna caribou

Collar frequency - 150.571 Female Captured - 8 April 1986 N = 3

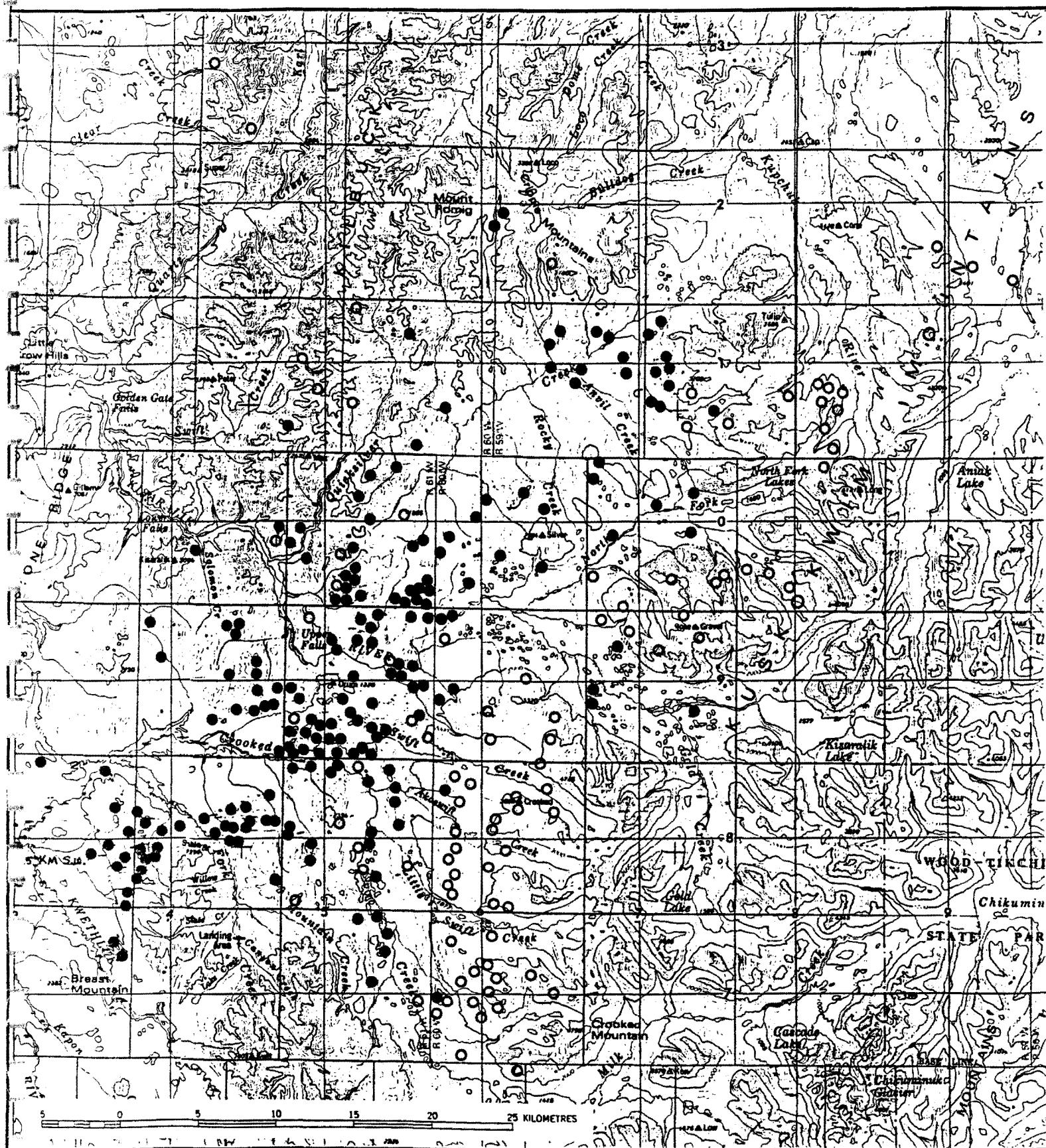
Obs #	Day	Mon	Yr	Total	Males	Females	Calves	Uncls.	Elev.	X-axis	Y-axis	Collar1	Collar2	Collar3	Collar4	Collar5
673	12	FEB	89	41				41	2500	124	120	151.571				
675	10	MAR	89	25		1		24	2000	114	111	151.571				
709	12	APR	89	1		1		?	2600	125	119	151.571				

Appendix IV. Seasonal distribution of caribou groups from the
Kilbuck herd, southwest Alaska, September 1985 -
May 1989.

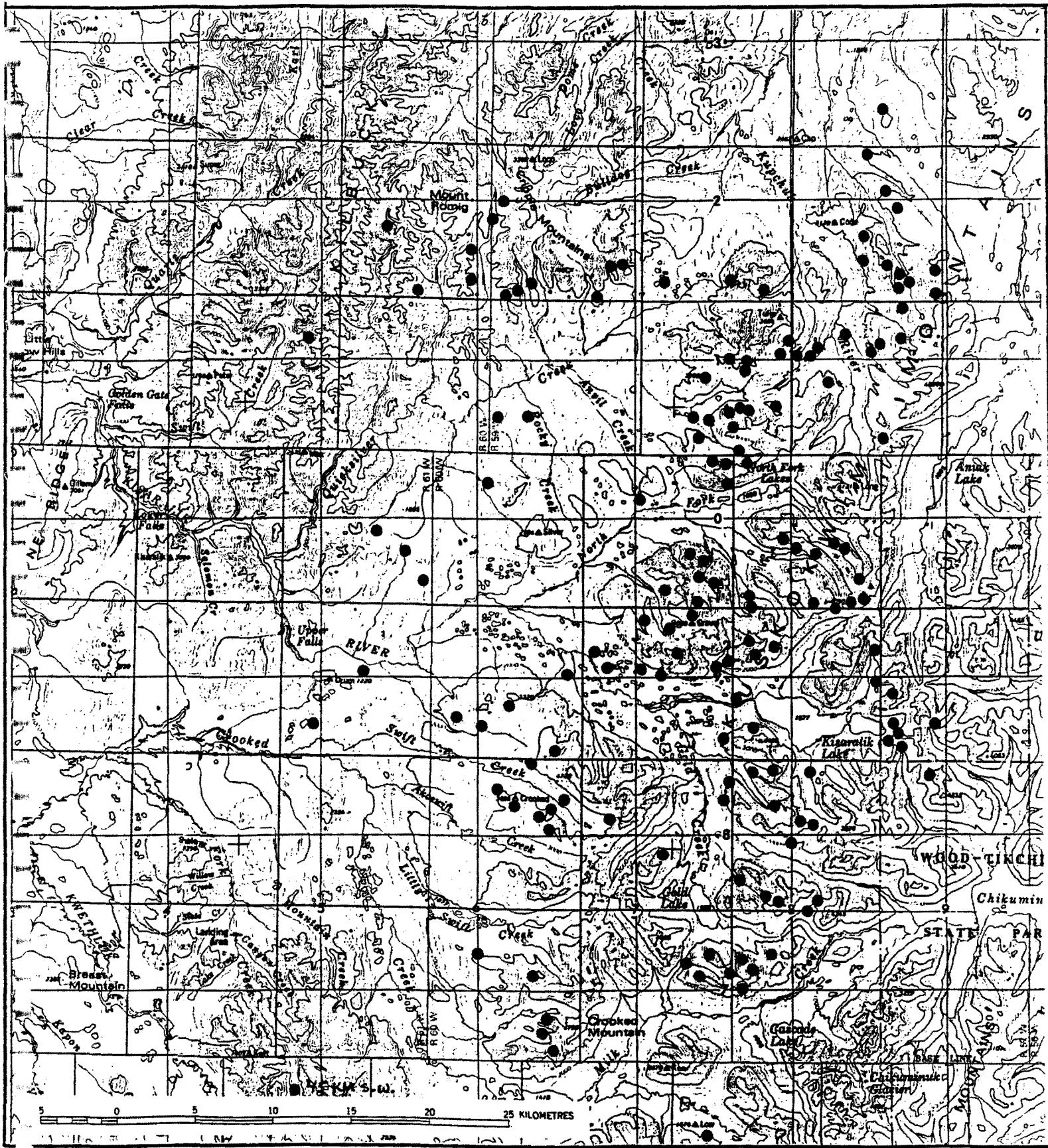
Map 1.....Winter (Oct-Mar)

Map 2.....Summer (Jun-Aug)

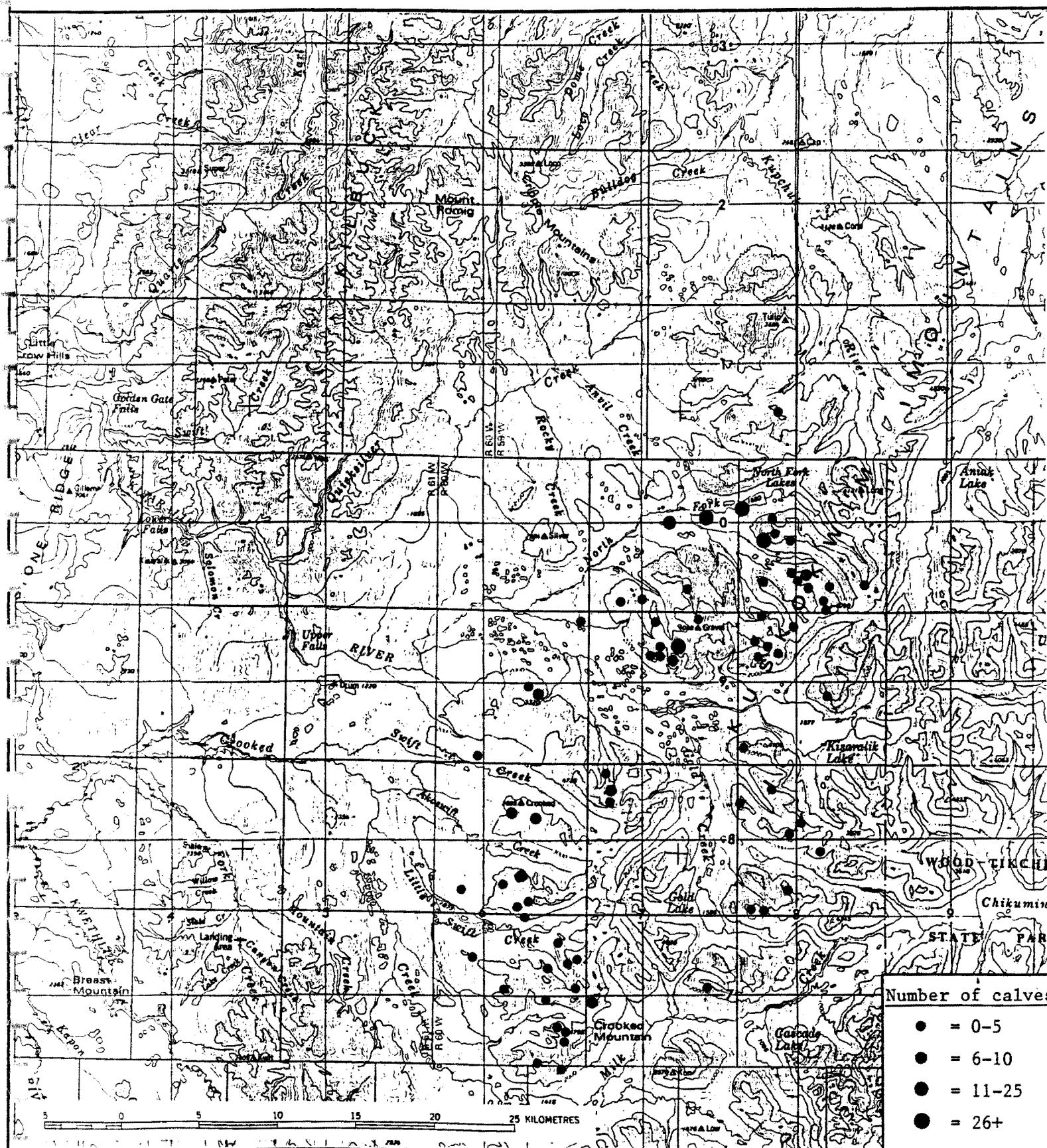
Map 3.....Neonate Calves (mid-May)



Map 1. Winter distribution of caribou groups from the Kilbuck herd, southwest Alaska, 1985-1989. Solid circles represent early winter (Oct-Dec) and open circles represent late winter (Jan-Mar).



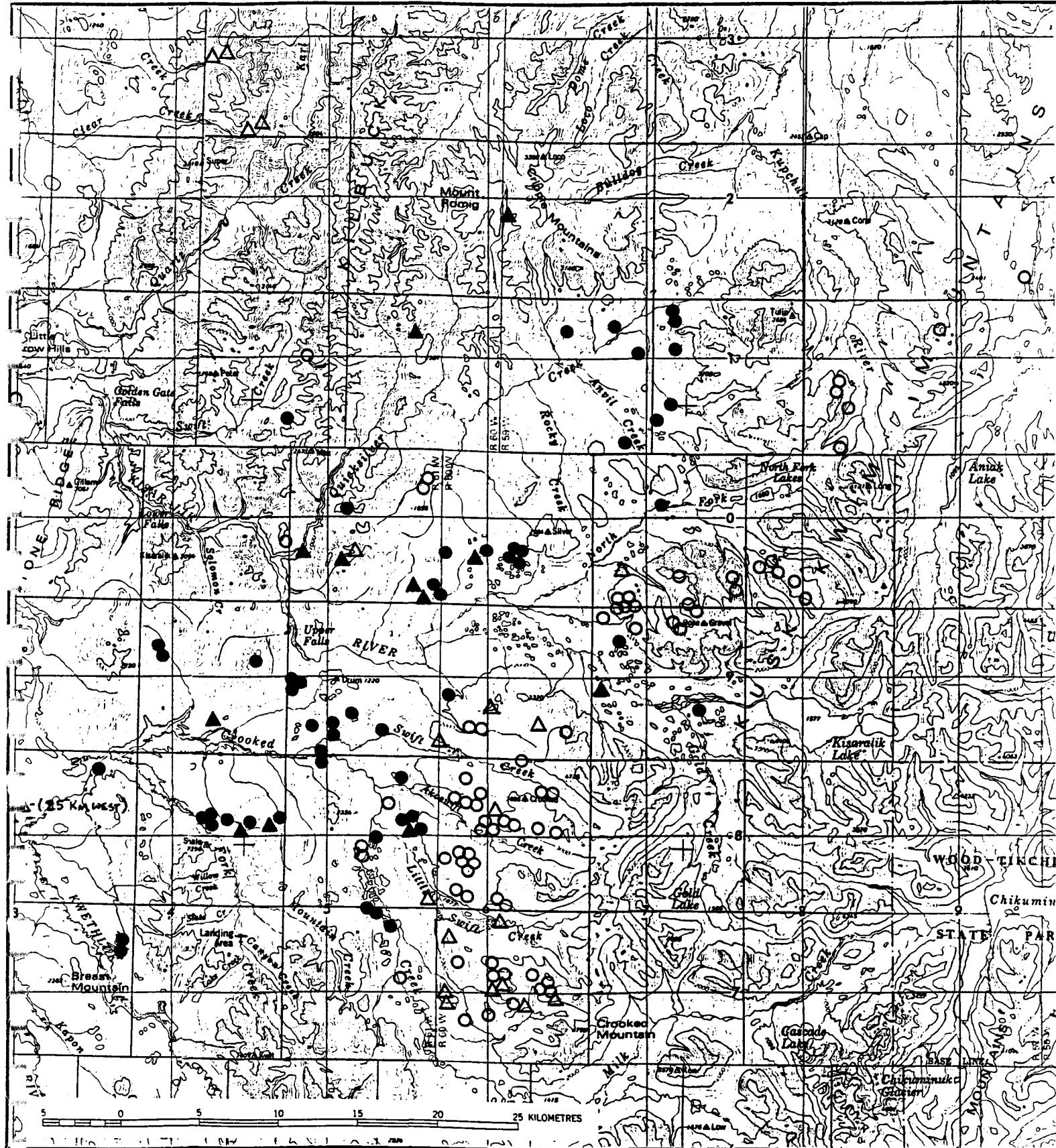
Map 2. Summer distribution (Jun-Aug) of caribou groups from the Kilbuck herd, southwest Alaska, 1986-1989.



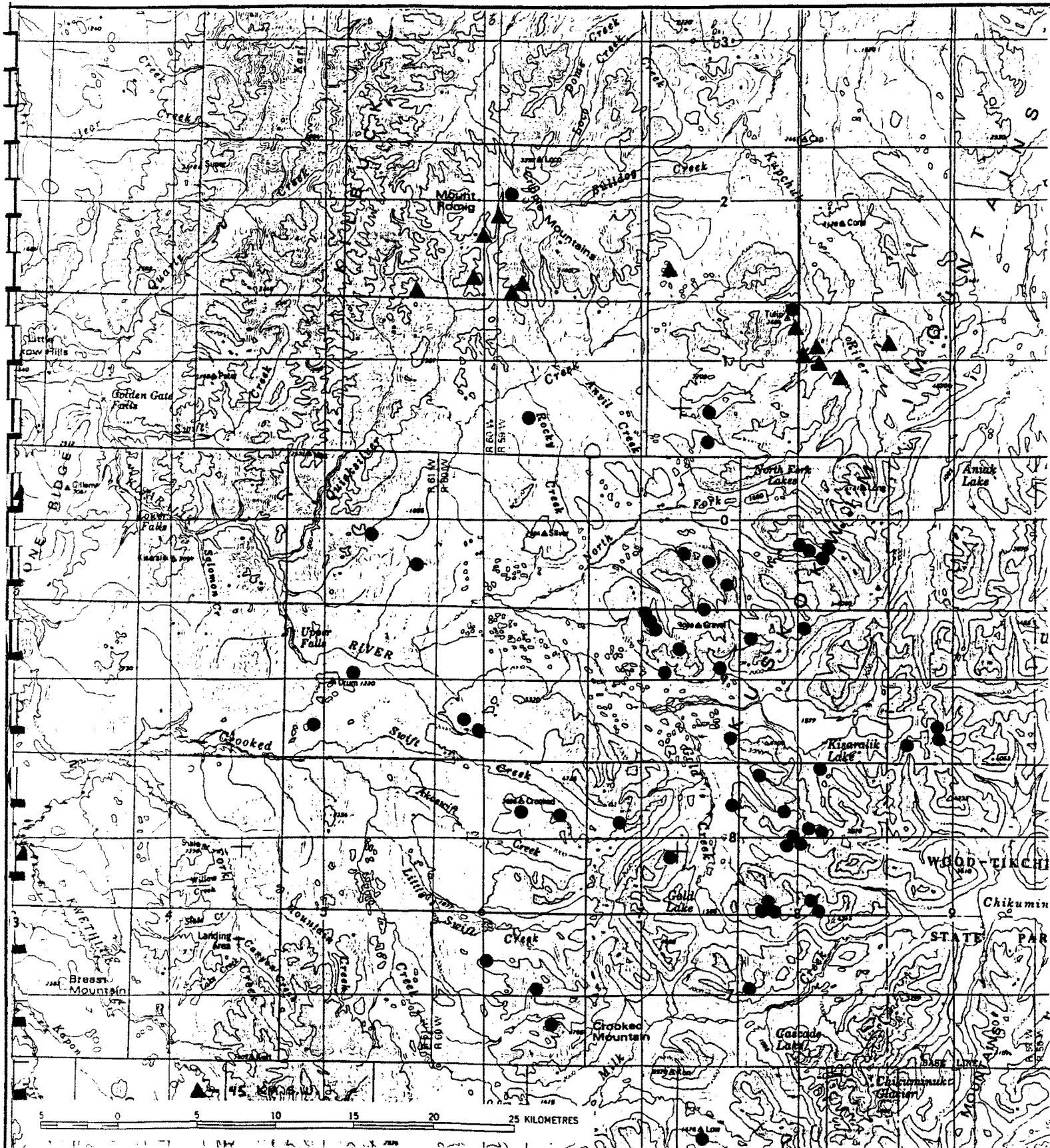
Map 3. Distribution of neonate calves during peak calving (May 10-25) from the Kilbuck caribou herd, southwest Alaska, 1986-1989.

Appendix V. Seasonal distribution and movements of radio-collared caribou from the Kilbuck herd, southwest Alaska, March 1987 - May 1989.

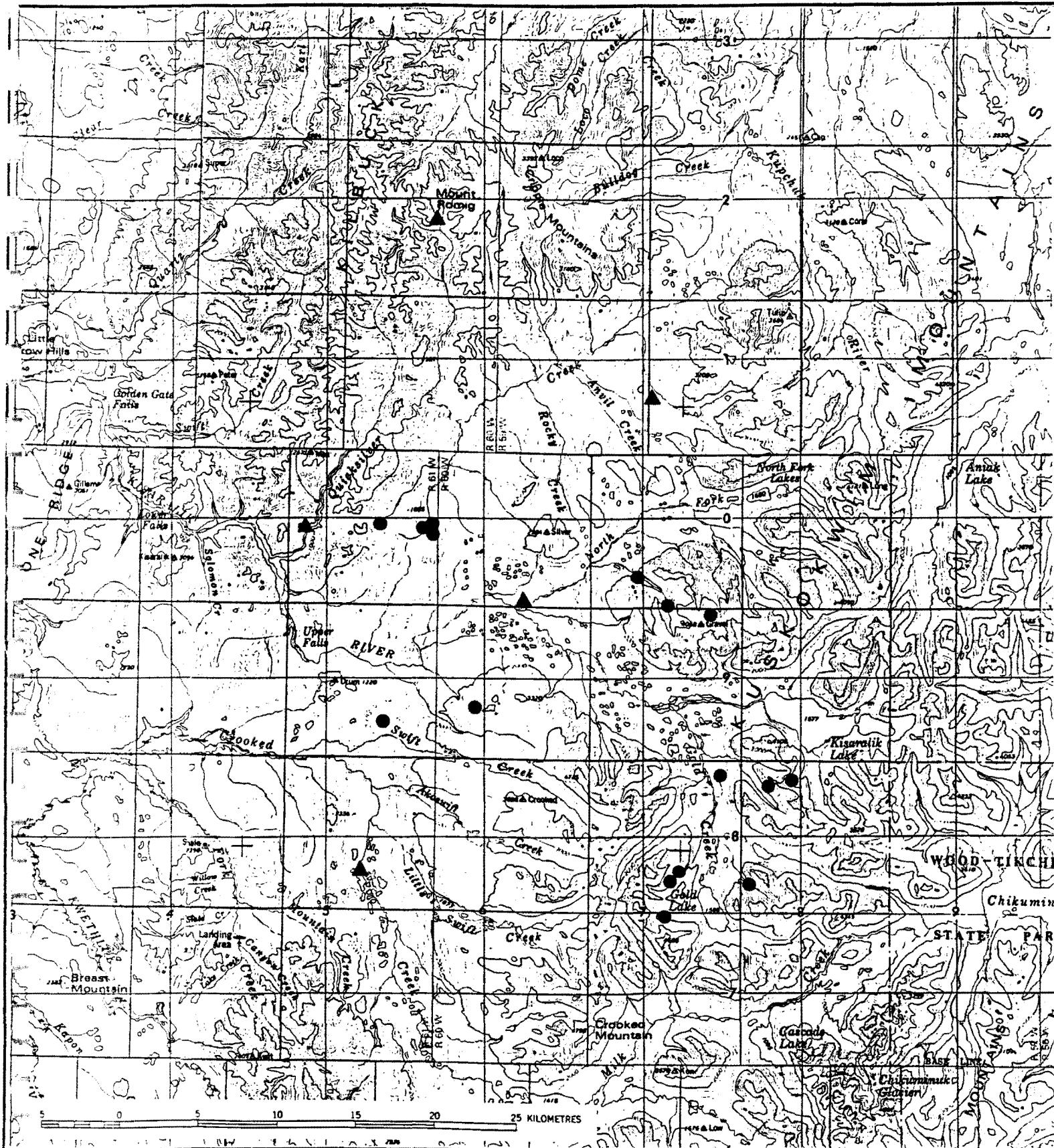
- Map 1.....Winter (Oct-Mar)
Map 2.....Summer (Jun-Aug)
Map 3.....Fall (Sep)
Map 4.....Spring (Apr)
Map 5.....Calving (May)
Map 6.....Female 151.304
Map 7.....Male 151.360
Map 8.....Female 150.120
Map 9.....Female 150.860
Map 10.....Female 150.170
Map 11.....Female 150.310
Map 12.....Female 150.020
Map 13.....Female 151.080
Map 14.....Female 151.625
Map 15.....Male 151.530
Map 16.....Female 150.520
Map 17.....Female 150.340
Map 18.....Male 150.240
Map 19.....Male 151.060
Map 20.....Female 150.571 (Mulchatna Caribou)



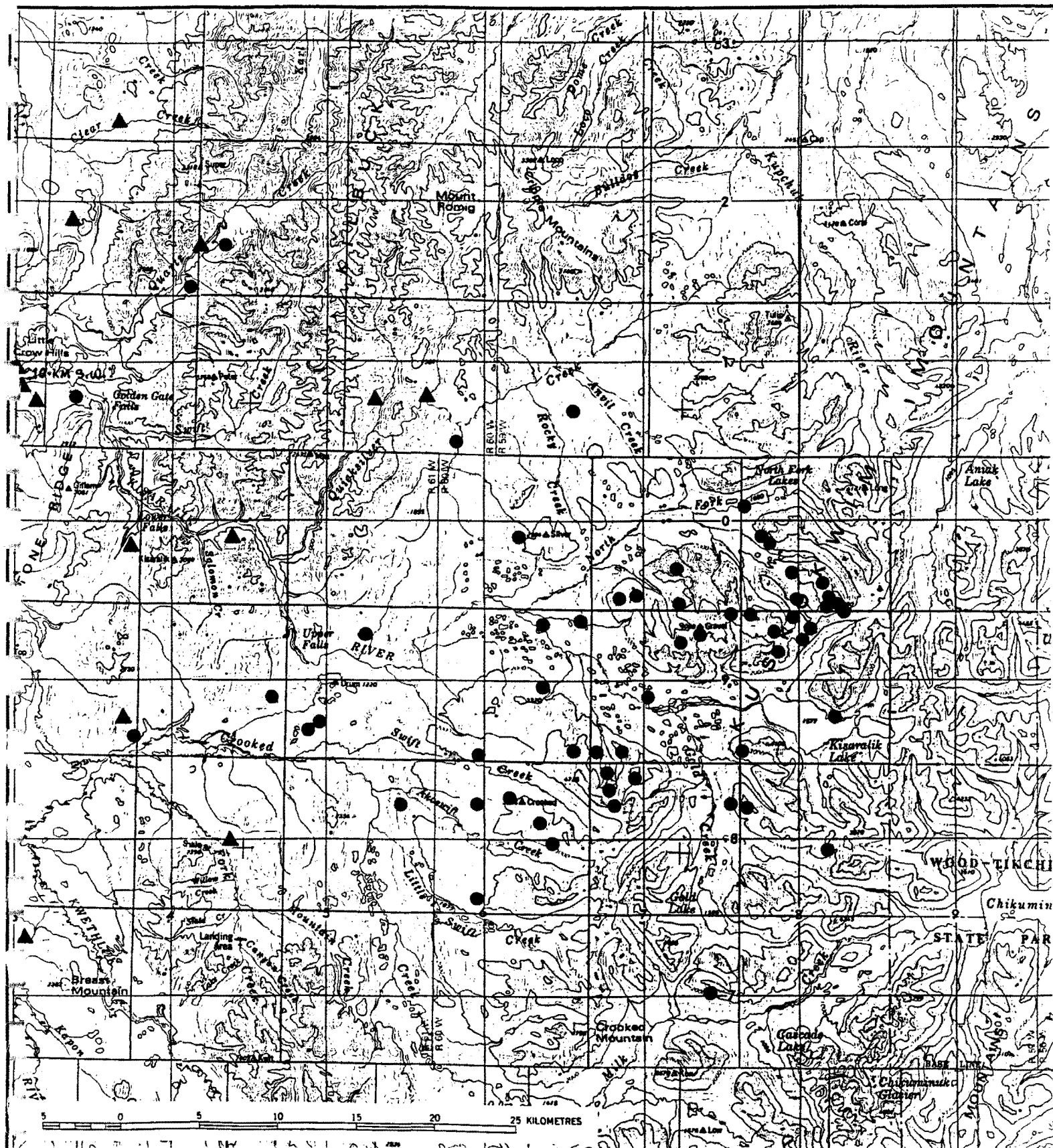
Map 1. Winter distribution of radio-collared caribou from the Kilbuck herd, southwest Alaska, March 1987 - May 1989. Solid symbols represent early winter (Oct-Dec) and open symbols represent late winter (Jan-Mar). Circles represent females and triangles represent males.



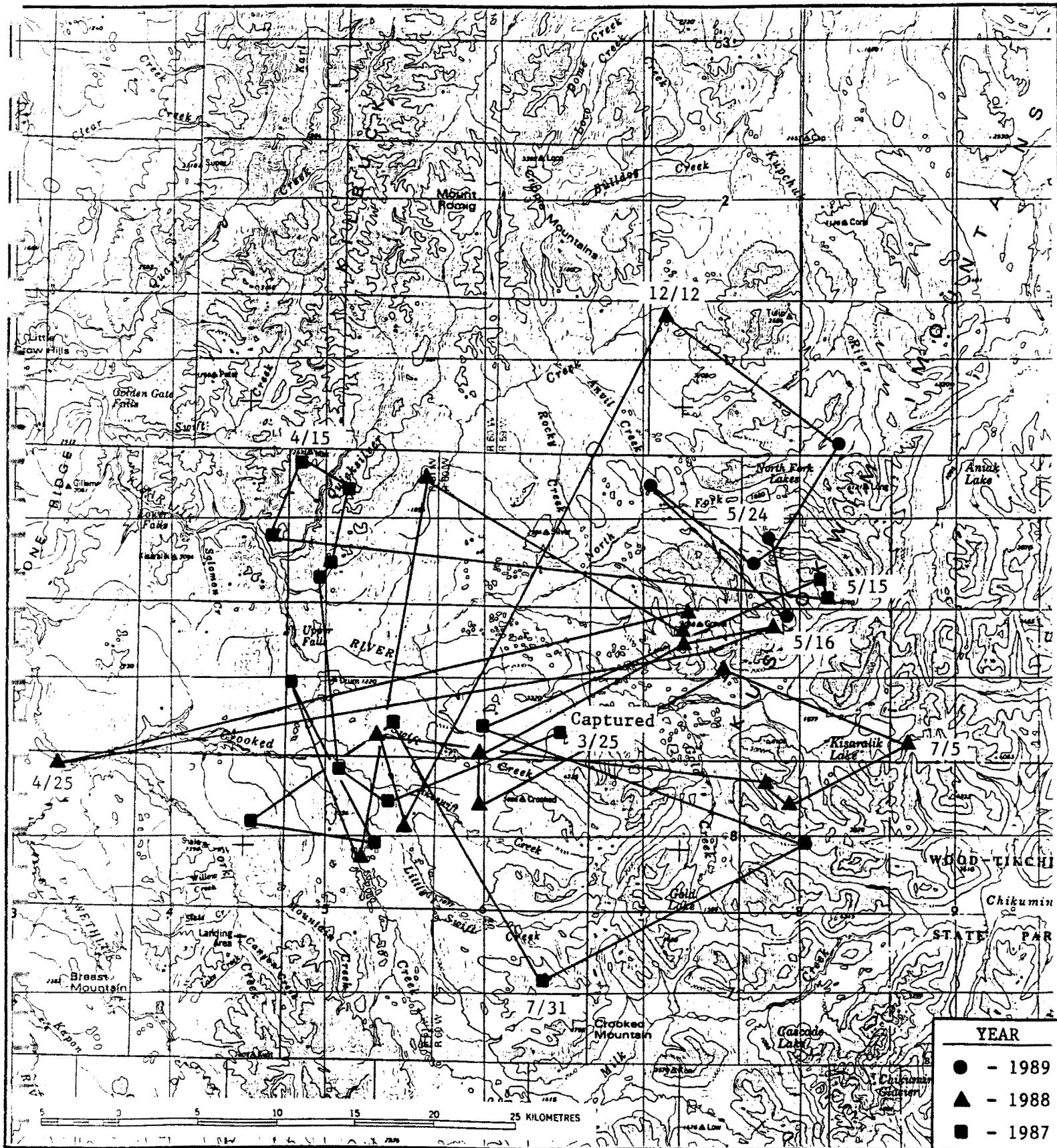
Map 2. Summer distribution (Jun-Aug) of radio-collared caribou from the Kilbuck herd, southwest Alaska, 1987-1989. Circles represent females and triangles represent males.

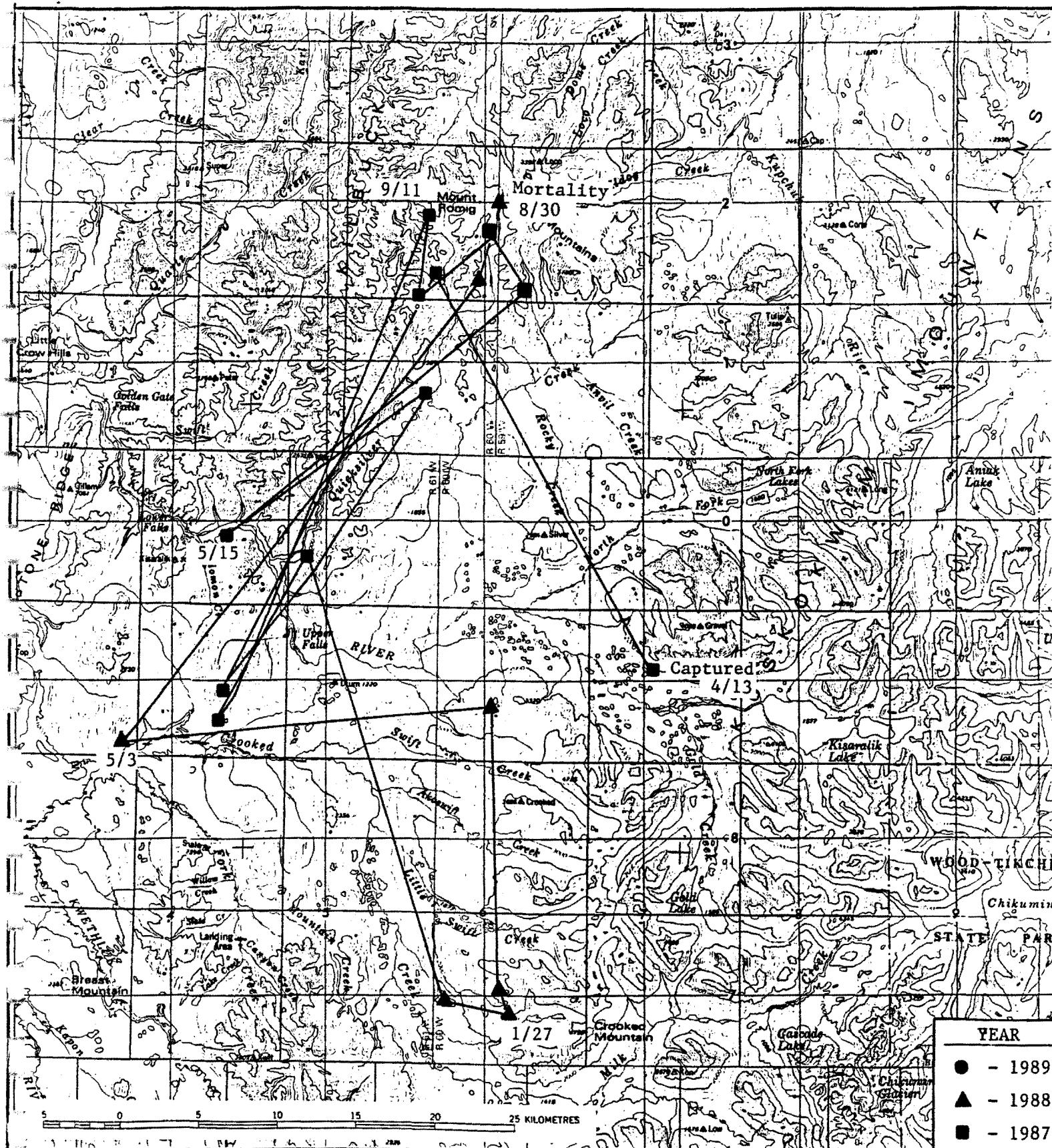


Map 4. Fall (Sep) distribution of radio-collared caribou from the Kilbuck herd, southwest Alaska, 1987-1989. Circles represent females and triangles represent males.

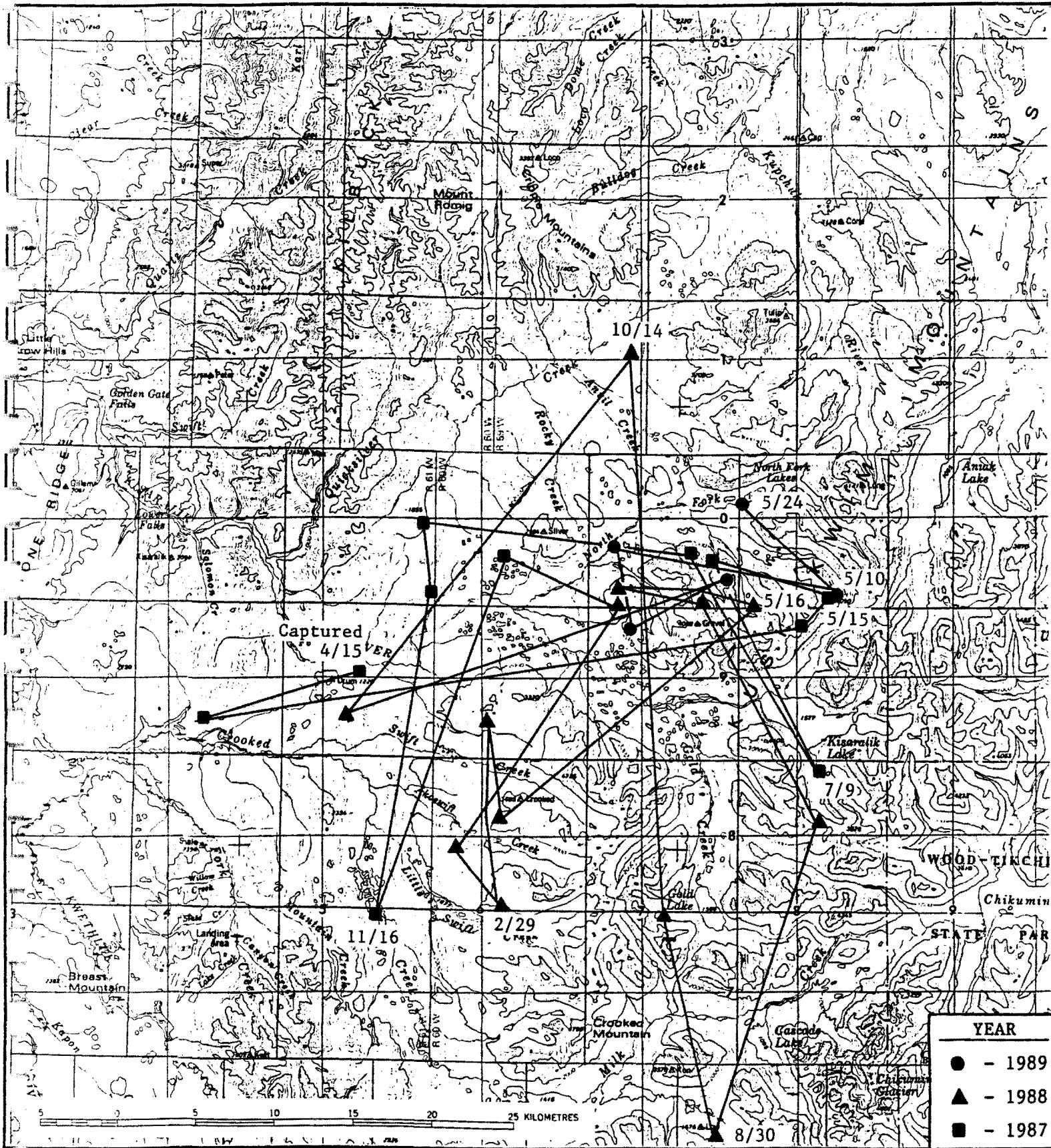


Map 5. Distribution during calving (May) of radio-collared caribou from the Kilbuck herd, southwest Alaska, 1987-1989. Circles represent females and triangles represent males.

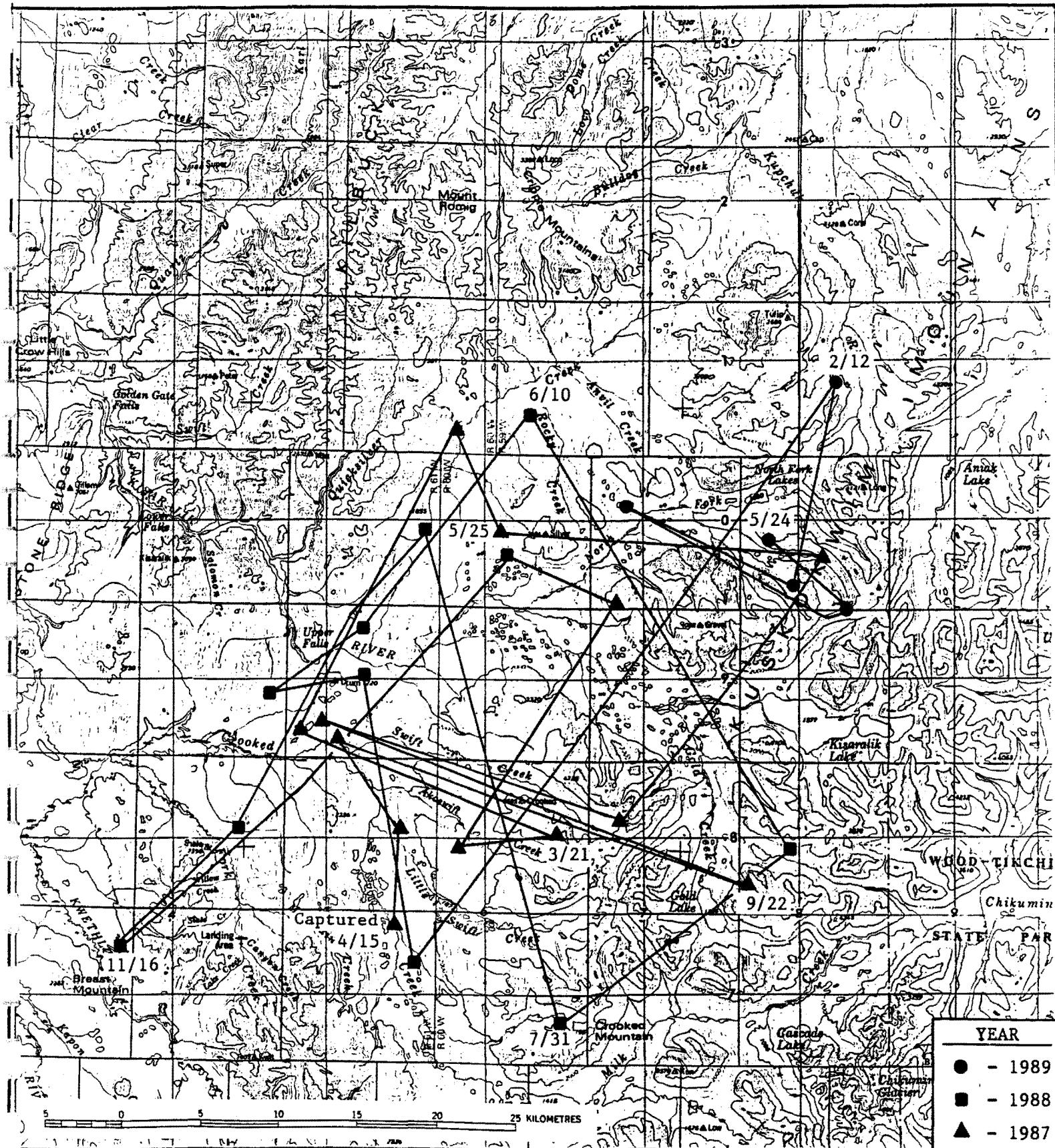


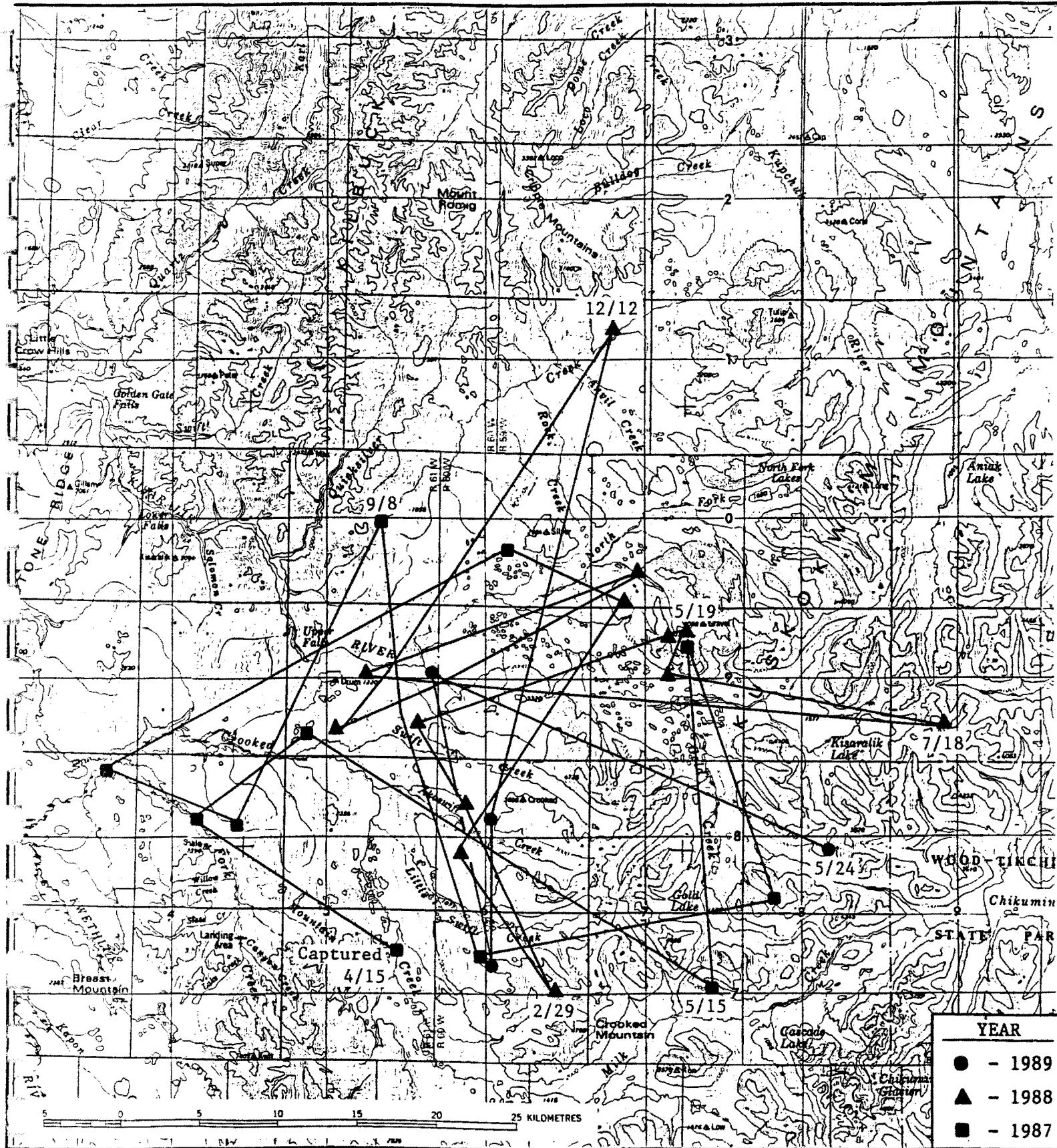


Map 7. Movements of adult male 151.360 from the Kilbuck caribou herd, southwest Alaska, April 1987 - May 1989.

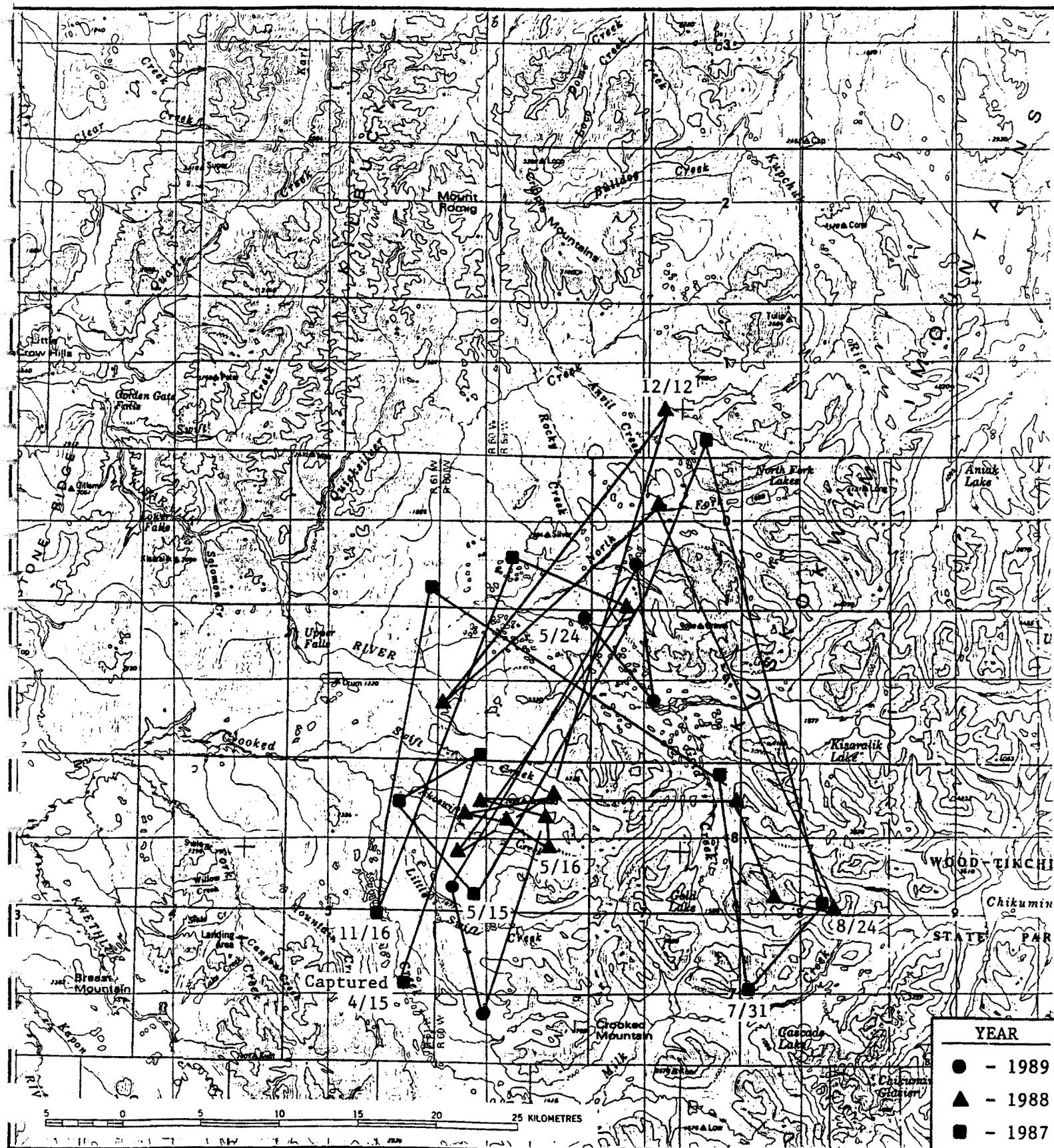


Map 8. Movements of adult female 150.120 from the Kilbuck caribou herd, southwest Alaska, April 1987 - May 1989.

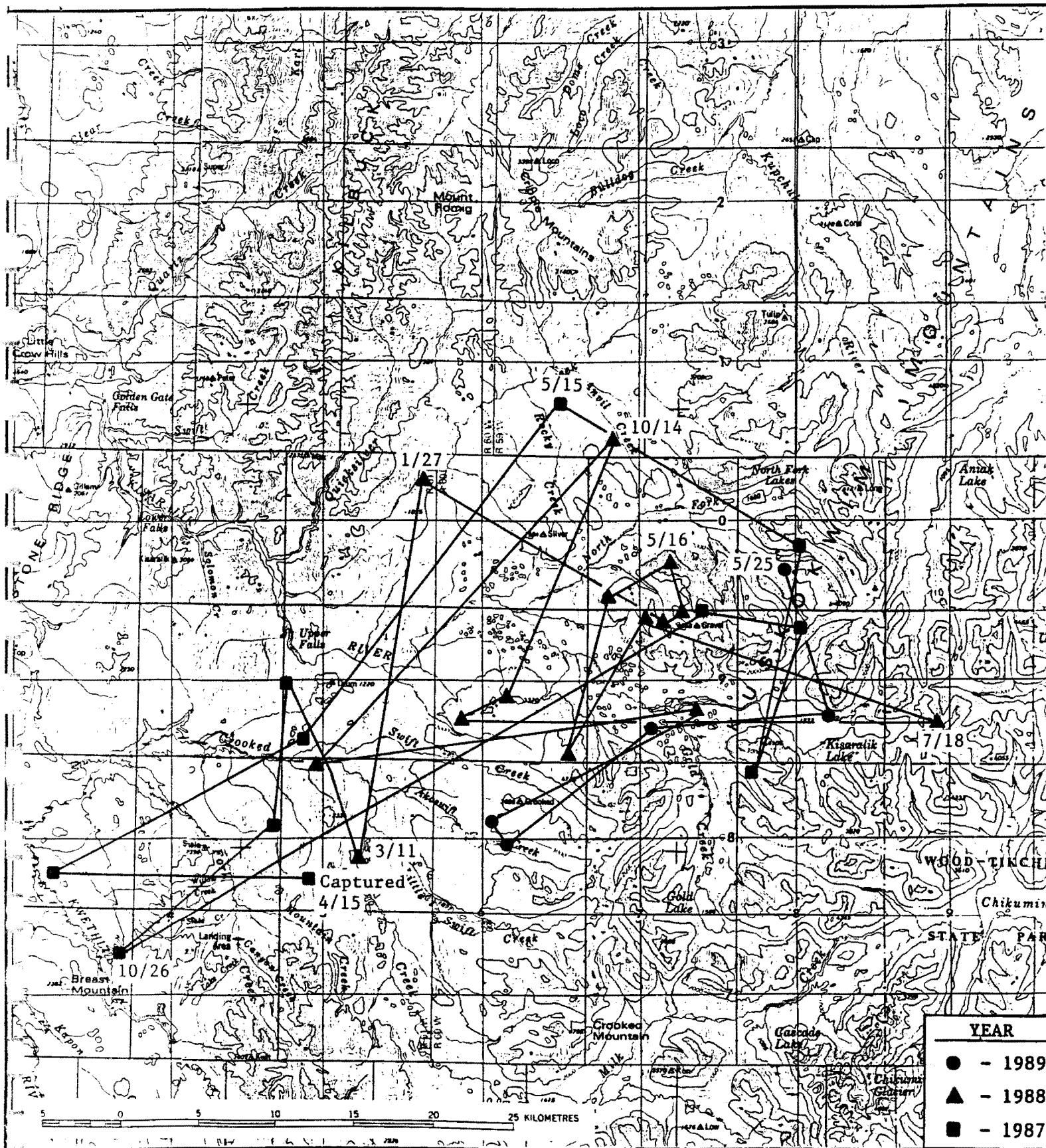




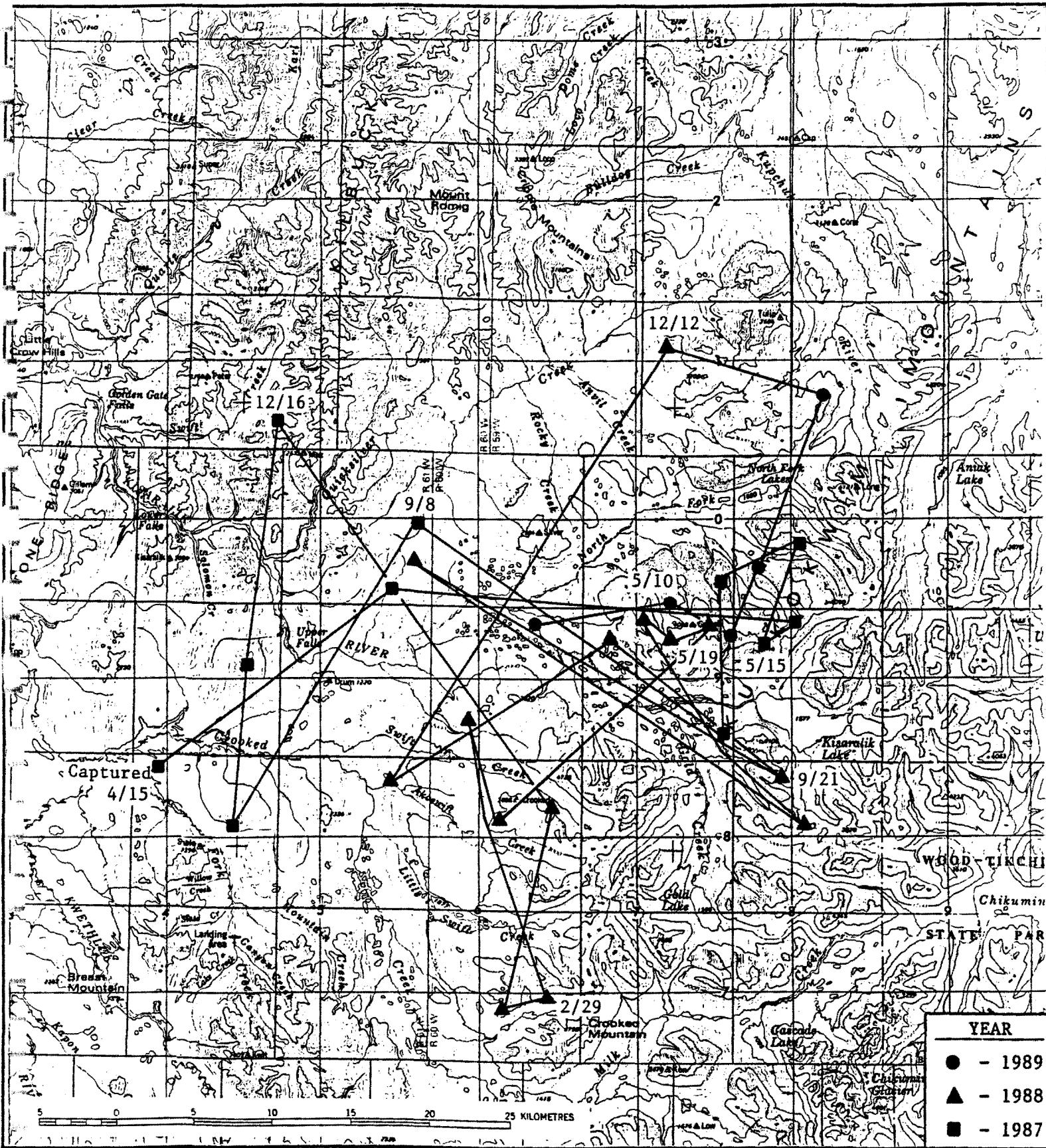
Map 10. Movements of adult female 150.170 from the Kilbuck caribou herd, southwest Alaska, April 1987 - May 1989.



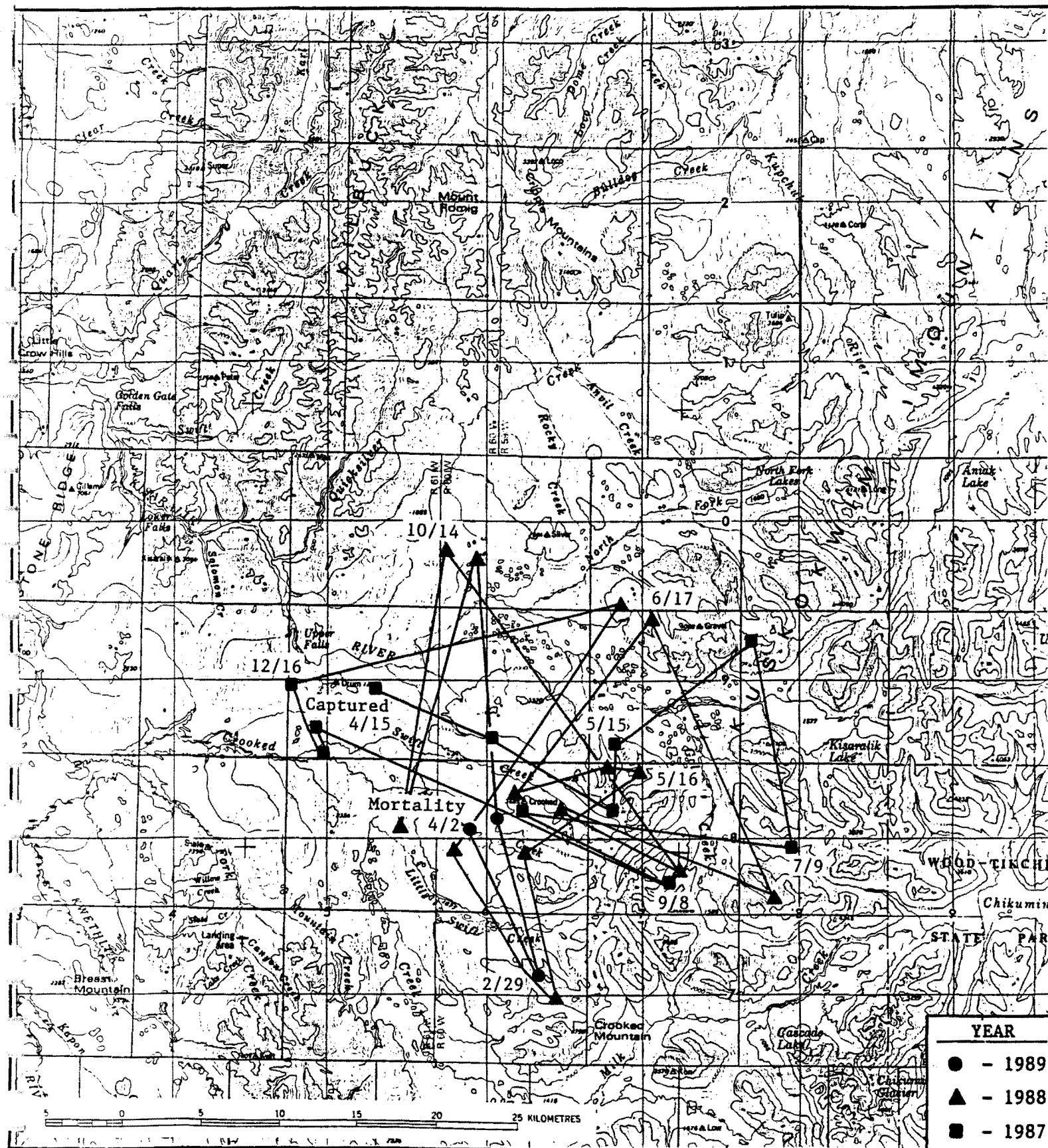
Map 11. Movements of adult female 150.310 from the Kilbuck caribou herd, southwest Alaska, April 1987 - May 1989.



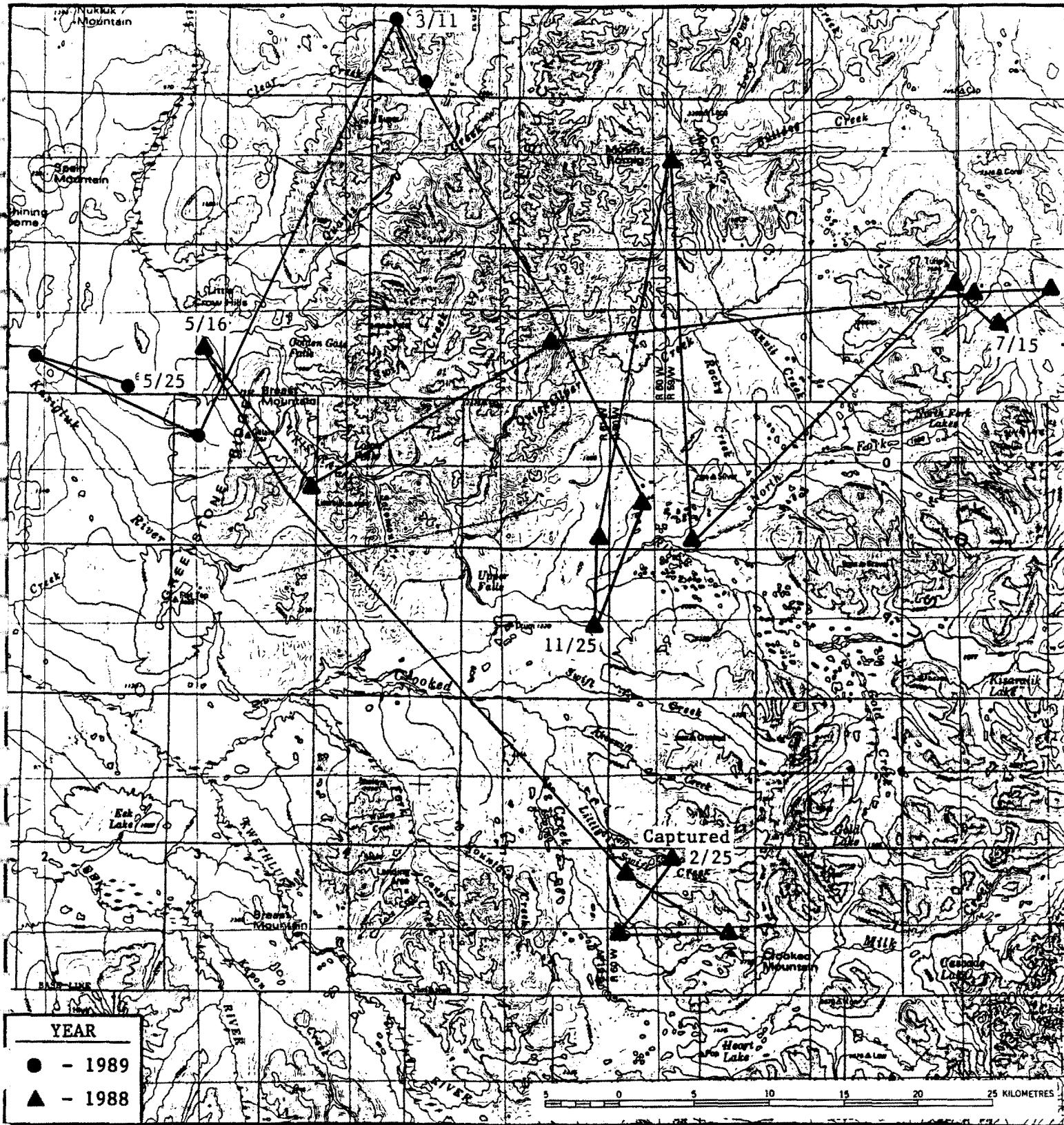
Map 12. Movements of adult female 150.020 from the Kilbuck caribou herd, southwest Alaska, April 1987 - May 1989.



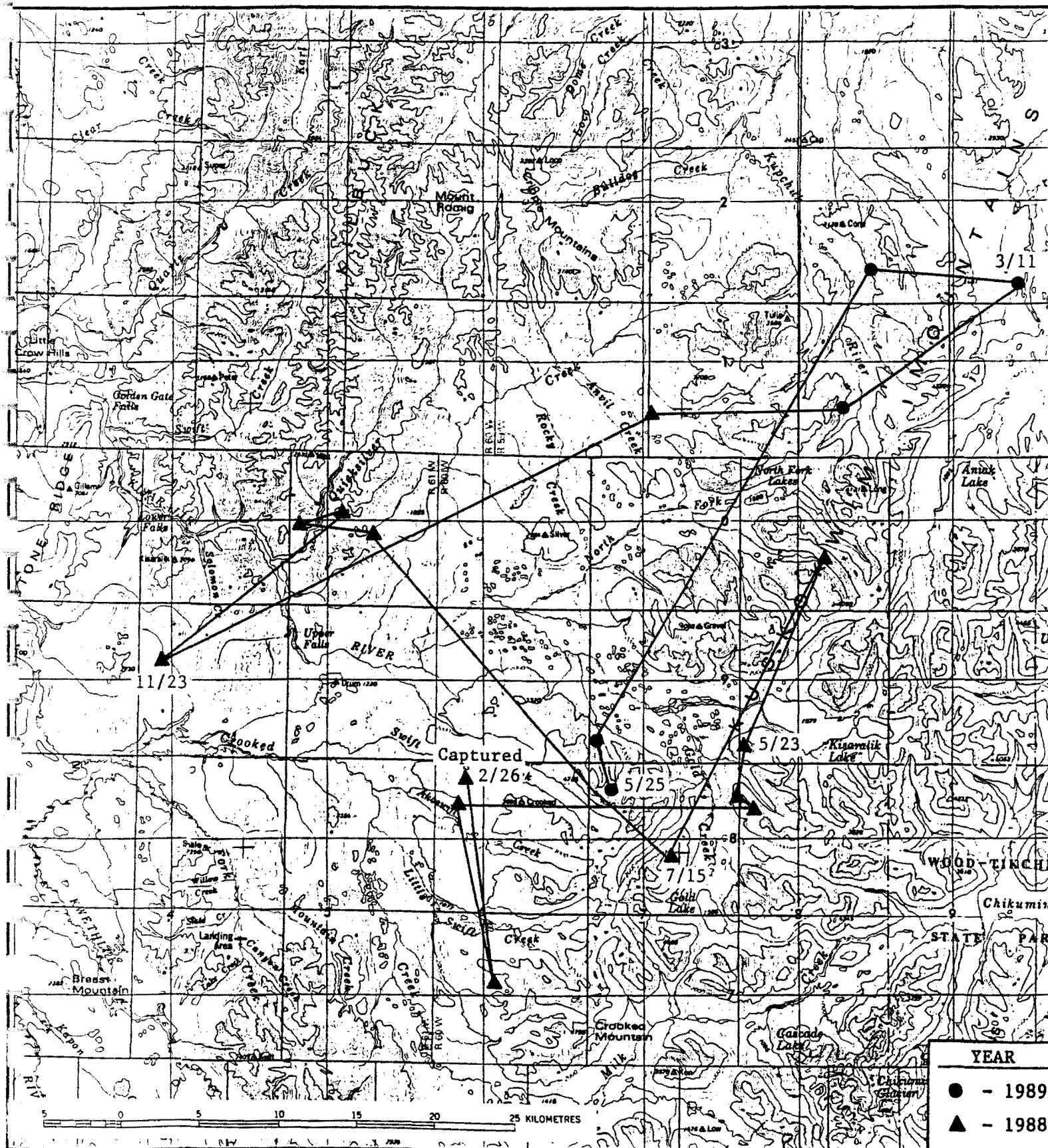
Map 13. Movements of adult female 151.080 from the Kilbuck caribou herd, southwest Alaska, April 1987 - May 1989.



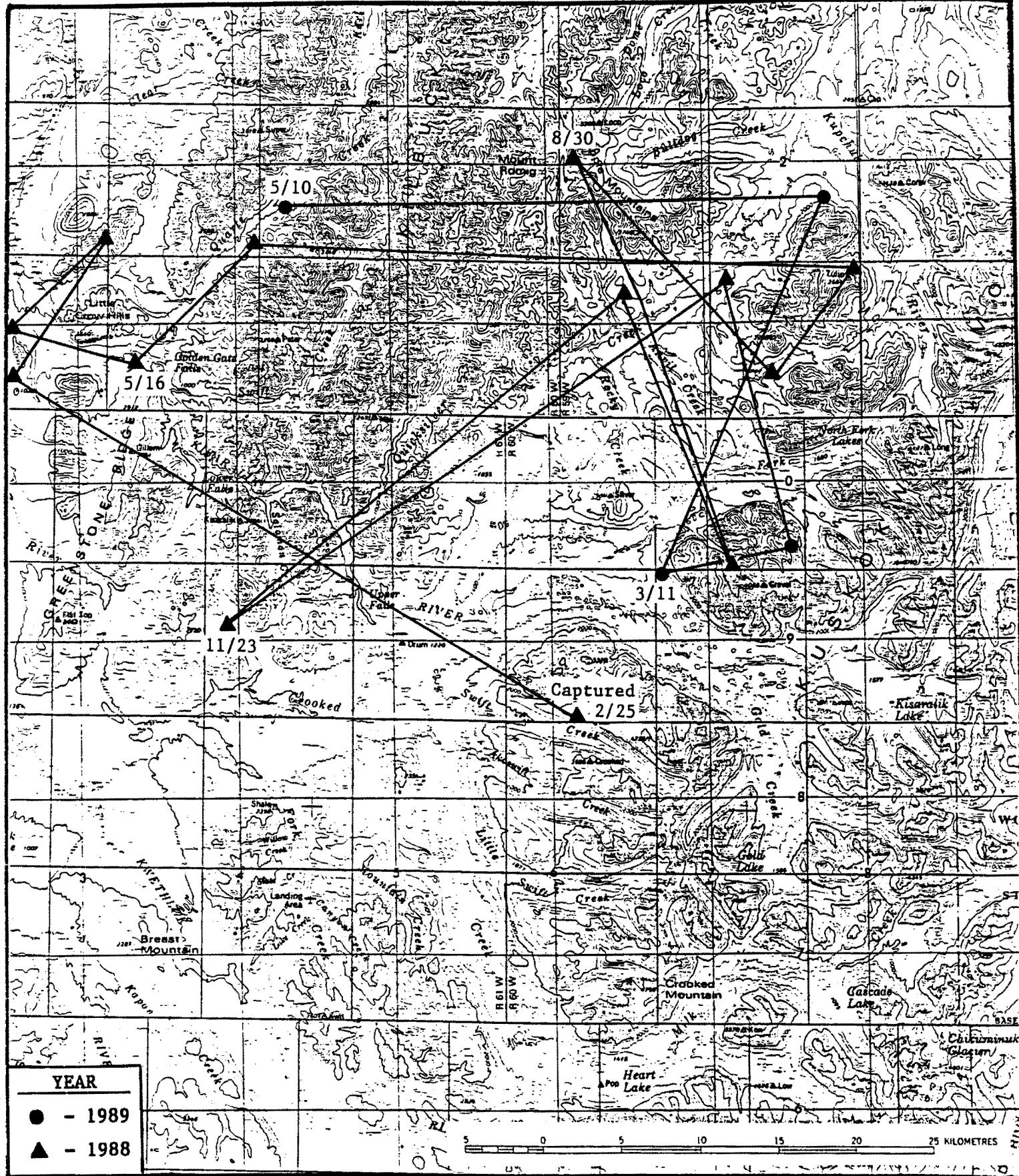
Map 14. Movements of adult female 151.625 from the Kilbuck caribou herd, southwest Alaska, April 1987 - 1989.



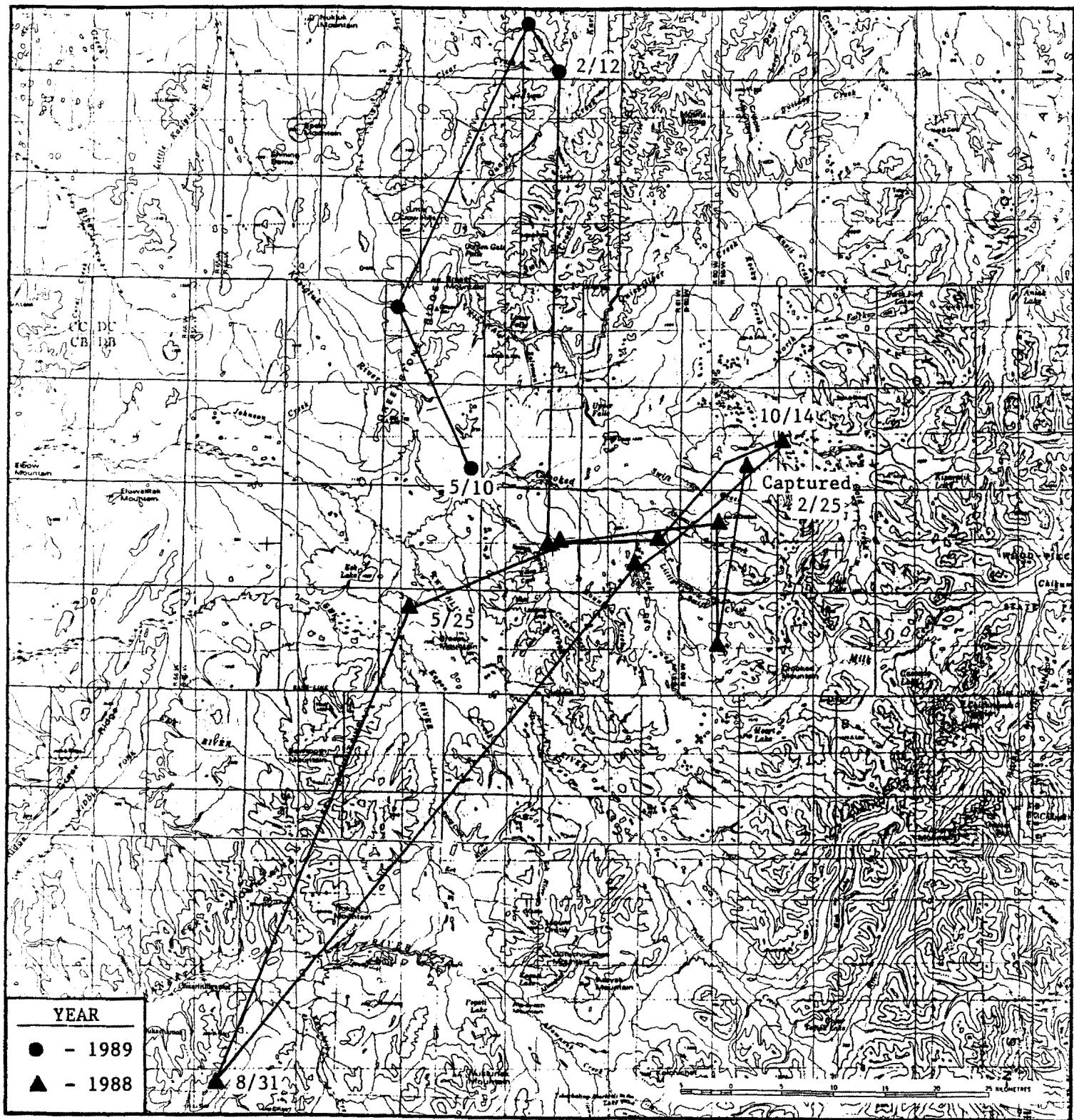
Map 15. Movements of adult male 151.530 from the Kilbuck caribou herd, southwest Alaska, February 1988 - May 1989.



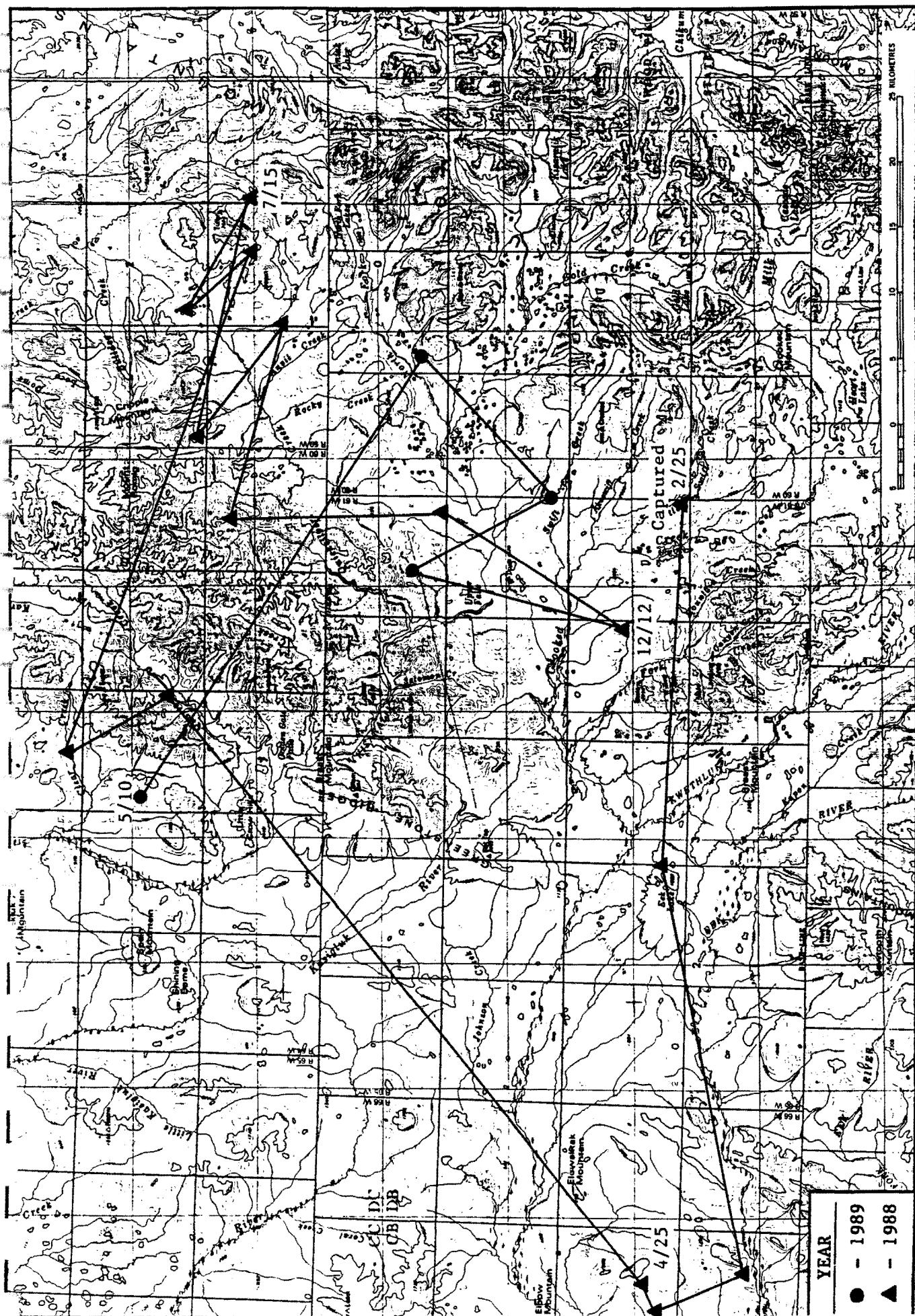
Map 16. Movements of adult female 150.520 from the Kilbuck caribou herd, southwest Alaska, February 1988 - May 1989.



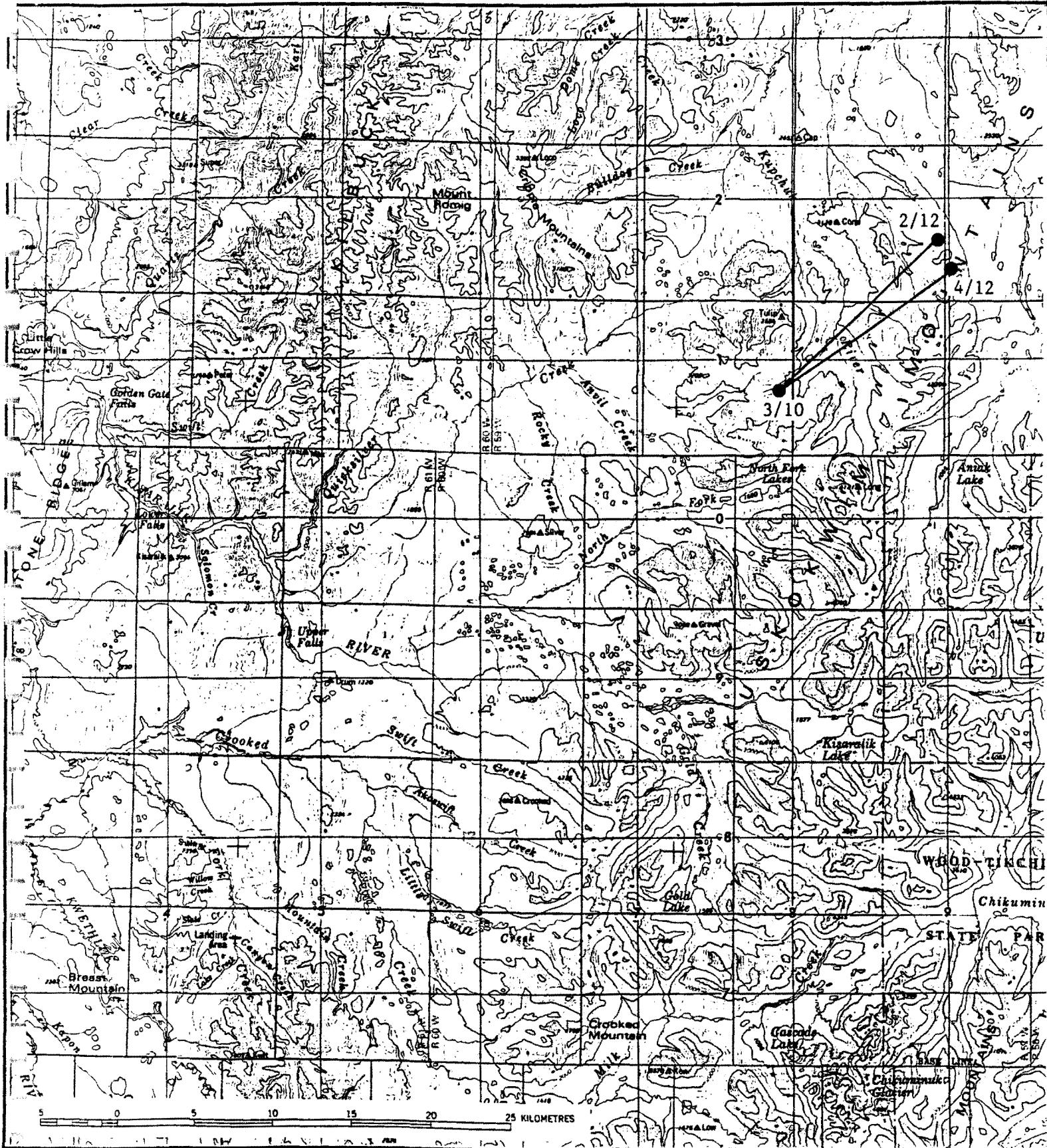
Map 17. Movements of adult female 150.340 from the Kilbuck caribou herd, southwest Alaska, February 1988 - May 1989.



Map 18. Movements of adult male 150.240 from the Kilbuck caribou herd, southwest Alaska, February 1988 - 1989.



Map 19. Movements of adult male 151.060 from the Kilbuck caribou herd, southwest Alaska, February 1988 – May 1989.



Map 20. Movements of adult female from the Mulchatna caribou herd located within the Kilbuck study area, February 1989 - April 1989. (150.571)