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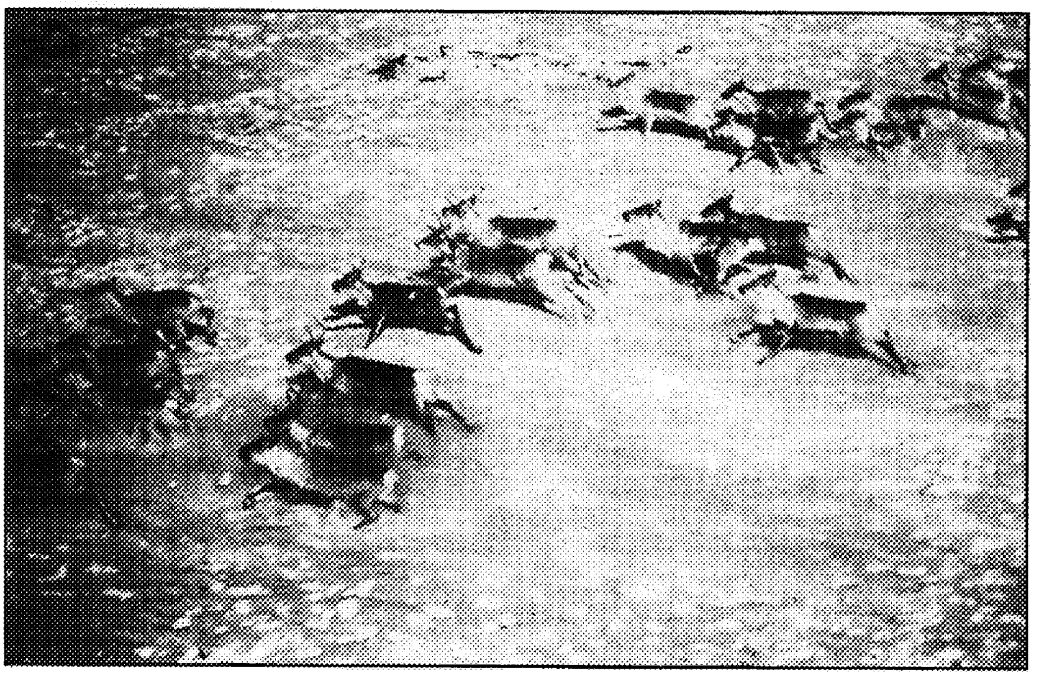
Ray Mountains Caribou: Distribution, Movements and Seasonal Use Areas, 1994-1997

R.R. Jandt



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Abstract

Abstract : Preliminary findings of habitat use patterns for the Ray Mountains caribou *(Rangifer tarandus)* herd were determined from three years of radiotelemetry observations. Caribou calving was concentrated in open south-sloping plateaus between Mt. Tozi and the Tozitna River. Most of the herd wintered between the Ray Mountains and the Kanuti-Kilolitna river. Use of previously designated Areas of Critical Environmental Concern was examined. Fire history of the caribou range was compiled with caribou locations to determine whether burned areas were used. There was minimal overlap between fire locations and caribou locations.

INTRODUCTION:

In the late 1970s investigators confirmed the existence of a small resident caribou herd in the Ray Mountains, located north of the Yukon River and the village of Tanana (Davis 1978, Robinson 1985). More recently, this herd as well as other small interior caribou herds, has been shown to have some degree of genetic difference from other Alaska herds (Cronin, et al. 1995). Of the caribou and reindeer samples tested, the Ray Mountains animals (n=20) shared the most genetic similarity with the Galena Mountain caribou herd (GMH) and the Central Arctic herd (Cronin, et al. 1995). The Ray Mountains caribou herd resides within the Bureau of Land Management (BLM) Central Yukon Planning Unit, Tozitna subunit. The Tozitna subunit is estimated to have 1.4 million acres of caribou habitat (BLM 1986). BLM biologists studied the Ray Mountains herd in the 1980s to determine potential impacts from conflicting land uses—especially mining—as the area has the best potential for metalliferous mineral development within the Central Yukon Planning Area. The Central Yukon Plan opened 90 percent of the caribou habitat in the subunit to mineral entry and noncompetitive oil and gas leasing. Biologists attempted to determine population size and identify crucial habitat areas (Robinson 1985). Initially, these determinations were made by visual observations of groups of caribou, without benefit of radiotelemetry. Caribou can be exceedingly difficult to see depending on visibility and snow or vegetation conditions. Identified crucial habitats were not closed to development, but were designated as ACECs (Robinson 1988). Size of the herd was estimated at about 500-1,000 animals in 1987, with the highest count at 511 animals (Robinson 1988). A 1995 aggregation count by the Alaska Department of Fish and Game (ADF&G) using radiotelemetry provided a new minimum herd size of 1,737 animals (J. Woolington, pers. comm.). The total size of the herd is currently about 2,000 caribou.

The present monitoring study began in October 1994 when 20 caribou from the Ray Mountain herd were fitted with radiocollars via collaboration by state and federal cooperators. Radiocollars were provided by BLM; ADF&G supplied the helicopter time and deployed the collars, while the Fish and Wildlife Service (USFWS): Koyukuk/Nowitna Refuge supported the capture operations with a spotting plane. The collars have been monitored cooperatively by the BLM and ADF&G. At the time of this report, there have been a total of 25 relocation flights, including two counts for sex and age composition in fall, and two post-calving aggregation photo-counts during summer.

The composition count in October of 1995 reflected the demography of 994 caribou in seven groups with all but two collars observed: 681 cows (68.5%), 83 calves (8.4%), and 230 bulls (23.1%). The calf:cow ratio was 12:100 while the bull:cow ratio was 34:100. A total of 230 bulls were observed with 14.8% consisting of small bulls, 37.4% medium bulls, and 47.8% large bulls. In 1996, the composition of 1,387 caribou observed by ADF&G was 971 cows (70%), 145 calves (10.5%), and 271 bulls (19.5%). This equates to calf:cow ratio of 15:100 and a bull:cow ratio of 28:100. These recruitment rates are low, but comparable to rates for other small interior caribou herds.

Adult mortality in the herd has been rather low, with 15/20 collars still active three years after collaring. The first two mortalities were recorded during the first relocation flight in December, 1994. They were recovered (or located on the ground) and appeared most likely to be due to bear predation, although none of the mortalities were recent enough to allow

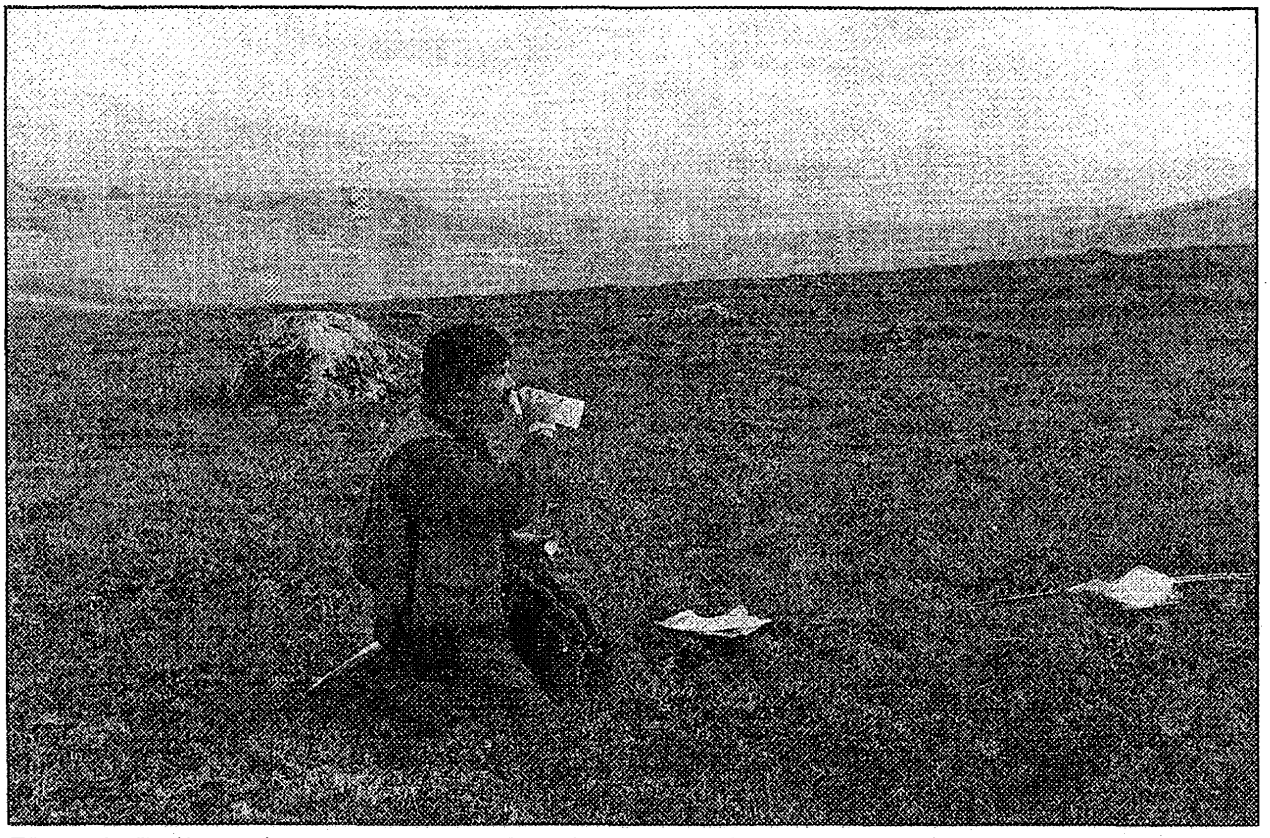


Photo 1. Caribou winter range north of the Ray Mountains.

determination of the cause with confidence.

STUDY AREA:

The Ray Mountains (Photo 1 and 2) are located approximately 240 km northwest of Fairbanks, Alaska about 80 km south of the Arctic Circle. The terrain of the range is diverse, with much of the area 500-1,200 m in elevation. Mt. Tozi, at 1,682 m, is the highest peak in the range. The range is surrounded by the broad alluviated lowlands of the Tozitna, Melozitna, Kanuti, and Ray Rivers, which drain its south and southwest, west, north and northeast portions, respectively. The Ray Mountains have been described as a physiologic and ecological island of subarctic tundra ecosystems within the taiga that dominates central interior Alaska (Farquhar and Schubert 1980).

The flora of the Ray Mountains includes at least 227 vascular plant species which are a mixture of arctic, alpine and boreal species. Treeline is near 610 m (2,000 ft) with about 22 per cent of the area covered by forest (Farquhar and Schubert 1980). The central upper elevation portion of the range is dominated by alpine rock-lichen barrens; the rolling lowland slopes are dominated by low arctic shrub-tussock tundra.

METHODS:

Caribou were located by fixed-wing aircraft and captured using standard helicopter and

chemical immobilization techniques in the vicinity of Kilo Hot Springs during October, 1994. Twenty female caribou calves were fitted with Telonix VHF radio transmitters. The transmitters included a mortality mode switch after five hours of inactivity. Radio- collared animals were subsequently located by fixed-wing aircraft. Monitoring flights were attempted monthly with more intensive monitoring during the spring calving season, although weather or lack of aircraft availability sometimes lenghtened intervals between relocation flights. Telemetry locations for each animal were plotted on USGS maps (1:250,000) and locations recorded using a Global Positioning System (GPS). GPS locations were not differentially corrected. The date, time, group size, weather conditions, visibility and any unusual conditions (lameness, use of recently burned areas) were also noted. In a few cases, no visual sighting of the animal was obtained, but an approximate location recorded based on the collar signal.

The database containing the GPS coordinates of caribou locations was combined with scanned base maps using a Universal Transverse Mercator (UTM) projection in ArcView to create maps showing caribou movements and habitat use by season. Fire history of the Ray Mountains area (Fig. 1) was obtained from the BLM Alaska Fire Service. This information was derived from digitizing approximate fire perimeters recorded by fire suppression forces or monitoring aircraft, and the precision of the mapping is known to be quite variable among mappers. However it provided a basis for examining the fire history of the area with respect to known caribou use patterns. No maps were available for a few fires, including the large 1969 Holanda Creek fire (Fire #9482: 321,000 ha) which burned in the northwest corner of the study area (Fig. 1), so only their points of origin are depicted. The fire report for the Holanda Creek fire states that fires #9483 and #9499 burned into it, indicating the areal extent that burned during 1969 in the western portion of the study area. In addition, there are approximately 10 fires in the study area ranging in size from 50-350 ha in size that are not included on the draft fire history map.

RESULTS AND DISCUSSION:

Seasonal Distribution and Movements

Locations for 205 caribou groups, radioed or incidentally observed over the first three years of the study are displayed in Figure 2. The locations are sorted by season and group size. This figure does not include locations where collars were located by telemetry but visuals were not achieved to obtain an estimate of group size. Non-visual locations are included in the maps of individual collar movements contained in Appendix A. During the three years of observations the Ray Mountain caribou demonstrated a relatively high degree of fidelity to their traditional ranges, similar to other small interior caribou herds like the GMH. Collared animals, at least, confined their movement between the Yukon River to the south and the Kanuti National Wildlife Refuge boundary to the north, and between the Ray and Big Salt River drainages to the east and the Tanana-Allakaket winter trail to the west. Biologists had expected to see animals utilizing the eastern Refuge and Dalton Highway Corridor during the fall, but no collars were recorded in these locations, although caribou were observed there in fall of 1995 and 1996. It is possible these were Ray Mountain caribou and no radioed animal happened to be in the group, but it also warrants consideration that animals frequently observed around Caribou Mountain and the Dalton Highway in the fall belong to another caribou herd, perhaps one that has not yet been described.

Access to the herd for hunting is extremely limited. Small groups wintering in the Dagislakhna Flats (Fig. 2) would be available to subsistence hunters off the Tanana-Allakaket trail. Radioed caribou were scarce in the Tanana Hills during the observation period, and Tanana residents would have had to travel into the upper Tozitna valley or Ray Mountains to find larger groups of caribou. In 1995-96, the reported harvest was zero, although hunters reported 16 unsuccessful attempts to harvest caribou from the area. ADF&G estimates the unreported harvest at about five animals yearly (ADF&G 1997).

The pattern of seasonal usage varies from what was previously described by Robinson (1988) during the development of ACECs. A map of the ACECs is provided in Appendix B. Originally both Tozitna North and South ACECs were felt to be important calving areas. Recent observations would indicate that the north unit is important to the herd on a year-round basis, but particularly in winter, while the south unit in the Tanana hills has seen little recent use. Instead, the south slopes of the upper Tozitna River have emerged as a core calving area and may prove to be a crucial habitat area (Fig. 3). For purposes of the display, the calving season was defined as May 1-June 7. All but two (Collars 9 and 4: Appendix A) radioed caribou utilized a particular slope south of Mt. Tozi during at least one spring, and many utilized it every year. During and just after the peak of calving, which generally occurred between May 18-25, this area was characterized by large aggregations of caribou cows and calves. We also observed grizzly bears in the area during calving and denning sites in the nearby mountains. Clearly, predation is an important factor in this herd's dynamics and behavior.

Although caribou in good nutritional status are capable of calving at two years of age, many wild caribou do not calve until three years of age. At least 6/18 (33%) of collared two-year-olds appeared to be pregnant in 1996 based on the retention of antlers into the spring, and at least 9/14 (64%) three-year-olds had antlers in May, 1997. None of the collared three-year-olds has yet been able to successfully raise a calf into the fall. Younger animals tend to be less successful mothers, but the calf:cow ratios reported by ADF&G during composition counts (19:100 in 1995, 15:100 in 1996) also suggest that recruitment rates for this herd overall are low. Adult survival rates, in contrast, have been quite high, averaging >90% over the three years.

During summer, defined as June 8-August, caribou aggregated high in the central Ray Mountains, presumably to gain relief from heat and insect harassment (Fig. 4). On hot, sunny days they were either in constant motion or favored windy passes and snow patches and did not feed much during periods of high insect activity. Groups of over 700 animals were observed during July aggregation counts. In the fall (September- October) groups tended to be smaller and distributed more in the mid-level elevations, with a general shift toward the north slopes of the Ray Mountains (Fig. 5). By winter (November-April) many caribou moved north into the headwaters of the Kanuti- Kilolitna River (Fig 6). Groups of 200-400 animals were typical during this season. Lichen cover was spot-checked at a couple of locations where large groups were overwintering and estimated to be 15-35% (Jandt, unpublished data), which is in the mid-range for quality of caribou lichen range. Major migratory trails were observed west of Torment Creek, where migration paths were recognizable from the ground from the density of caribou droppings as well as tracks, and on

each side of the upper Kanuti-Kilolitna River. Small groups of caribou also wintered in the hills between Ishtalitna Creek and Holanda Creek, and in the Dagislakhna flats.

Burned Areas vs. Caribou Distribution

In comparing burn history and caribou distribution, it is apparent that lowland flats and drainages have burned more extensively during the last 50 years than lichen-tussock tundra uplands favored by Ray Mountains caribou (Fig. 7). Two reasons for the observed distribution may be that North American caribou herds are largely dependent on lichens for winter forage and also require foraging areas where the snow depth is relatively shallow, such as exposed windblown slopes. Prevalence of ground lichens in the winter diet has been estimated to be about 70% for the Western Arctic caribou herd (Jandt, unpublished data). Spruce forest cover dominates some lowlands that have not recently burned, such as the drainages north of the Yukon, and the Ray and Big Salt Rivers. Snow in these protected areas is deeper than on windblown tundra plateaus. For tundra uplands, the most extensive research studies to date, in Canada, have shown that the lichen species preferred by caribou take 40-70 years to re-establish following fire (Thomas et al., 1996). There may be other reasons for the observed caribou distribution, such as the ability to escape predators.

Most of the observed use of burned areas by Ray Mountains caribou was during spring and fall. An exception was the large 1990 fire (A417: 58,900 ac) just south of the Kanuti-Kilolitna River, where groups of up to 83 wintering caribou were observed (Fig. 7). However, upon inspecting one of these areas from the ground via helicopter, it appeared that the caribou were using large areas of unburned habitat included within the larger fire perimeter. Observations of caribou in recent burns were usually during the spring (May). A concentration of calving locations south of Mt. Tozi seems to correspond at least partially with a 1984 burn (Fig. 8). Further study is needed to determine if there are favorable habitat characteristics related to the burn, such as more vigorous or earlier growth of vegetation. or if the association is coincidental.

In summary, we found little use of recently burned areas by caribou but data is insufficient to determine whether burned areas are avoided or selected during a particular season. All large wintering aggregations were located outside of burned areas, however.

CONCLUSIONS:

This study shows that almost the entire range of the Ray Mountains caribou herd is under BLM management, reinforcing the importance of monitoring and impacts studies. Potential management issues that impact caribou are fires, mineral activity, recreation access and developments, and subsistence. Fire management for most of the herd's range is currently under a "limited" suppression management regime, meaning that fires are allowed to burn naturally unless they threaten human life or property. Given that current indicators do not point to food as a limiting factor for this herd, this management philosophy is probably appropriate. However, we do not know what the potential impact of a large fire in the herd's core wintering area would be. Should such an event occur, BLM should increase the intensity of monitoring of the herd accordingly. Any fire management strategy needs to consider impacts on all components of the ecosystem, including caribou. Ideally, a

fire management strategy would identify the percent of allowable loss of habitat types—such as high-value lichen stands aged >50 years—and this would determine when a higher level of protection should be afforded. In order to implement such a strategy on caribou ranges, managment agencies need more information on the seasonal importance of different-aged stands and habitat types.

Bureau policy states that public lands shall remain open and available for mineral exploration unless withdrawl is clearly justified in the national interest. When the Central Yukon Resource Management Plan was written, 741 federal mining claims covering 14,820 acres were located throughout the Ray Mountains, but by 1987 only 60 mining claims covering 1,200 acres were listed on BLM files (Robinson 1988). Mineral commodities include tungsten, gold, asbestos, coal, tin, and chromite. Although two ACECs totalling 190,369 acres were designated in 1988 to protect crucial caribou habitat (Appendix B), Federal Land Policy and Management Act (FLPMA) leases, mineral entry and location, and mineral leasing were not precluded. Current activity has been exploratory in nature and immediate conflicts with caribou are not anticipated.

Kilo Hot Spring, which lies within the herd's primary wintering grounds, has been leased for authorized development as a medicinal hot springs. There is an airport lease, homesite, and trade and manufacturing site all associated with this lease covering an area of 175 acres (Robinson 1988). However, activity on the lease has been very minimal for the past 10 years, precluding any conflicts with caribou. Opportunities for recreational viewing and hunting could be attractions for visitors to Kilo Hot Springs, but its remoteness and inaccessibility have so far precluded economic development.

Lack of access has also limited human harvest, although a few caribou are taken each year by subsistence users. Sport harvest is negligible due to the short season, lack of road or trail access from population centers, the small size of the herd and the difficulty of locating airplane landing sites in the Ray Mountains. Low observed recruitment rates indicate that the herd will not support a very large human harvest unless other factors, such as predation rates and neonatal survival, are altered.

Nonconsumptive recreational use of this area has great potential for the self-sufficient adventurer. Terrain is rugged and varied enough to promote a quality hiking experience, with many scenic tors and rock pillars. Vegetation is mostly open tundra and dwarf-shrub communities, which allows for optimal viewing of caribou. Bears, wolves, golden eagles, moose, wolverine, red fox, marten, ptarmigan, and other wildlife contribute to a rich terrestrial wildlife community. Some of the more scenic areas in the Ray Mountains, such as Spooky Valley (Photo 2), have recently been pictured in a computer web page produced by BLM. Whether recreational use of these non-designated areas will increase remains to be seen.

The present level of monitoring on the Ray Mountains caribou herd is adequate for existing management issues. The baseline data on habitat use and herd dynamics provided by this cooperative federal-state study is essential for informed management decisions in the future, and is being used to assess appropriateness of seasons and bag limits on caribou and mitigation measures for permitted land uses. A minimum of two years additional data is

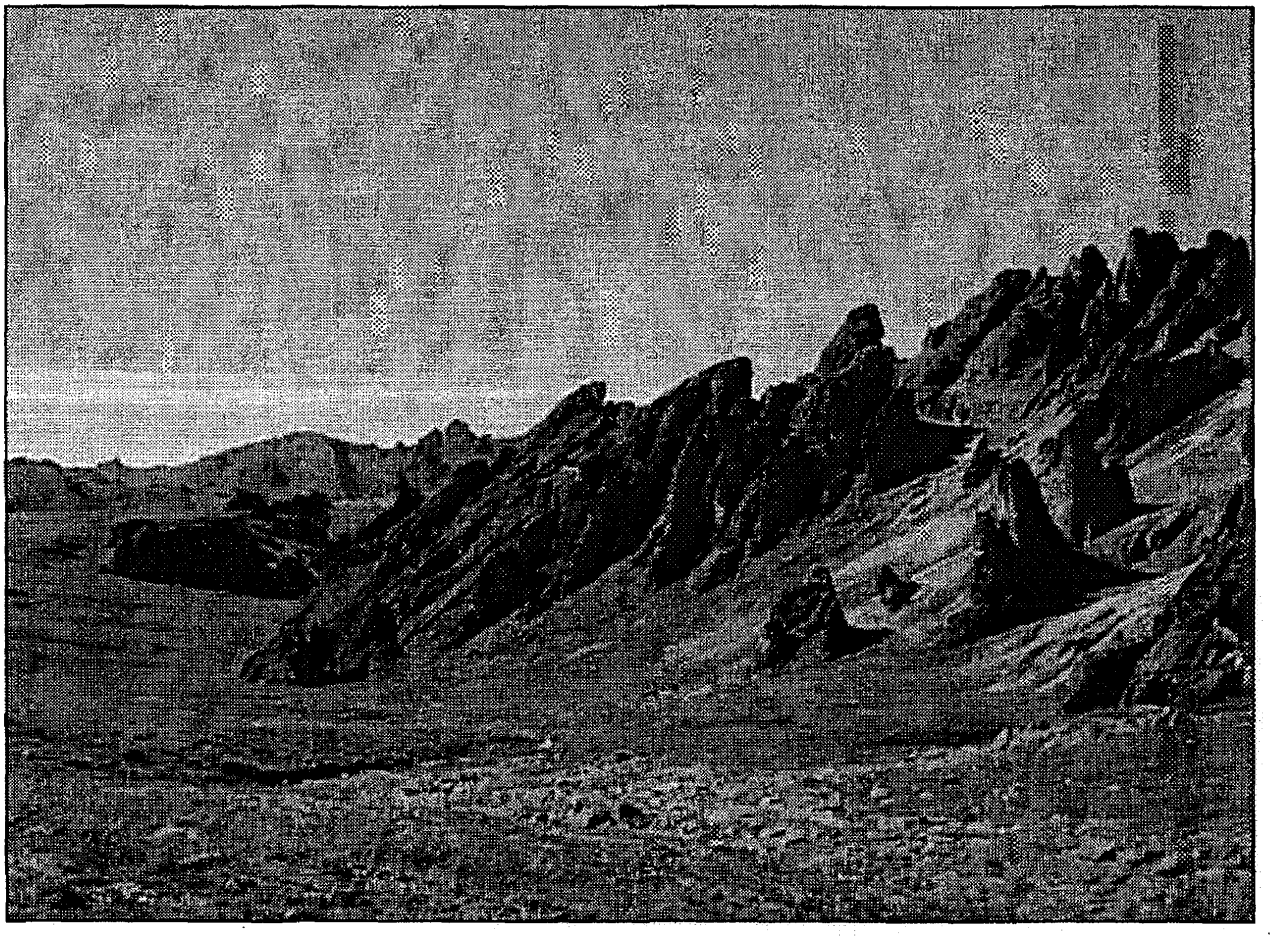
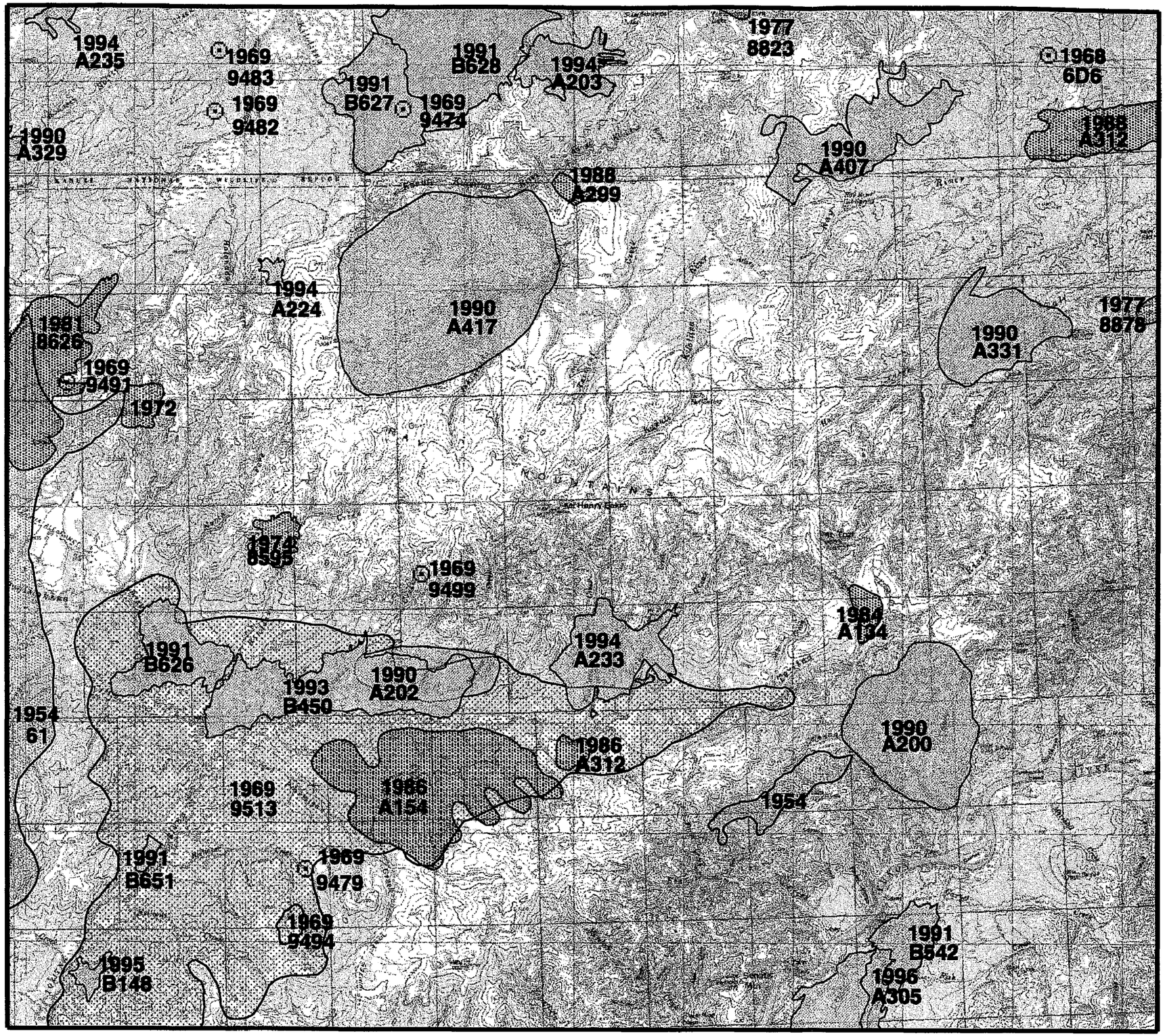


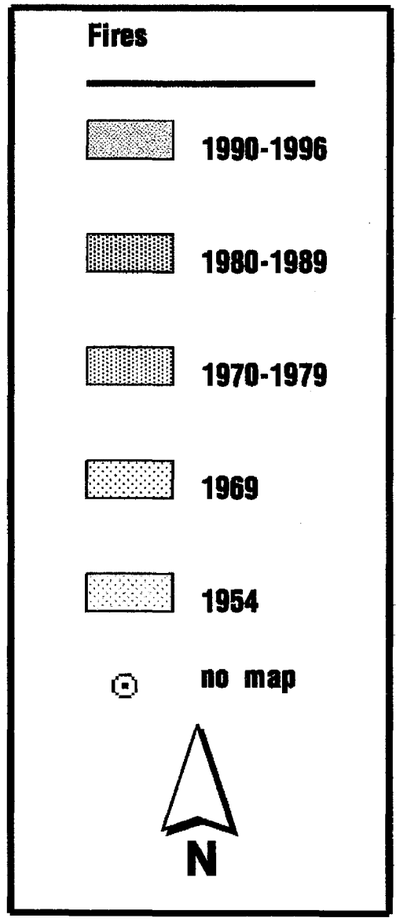
Photo 2. Rugged terrain of Spooky Valley in the southern Ray Mountains which is used by caribou in autumn.

essential to substantiate the preliminary conclusions about habitat use contained in this report. The next 2-3 years of observations will be very important in determining whether the spring use pattern observed in 1995-1997 is continued, which might warrant redefining the core calving area. We will also observe whether older radioed cows become more successful in raising calves. Because caribou herds, in particular, can change migration patterns radically over time, the biological community will view preliminary conclusions with some skepticism until more long-term data, i.e. 10 years or more, can be assimilated. Whether we can accomplish long-term monitoring will depend on future management issues/priorities and funding available to federal and state partners.

Ray Mountains Caribou Herd

Fire History





0 5 10 15 20 25 Kilometers

Figure 1.

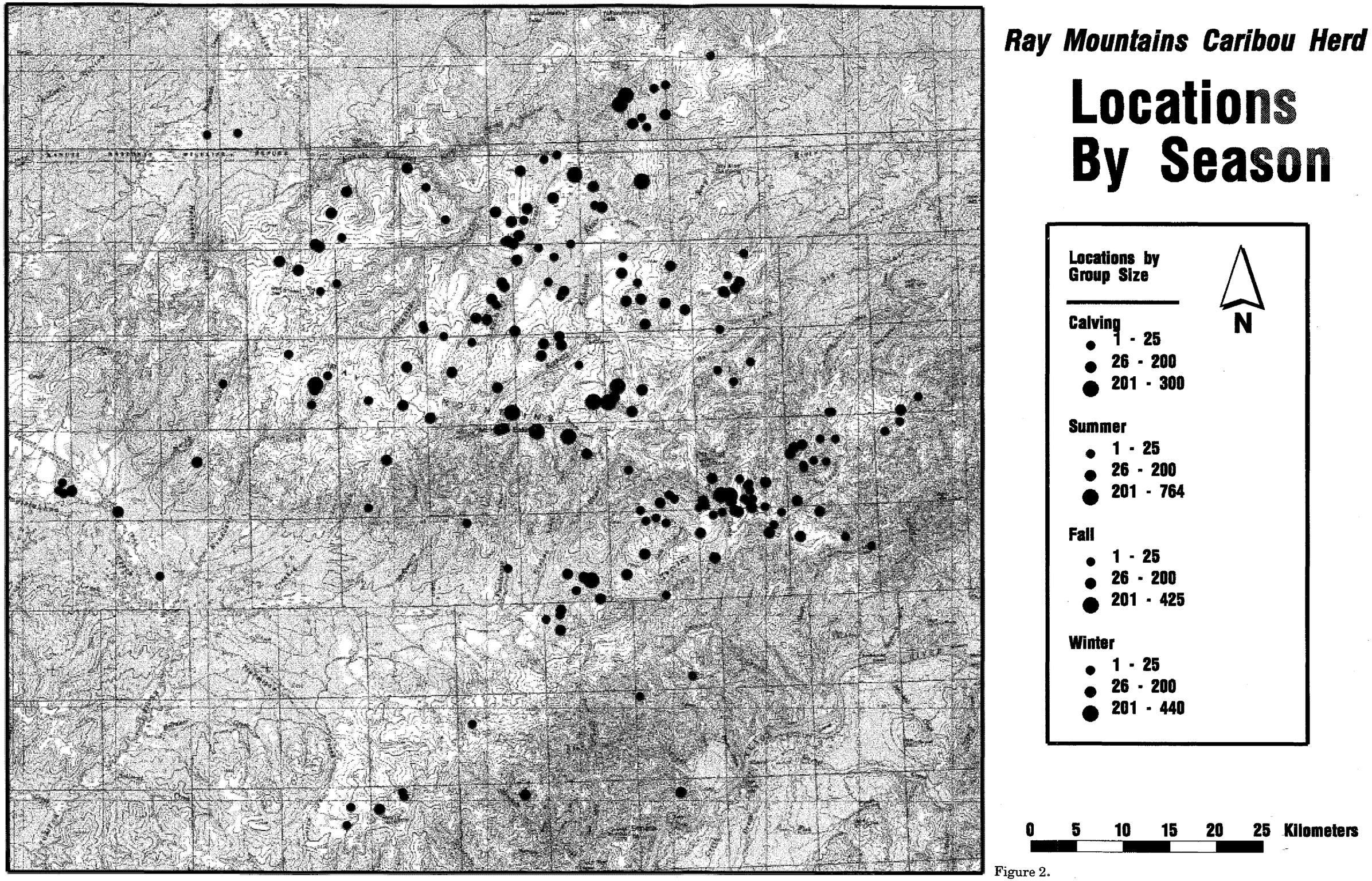
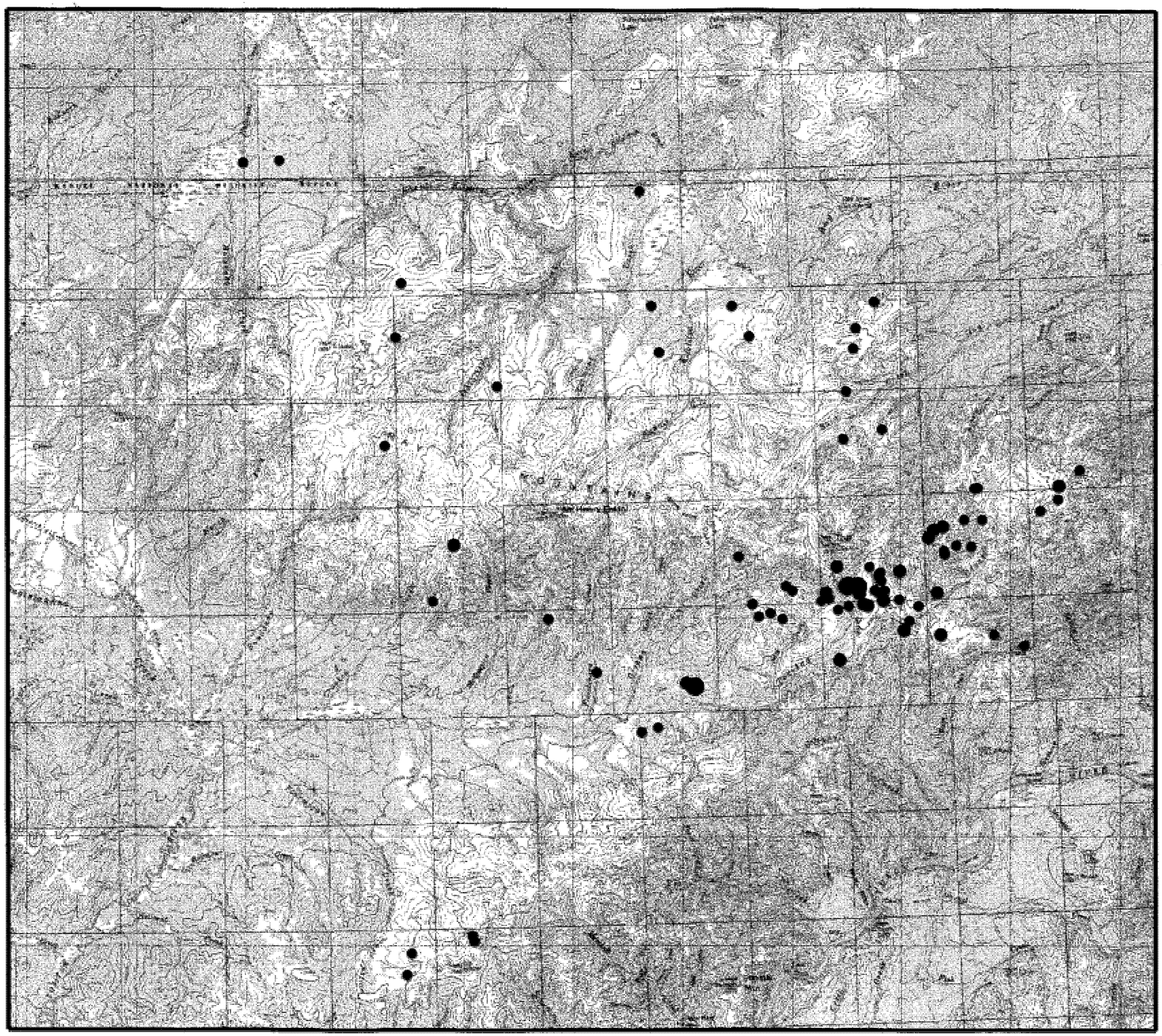

Ray Mountains Caribou Herd
Locations By Season
Locations by Group Size
Calving
1 - 25
26 - 200
201 - 300
Summer
1 - 25
26 - 200
201 - 764
Fall
1 - 25
26 - 200
201 - 425
Winter
1 - 25
26 - 200
201 - 440
N
0 5 10 15 20 25 Kilometers

Figure 2.



Ray Mountains Caribou Herd

Calving Locations

Locations by Group Size

Calving
- 1 - 25
- 26 - 200
- 201 - 300

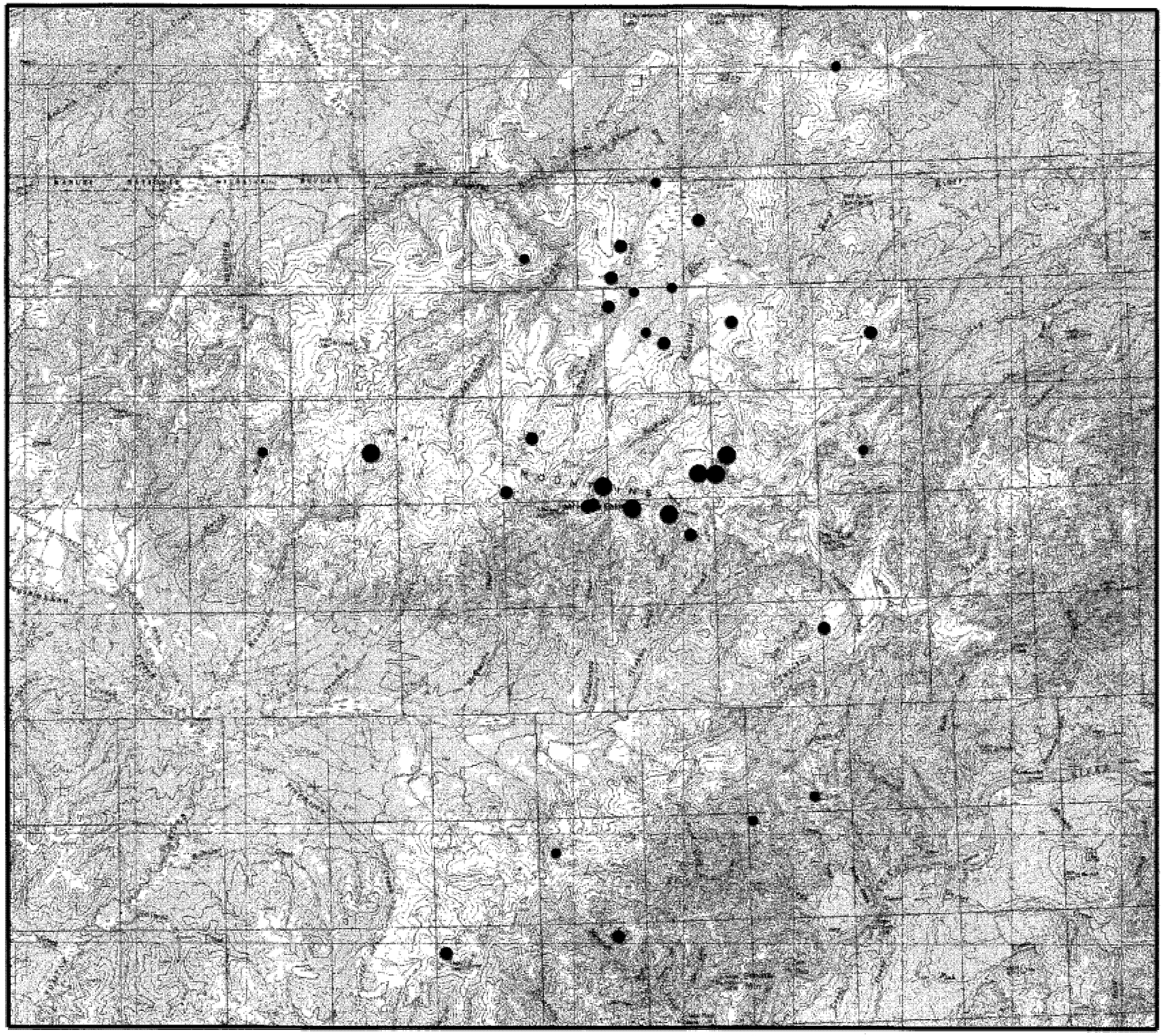
N

0 5 10 15 20 25 Kilometers

Figure 3.

Ray Mountains Caribou Herd

Summer Locations



Locations by Group Size

Summer

- 1 - 25
- 26 - 200
- 201 - 764

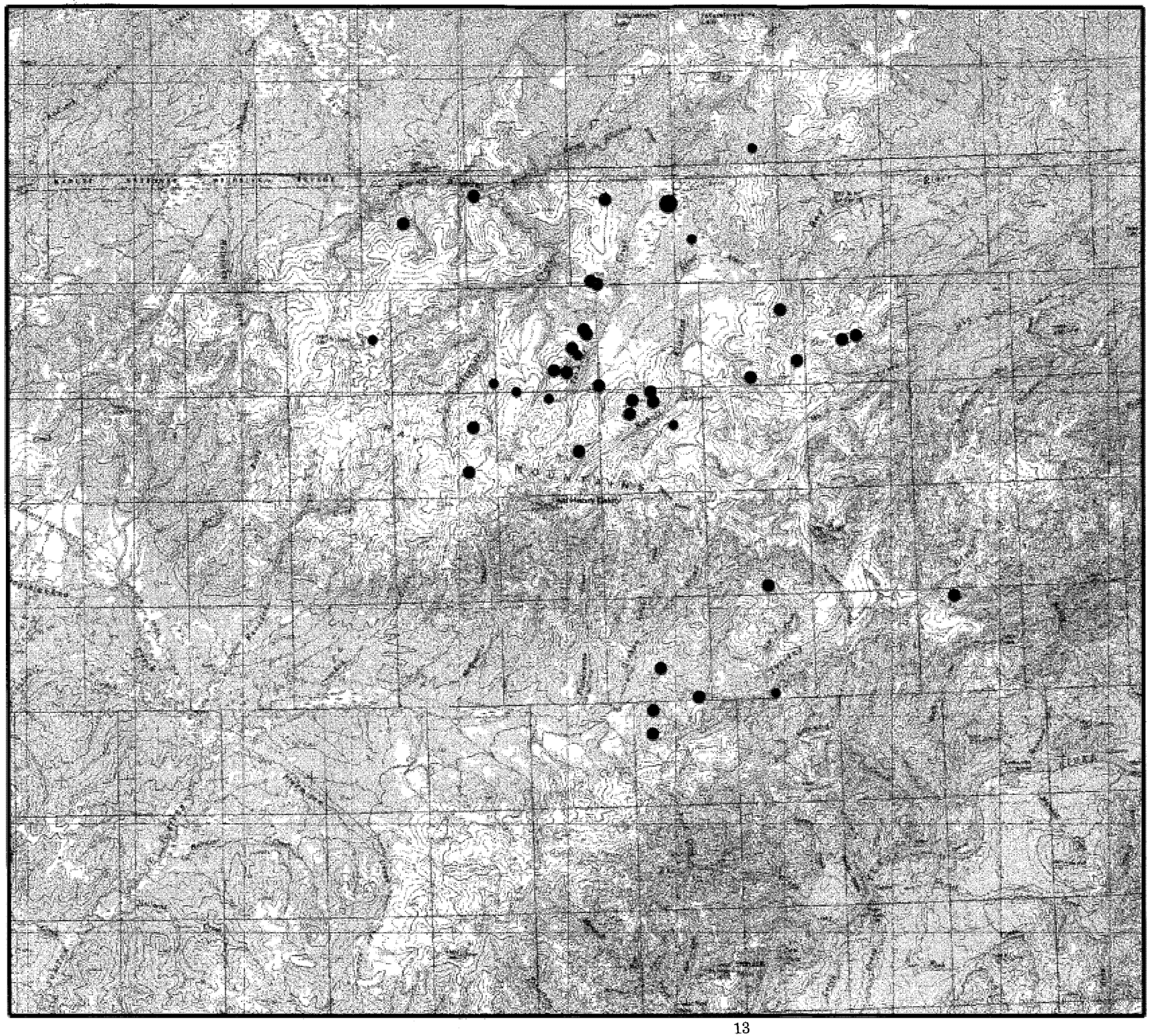
N

0 5 10 15 20 25 Kilometers

Figure 4.

Ray Mountains Caribou Herd

Fall Locations



Locations by Group Size

Fall

- 1 - 25
- 26 - 200
- 201 - 425

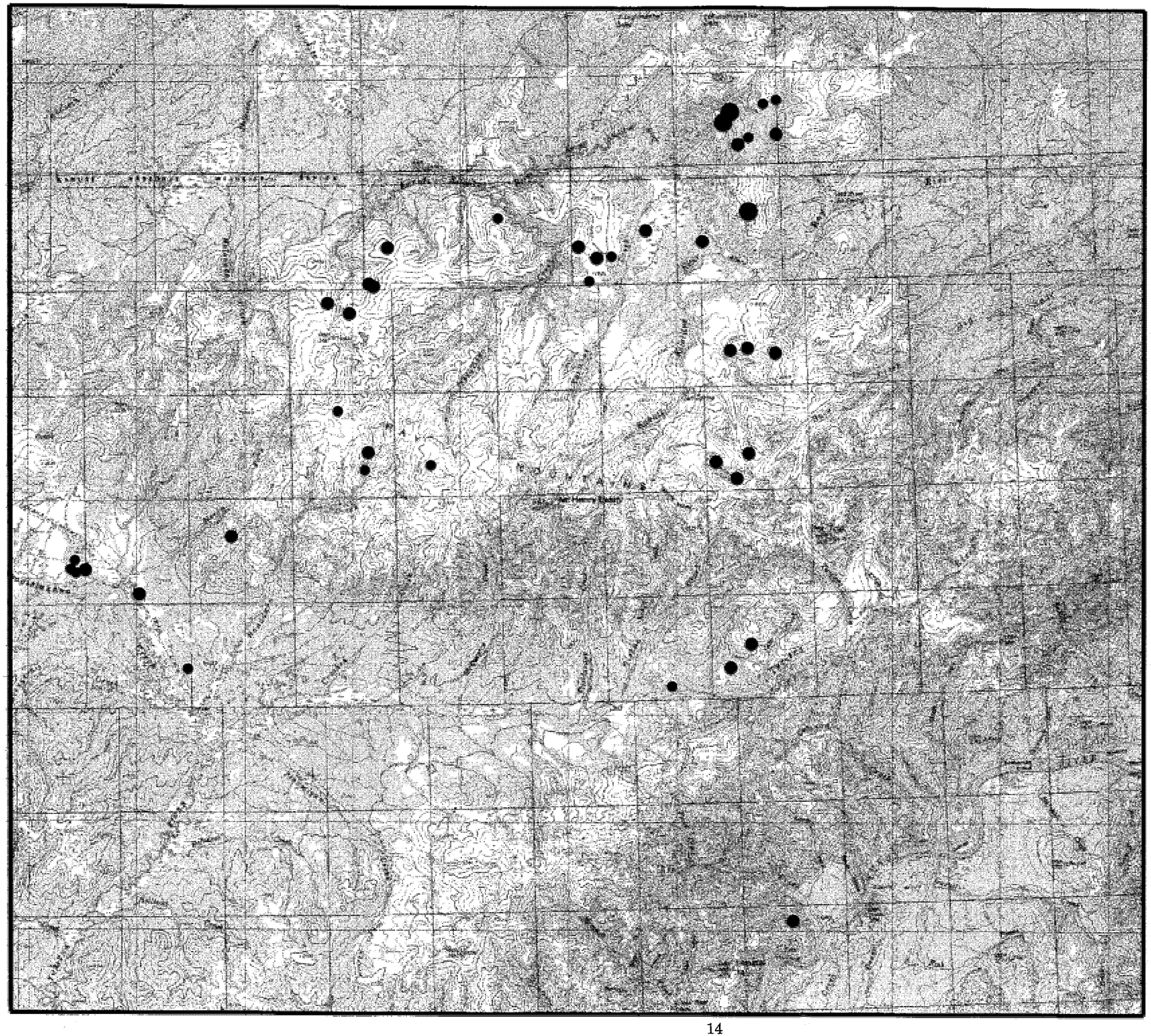
N

0 5 10 15 20 25 Kilometers

Figure 5.

Ray Mountains Caribou Herd

Winter Locations



Locations by Group Size

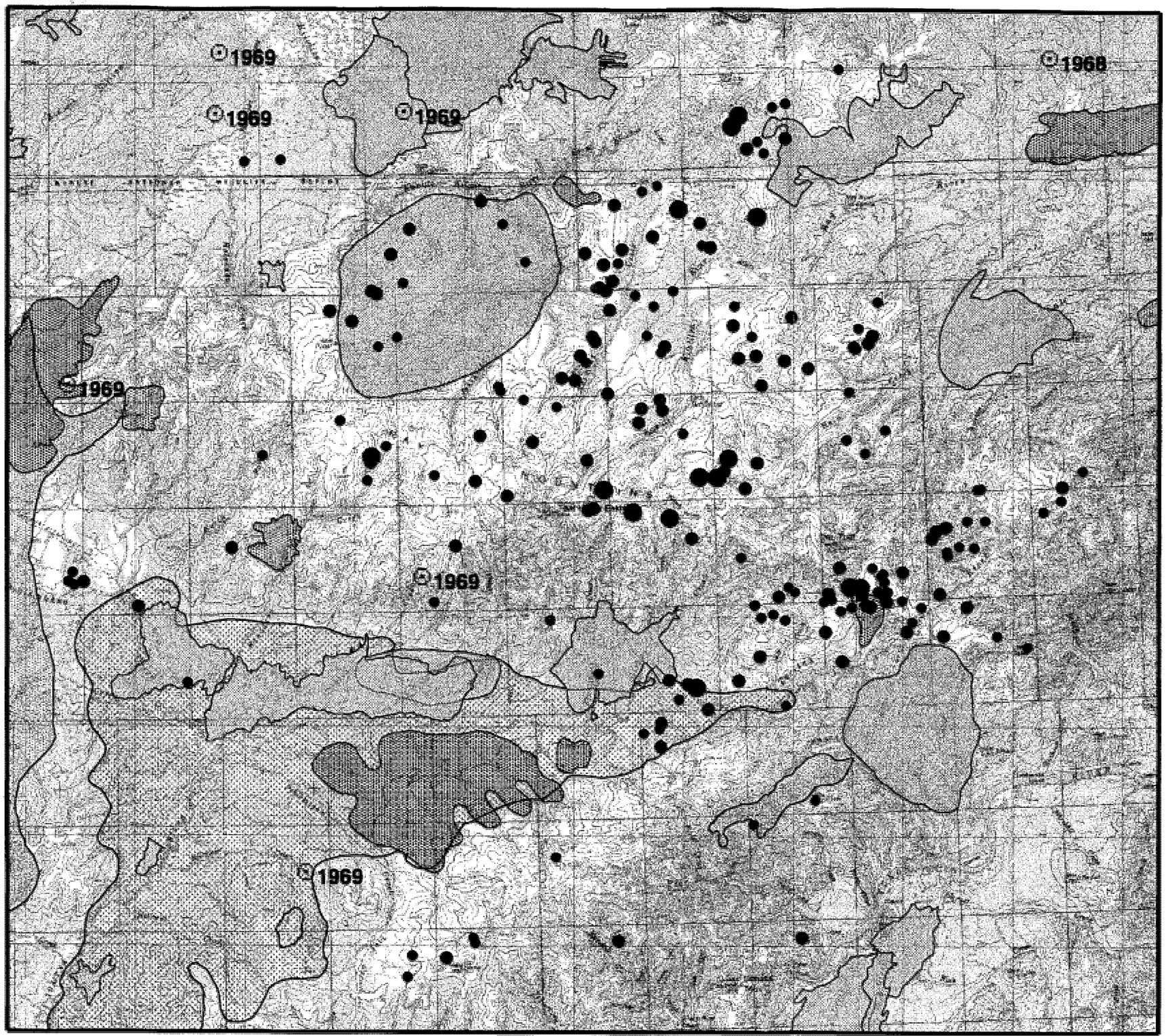
Winter

- 1 - 25
- 26 - 200
- 201 - 440

N

0 5 10 15 20 25 Kilometers

Figure 6.



Ray Mountains Caribou Herd

Locations & Fire History

Locations by Group Size

Calving
- 1 - 25
- 26 - 200
- 201 - 300

Summer
- 1 - 25
- 26 - 200
- 201 - 764

Fall
- 1 - 25
- 26 - 200
- 201 - 425

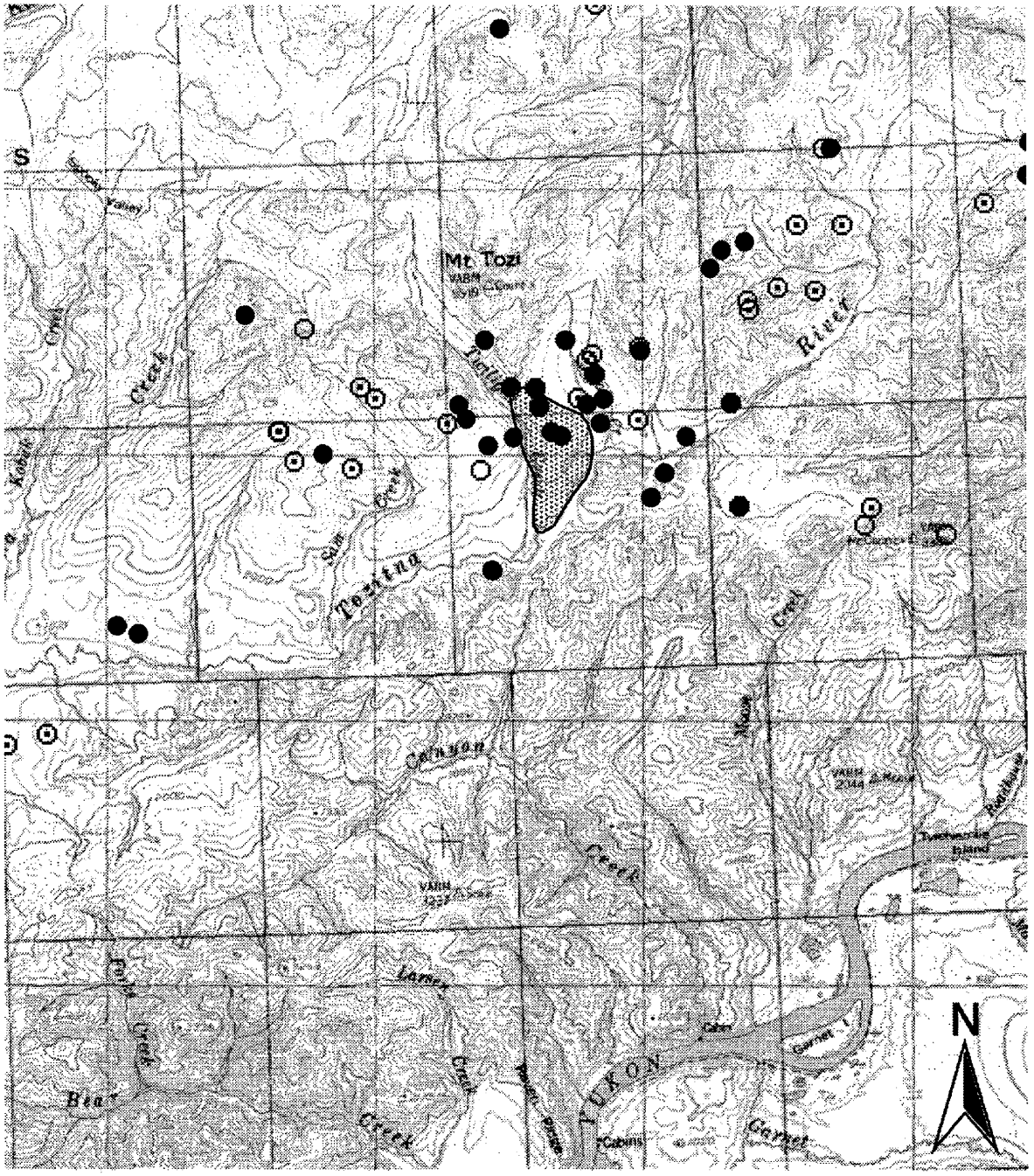
Winter
- 1 - 25
- 26 - 200
- 201 - 440

Fires
- 1990-1996
- 1980-1989
- 1970-1979
- 1969
- 1954
- no map

N

0 5 10 15 20 25 Kilometers

Figure 7.



0 2 4 6 8 Kilometers

Legend:

- No visual
- 1 - 12 caribou
- 12 - 300 caribou
- 1984 Fire

Figure 8. Concentrations of spring (May 1-June 7) Ccaribou relocations in the upper Tozilina river and location of 1984 fire data is from 1995-1997.

ACKNOWLEDGMENTS

Cooperating biologists J. Woolington, B. Dale, and E. Lenart of the Alaska Department of Fish and Game (ADFG) collected portions of the data in this study. We thank P. Valkenburg (ADFG) for some of the initial planning and technical support. A. Burns (BLM Alaska Fire Service) spent many hours preparing the databases and maps. Pilot J. Hamilton (Arctic Air Alaska) provided safe and efficient transportation and telemetry expertise. Field observers included M. Fisk (BLM), D. Jandt (BLM-AFS), and J. Roessler (BLM-AFS). T. Hammond (BLM) provided essential computer mapping and analysis expertise.

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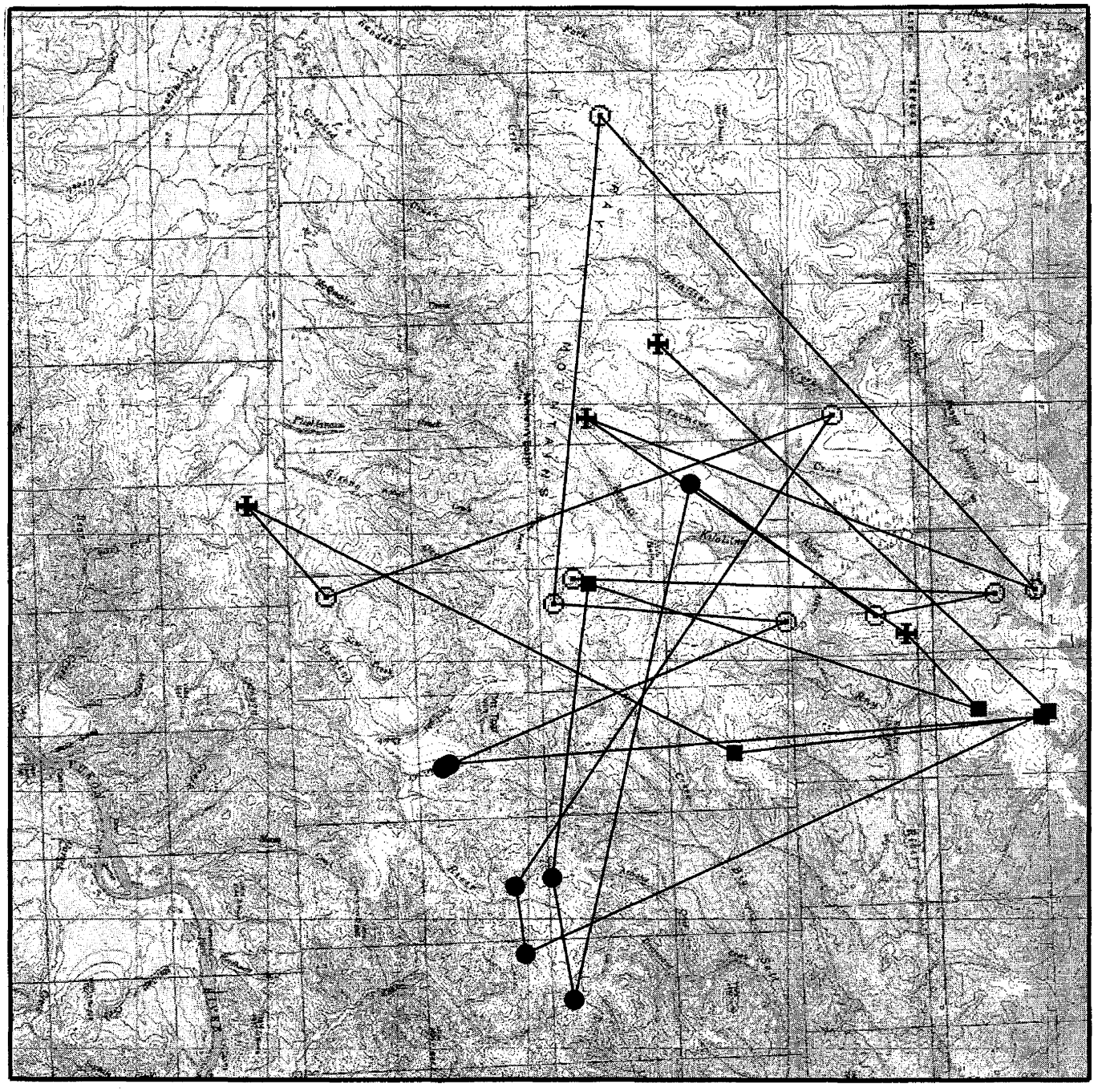

Ray Mountains Caribou Herd
Collar 1
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 9.

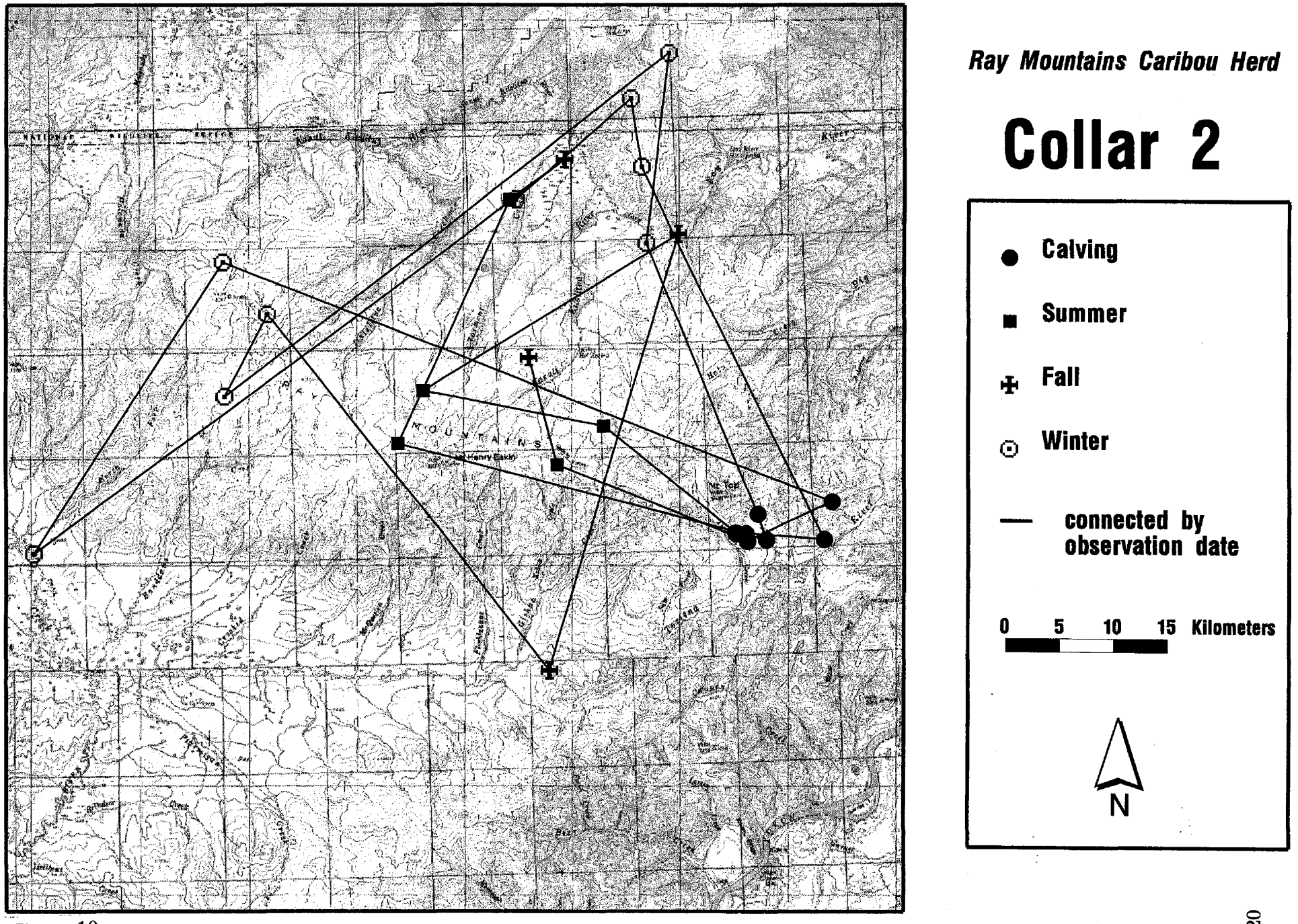

Ray Mountains Caribou Herd
Collar 2
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 10.

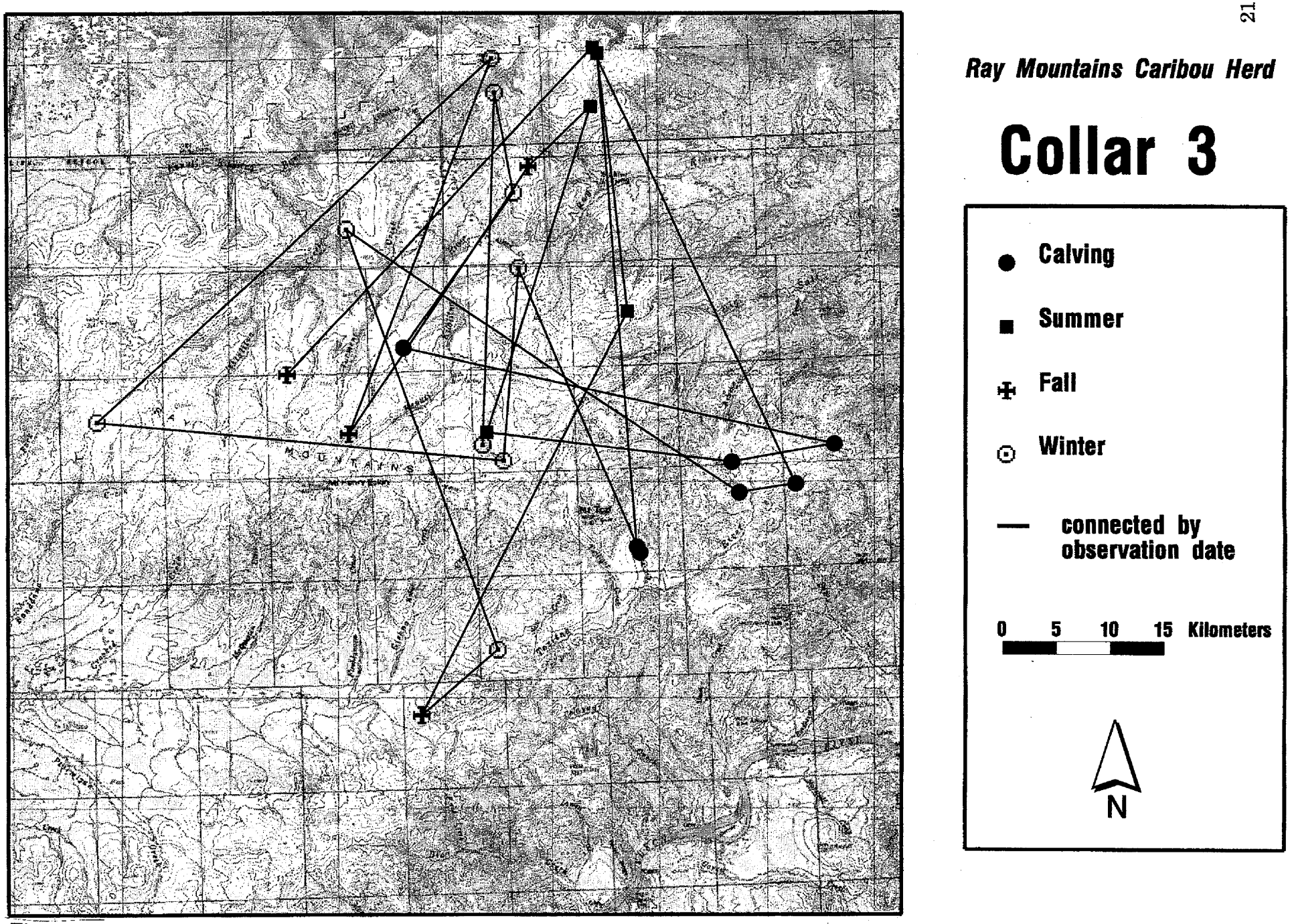

Ray Mountains Caribou Herd
Collar 3
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 11.

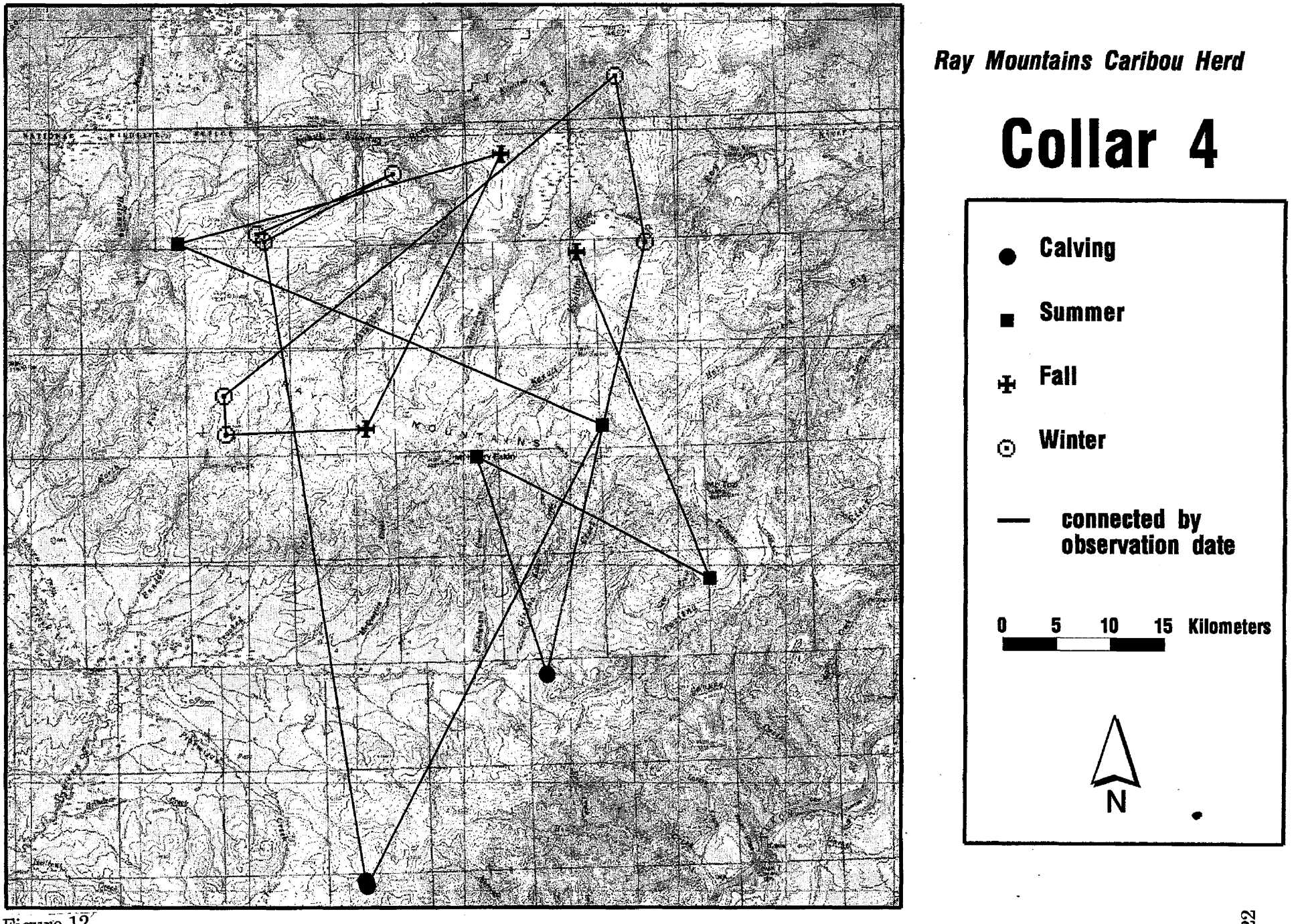

Ray Mountains Caribou Herd
Collar 4
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 12.

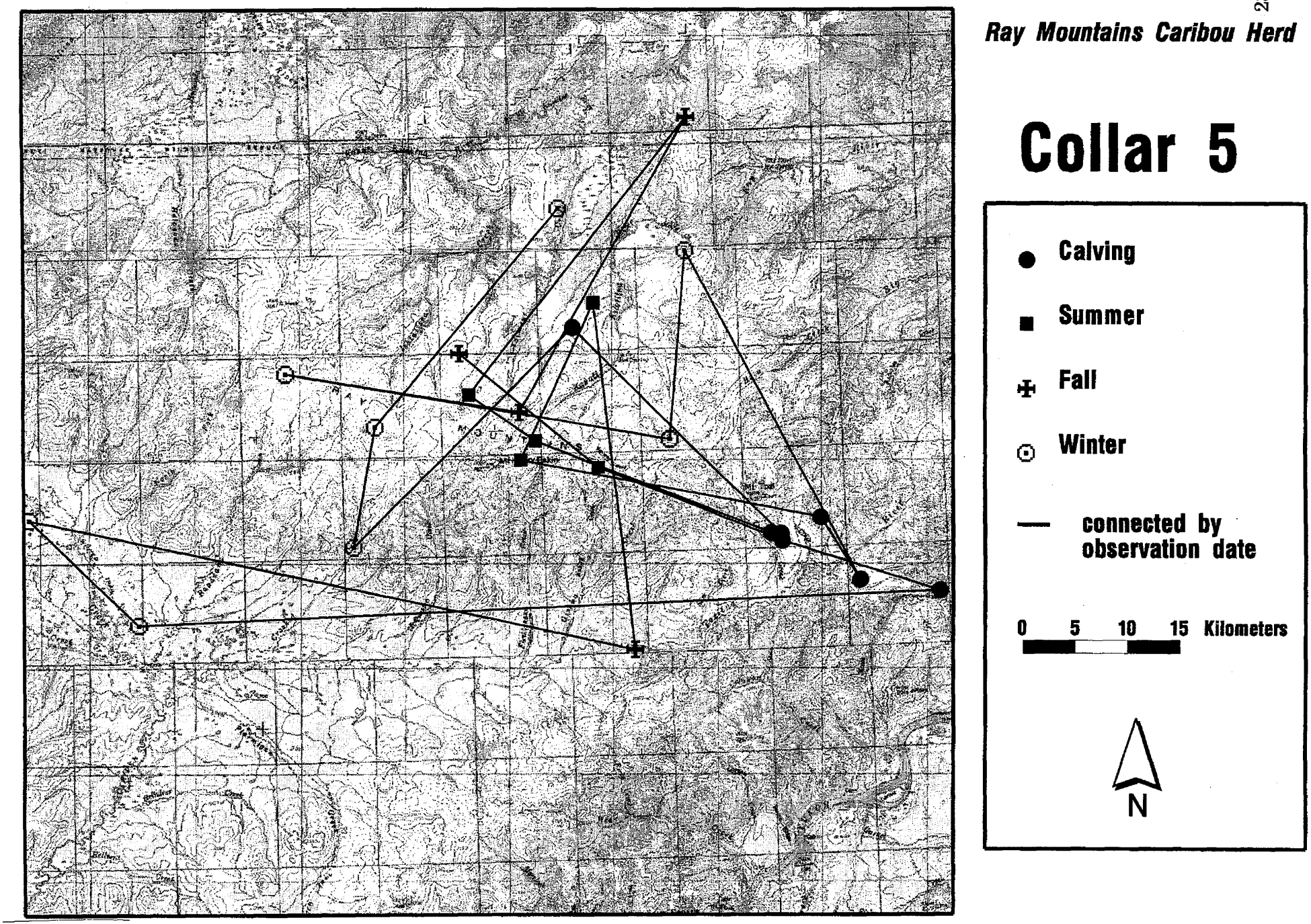

Ray Mountains Caribou Herd
Collar 5
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 13.

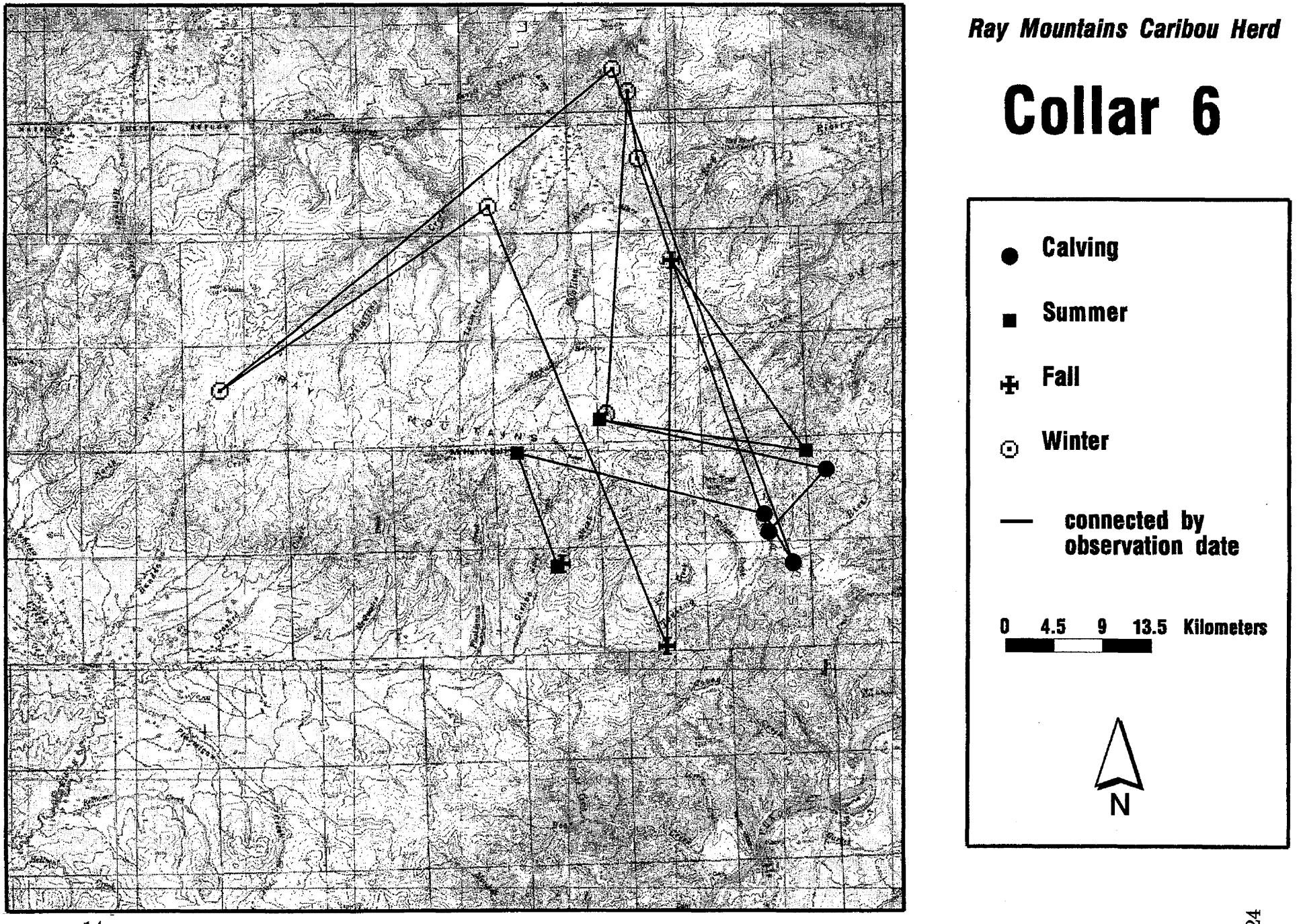
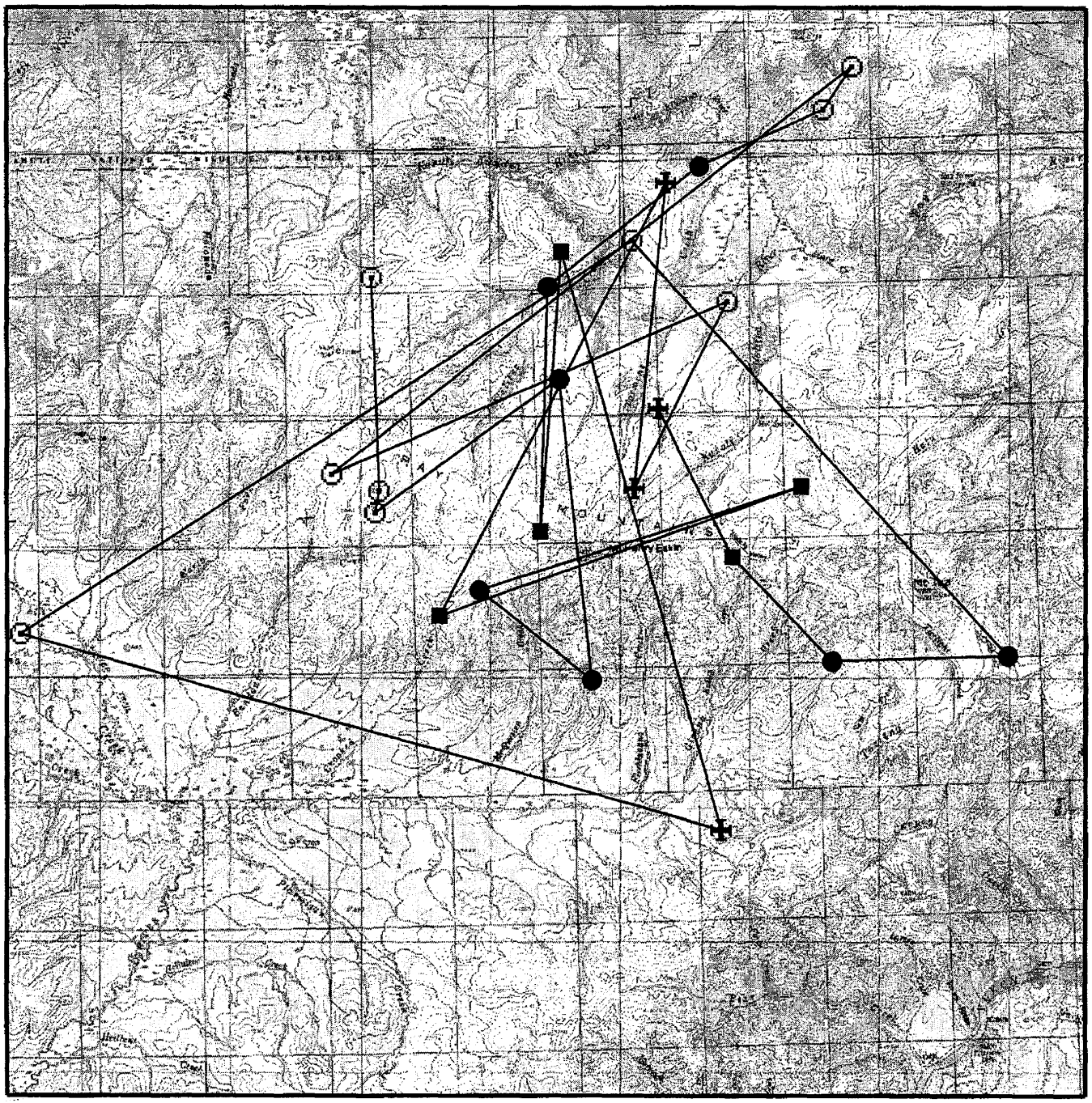

Ray Mountains Caribou Herd
Collar 6
Calving
Summer
Fall
Winter
connected by observation date
0 4.5 9 13.5 Kilometers
N

Figure 14.

Ray Mountains Caribou Herd



Collar 7

- Calving
- Summer
- Fall
- Winter
- connected by observation date

0 5 10 15 Kilometers

N

Figure 15.

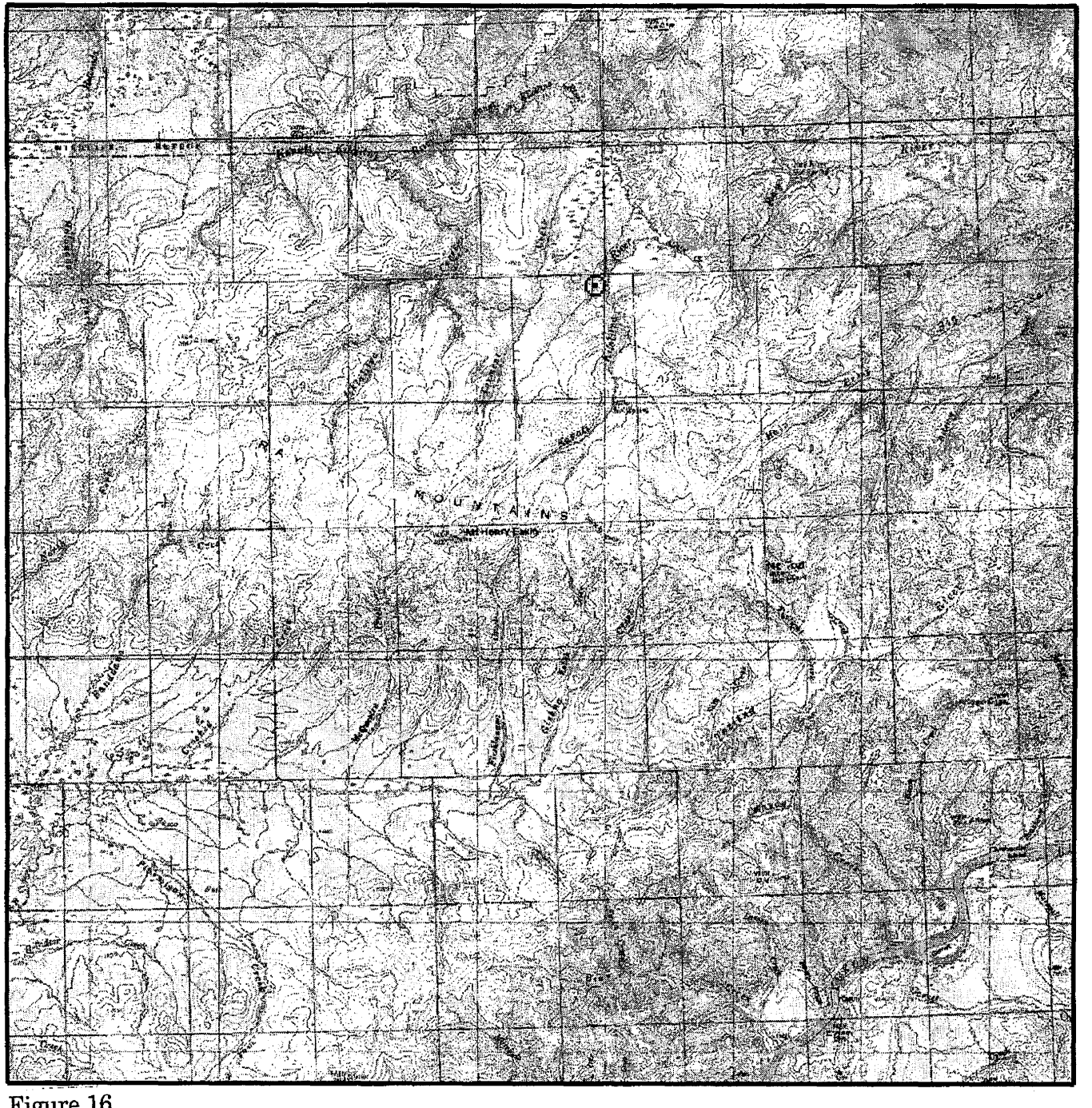


Figure 16.

Ray Mountains Caribou Herd

Collar 8

- Calving
- Summer
- Fall
- Winter
- connected by observation date

0 5 10 15 Kilometers

N

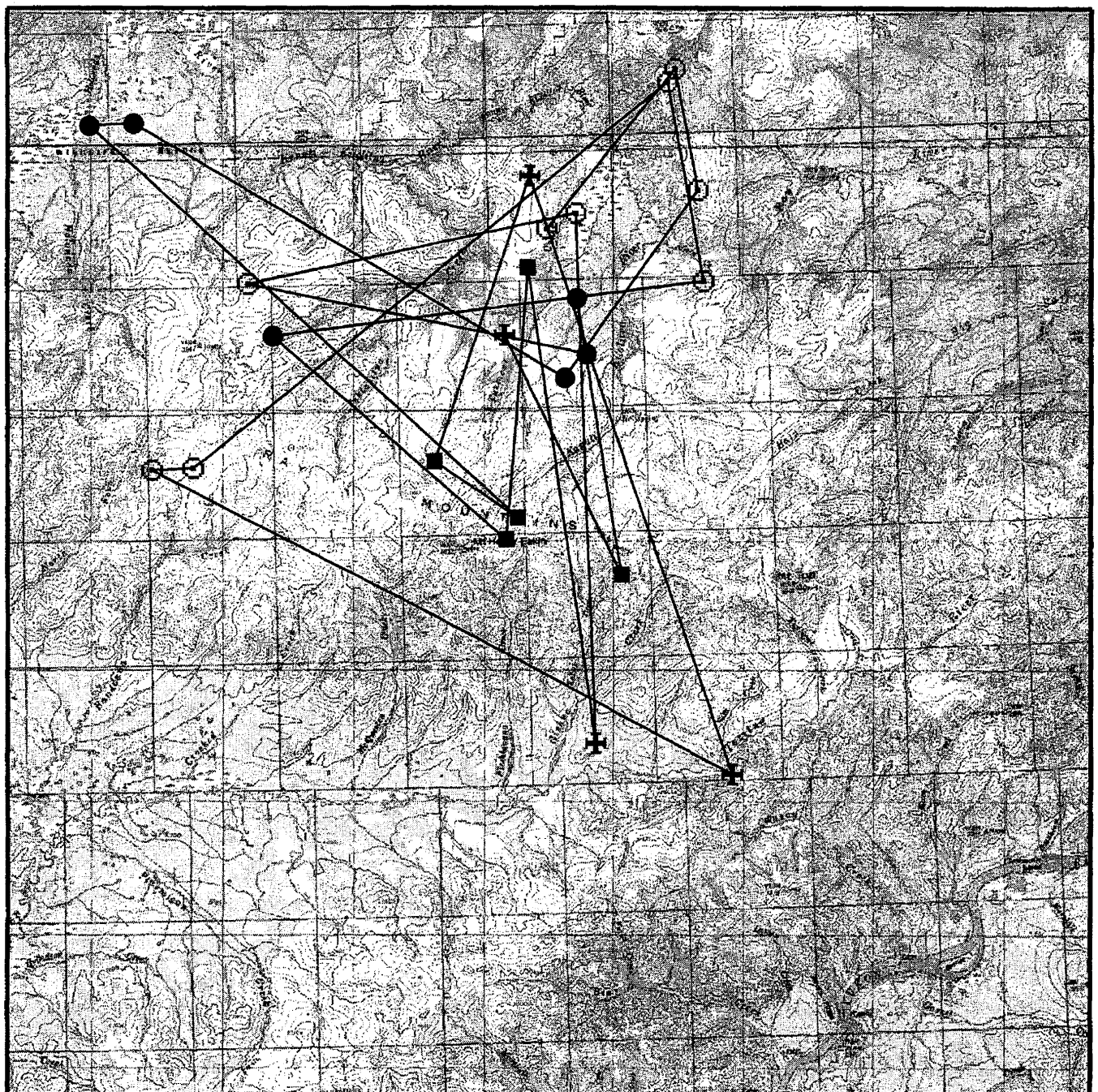


Figure 17.

Ray Mountains Caribou Herd

Collar 9

- Calving
- Summer
- Fall
- Winter
- connected by observation date

0 5 10 15 Kilometers

N

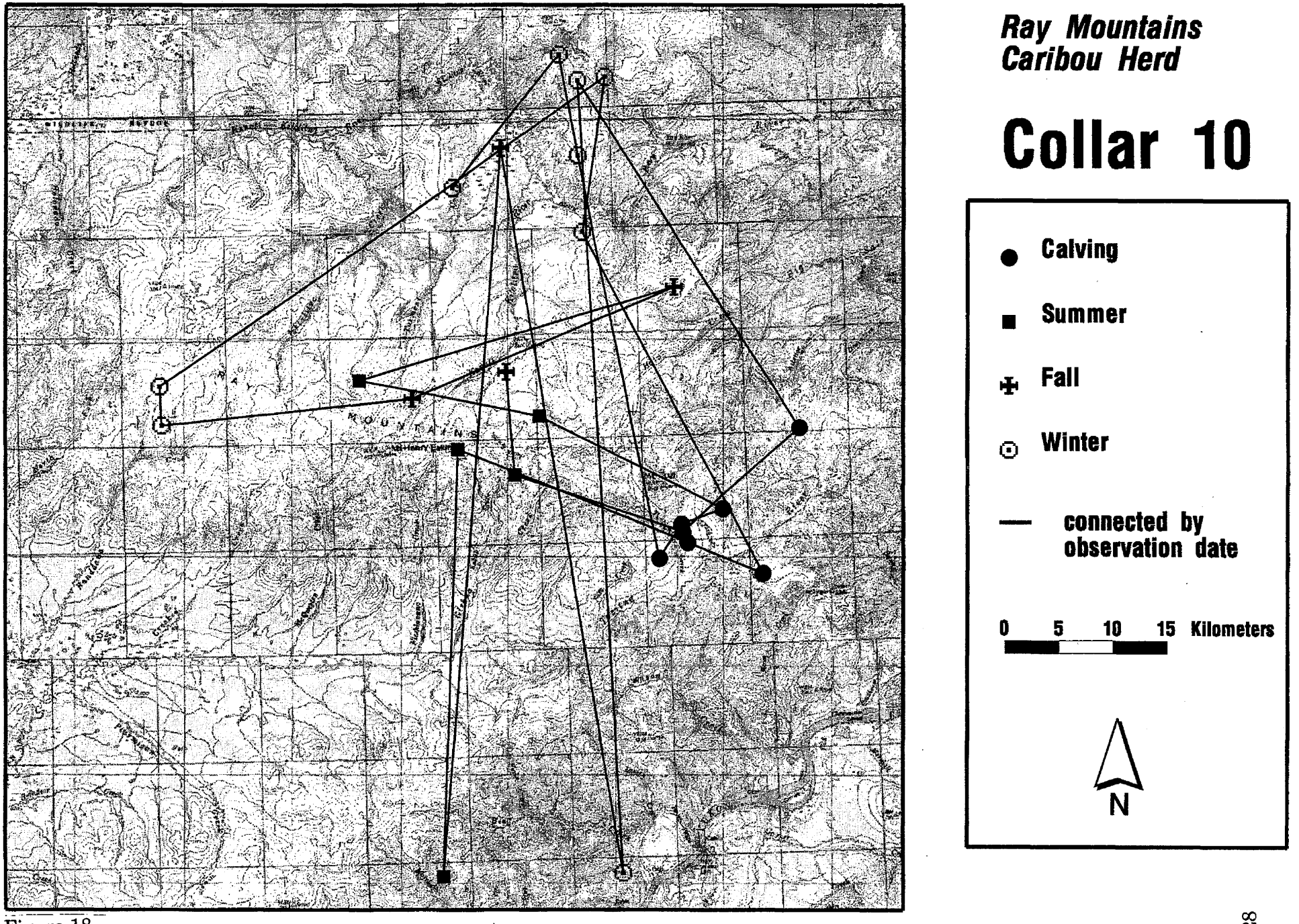
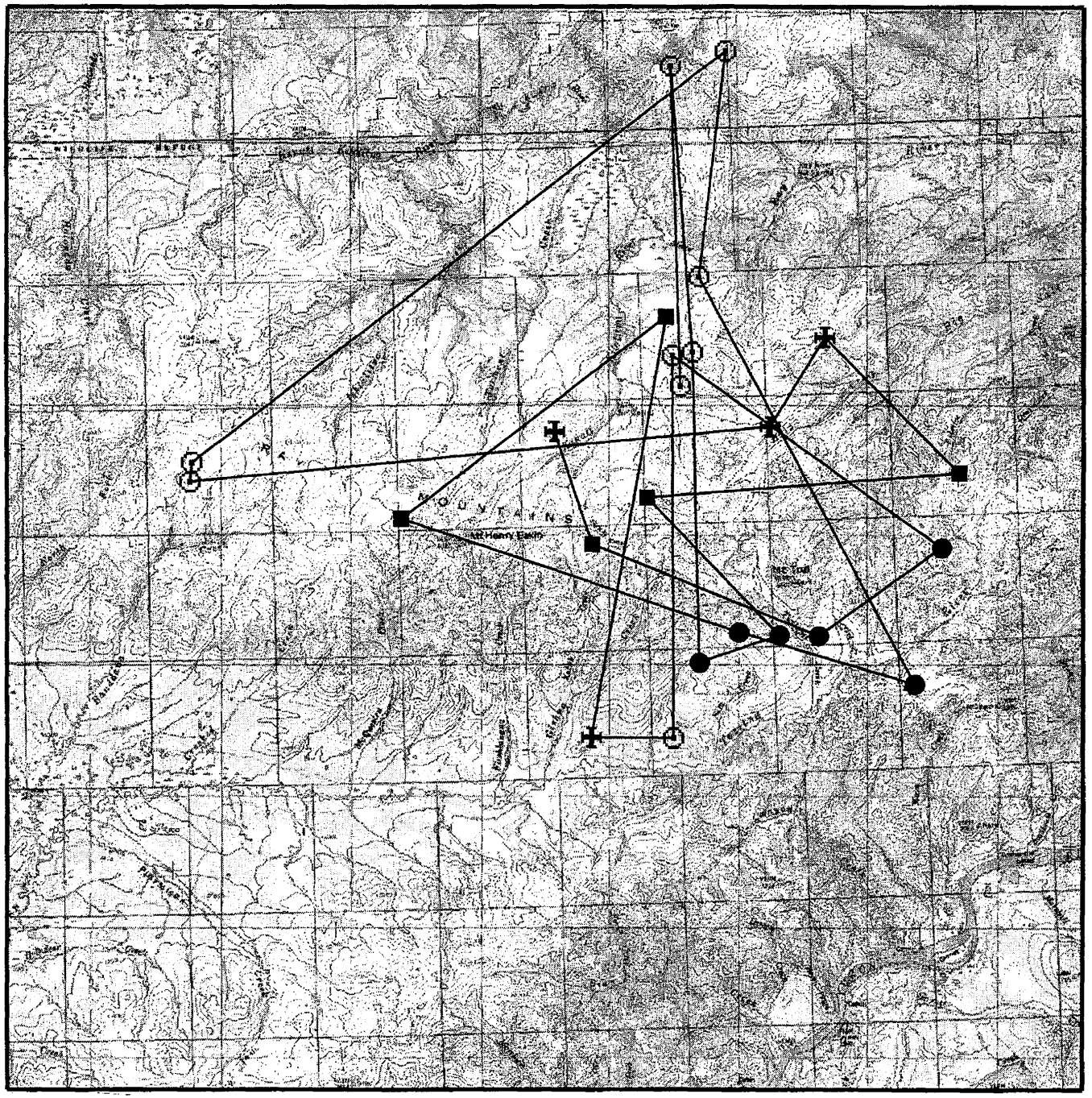

Ray Mountains
Caribou Herd
Collar 10
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 18.

Ray Mountains Caribou Herd

Collar 13

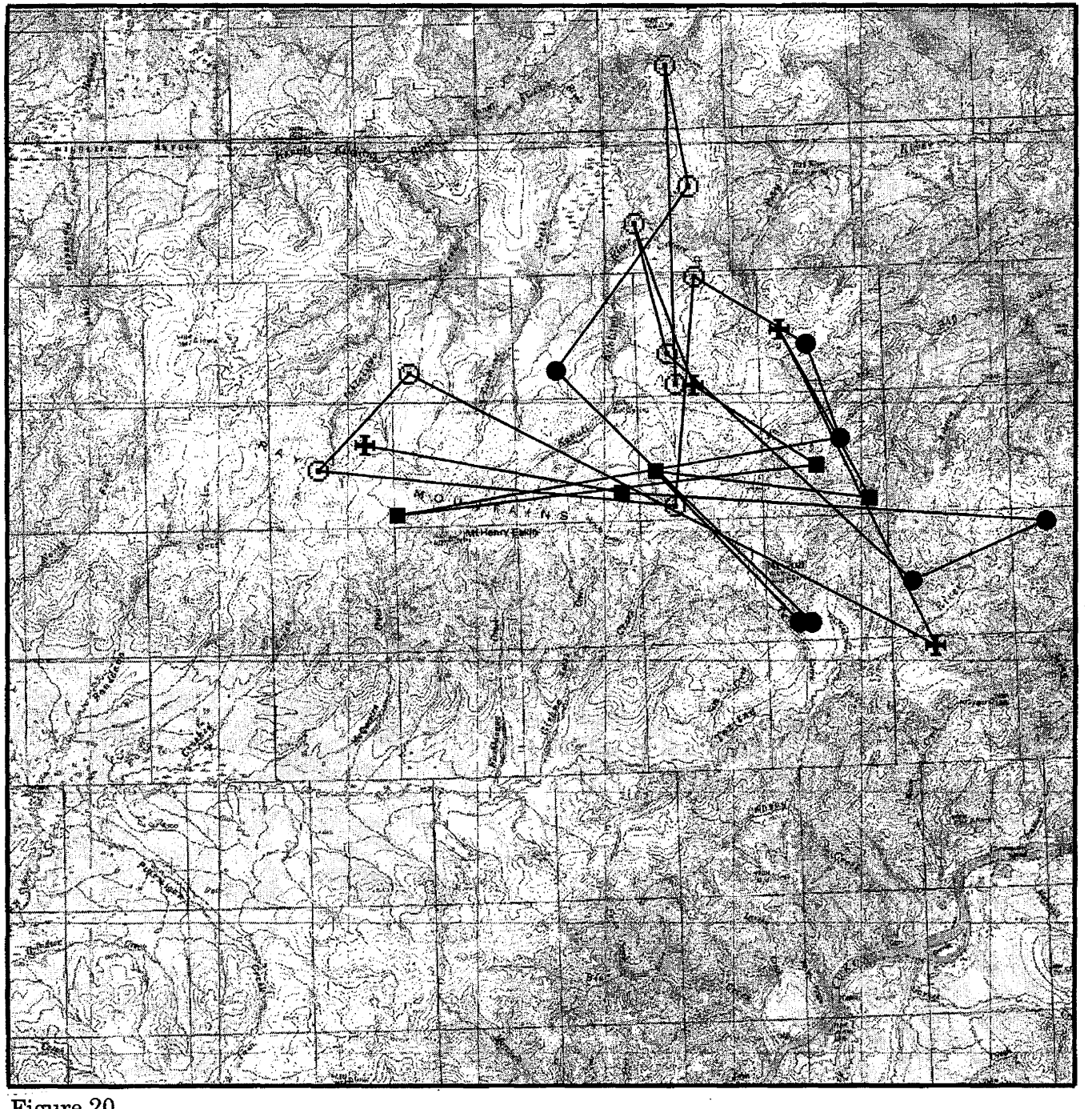


- Calving
- Summer
- Fall
- Winter
- connected by observation date

0 5 10 15 Kilometers

N

Figure 19.



Ray Mountains Caribou Herd

Collar 31

- Calving
- Summer
- Fall
- Winter
- connected by observation date

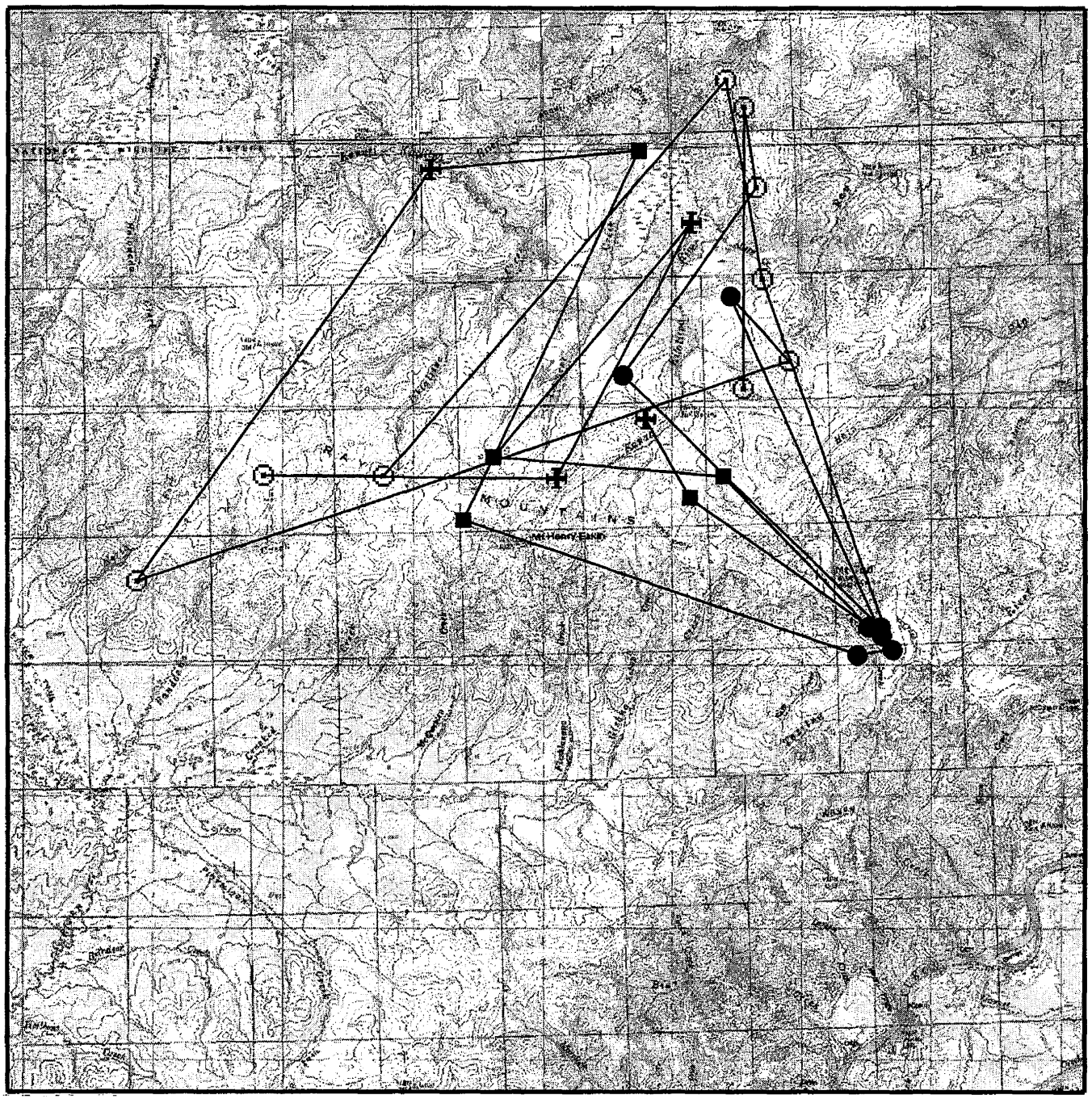
0 5 10 15 Kilometers

N

Figure 20.

Ray Mountains Caribou Herd

Collar 93



- ● Calving
- ■ Summer
- ✚ Fall
- ⊙ Winter
- — connected by observation date

0 5 10 15 Kilometers

N

Figure 21.

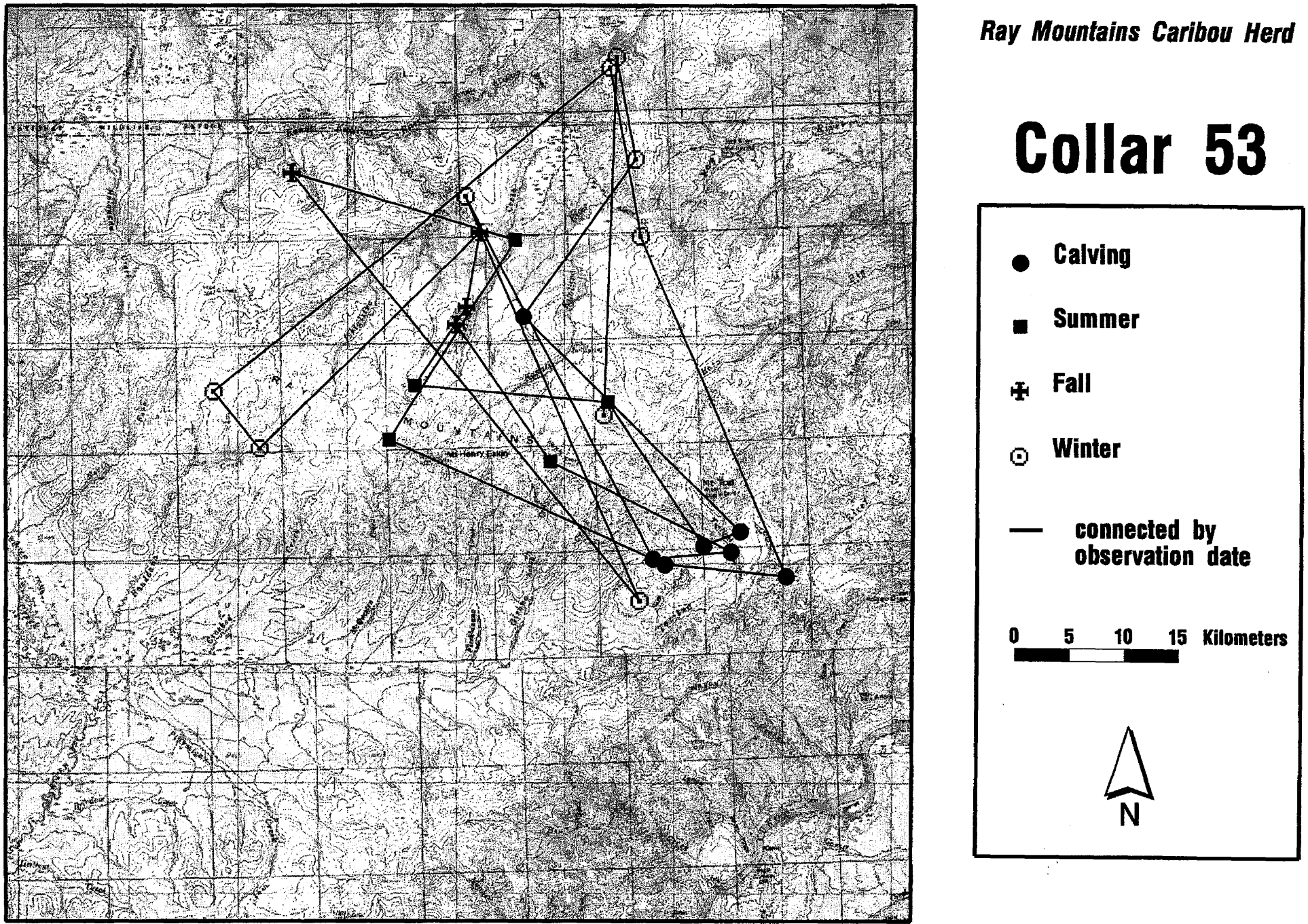
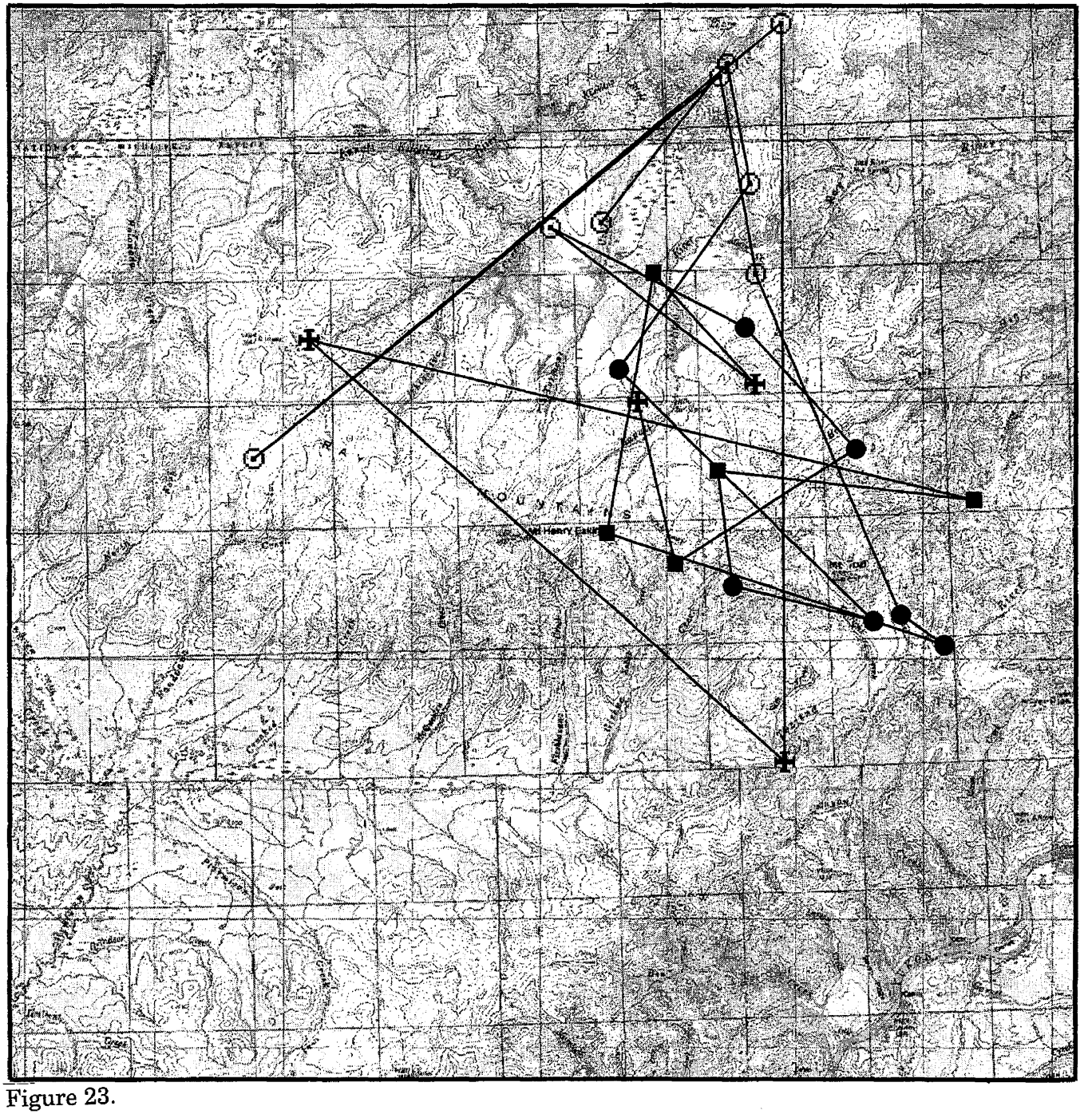

Ray Mountains Caribou Herd
Collar 53
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 22.

Ray Mountains Caribou Herd

Collar 32



- Calving
- Summer
- Fall
- Winter
- connected by observation date

0 5 10 15 Kilometers

N

Figure 23.

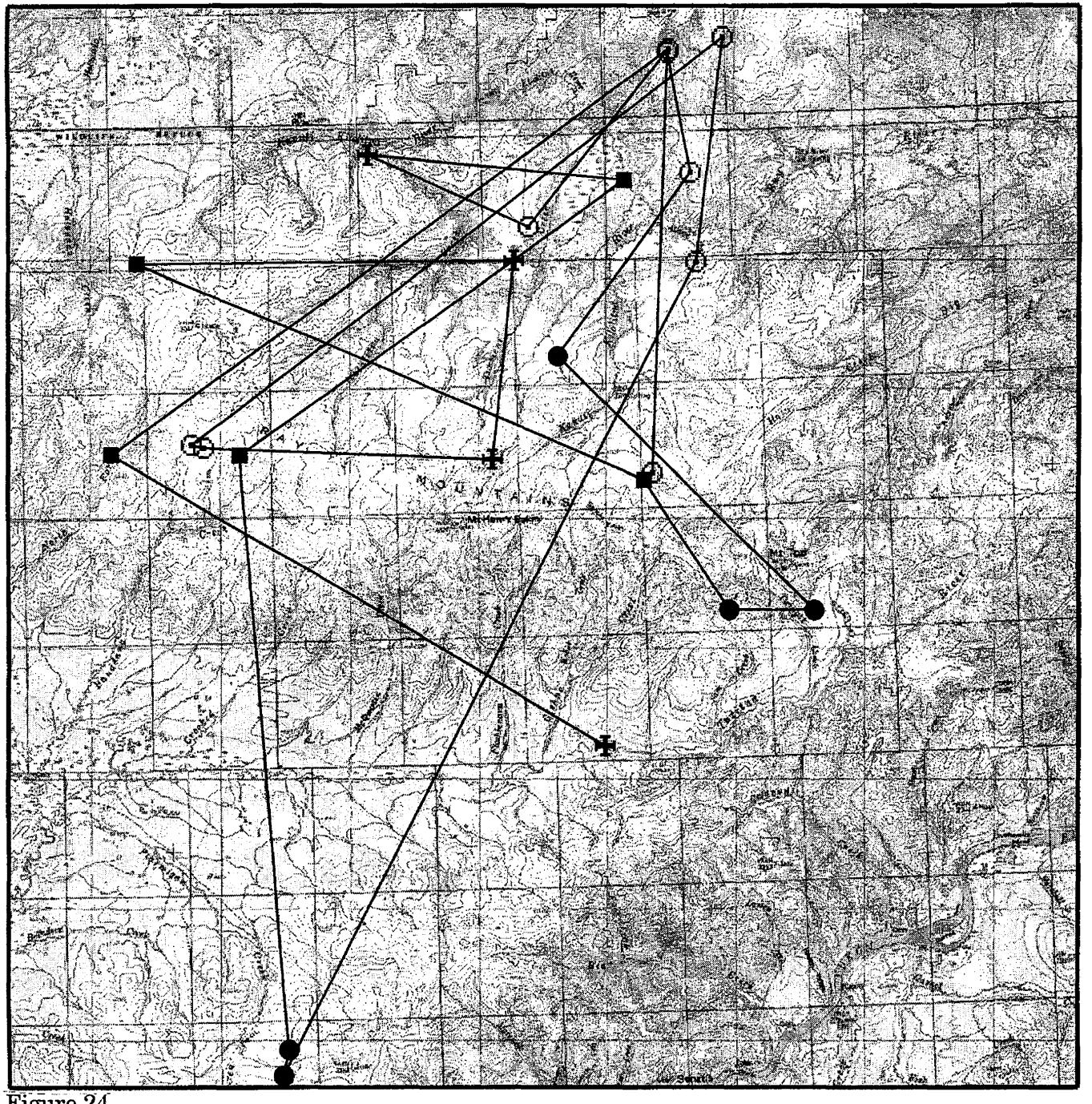


Figure 24.

Ray Mountains Caribou Herd

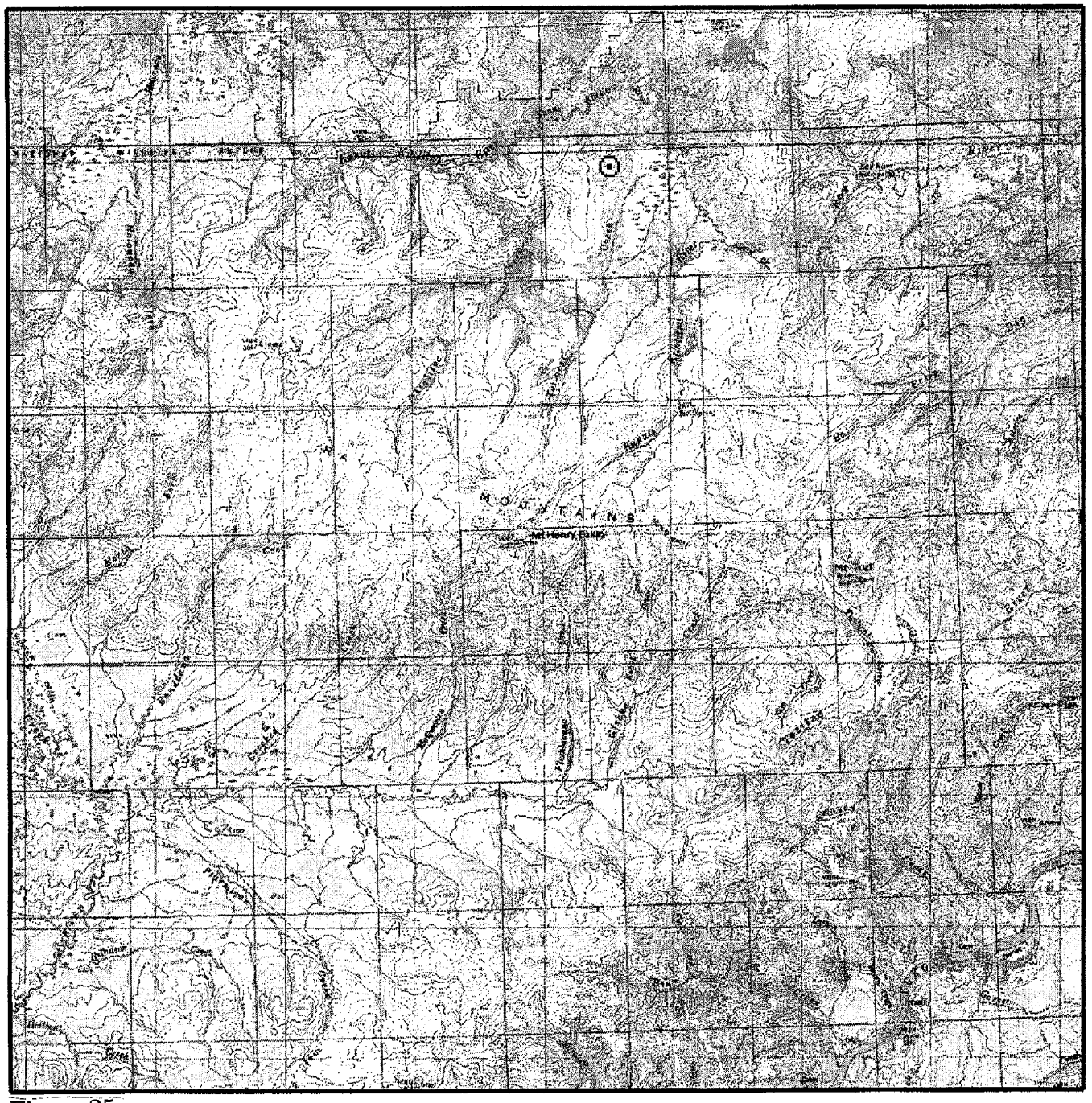
Collar 33

- Calving
- Summer
- Fall
- Winter
- connected by observation date

0 4.8 9.6 14.4 Kilometers

N

Ray Mountains Caribou Herd



Collar 34

- ● Calving
- ■ Summer
- ✚ Fall
- ⊙ Winter
- — connected by observation date

0 5 10 15 Kilometers

N

Figure 25.

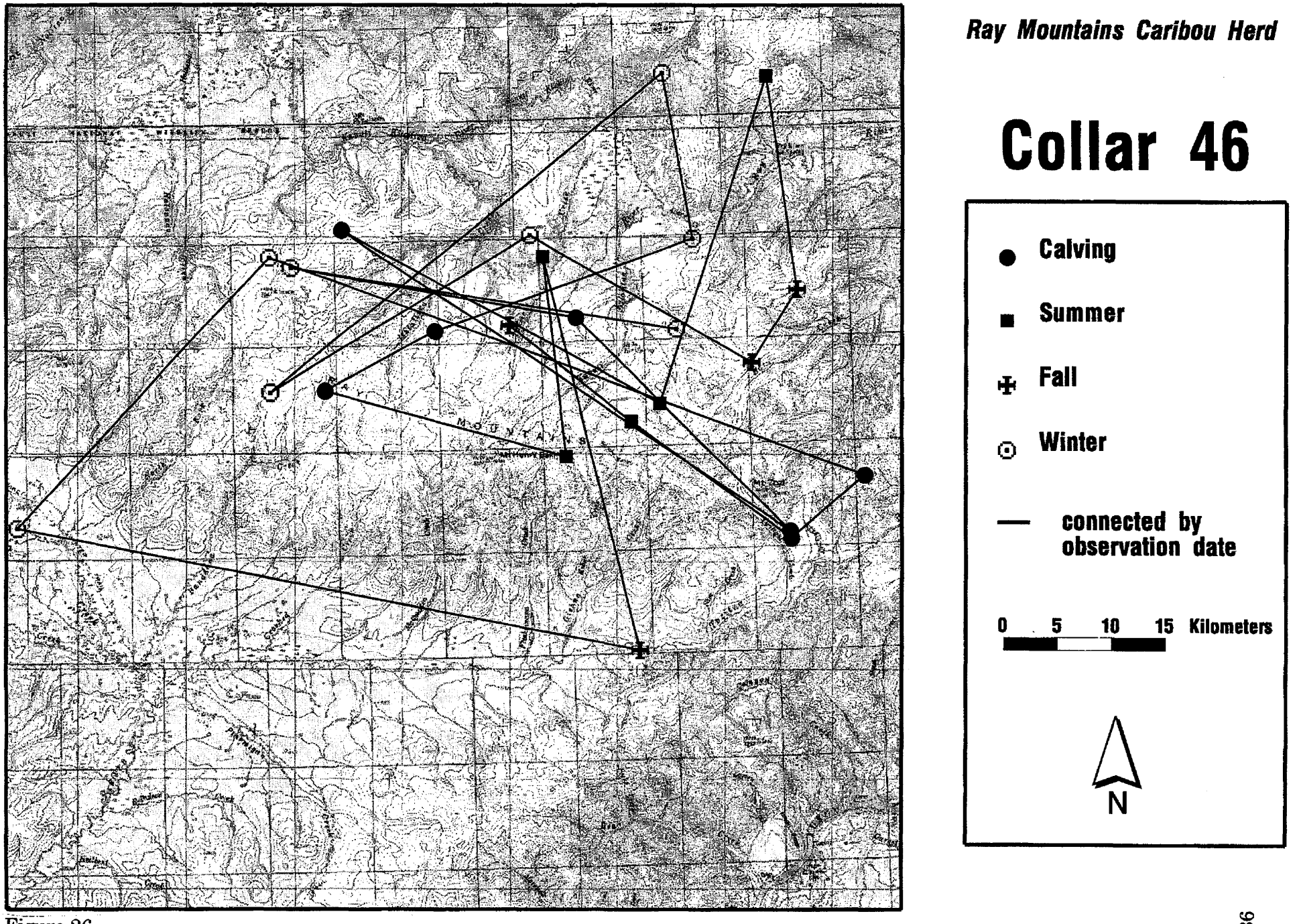
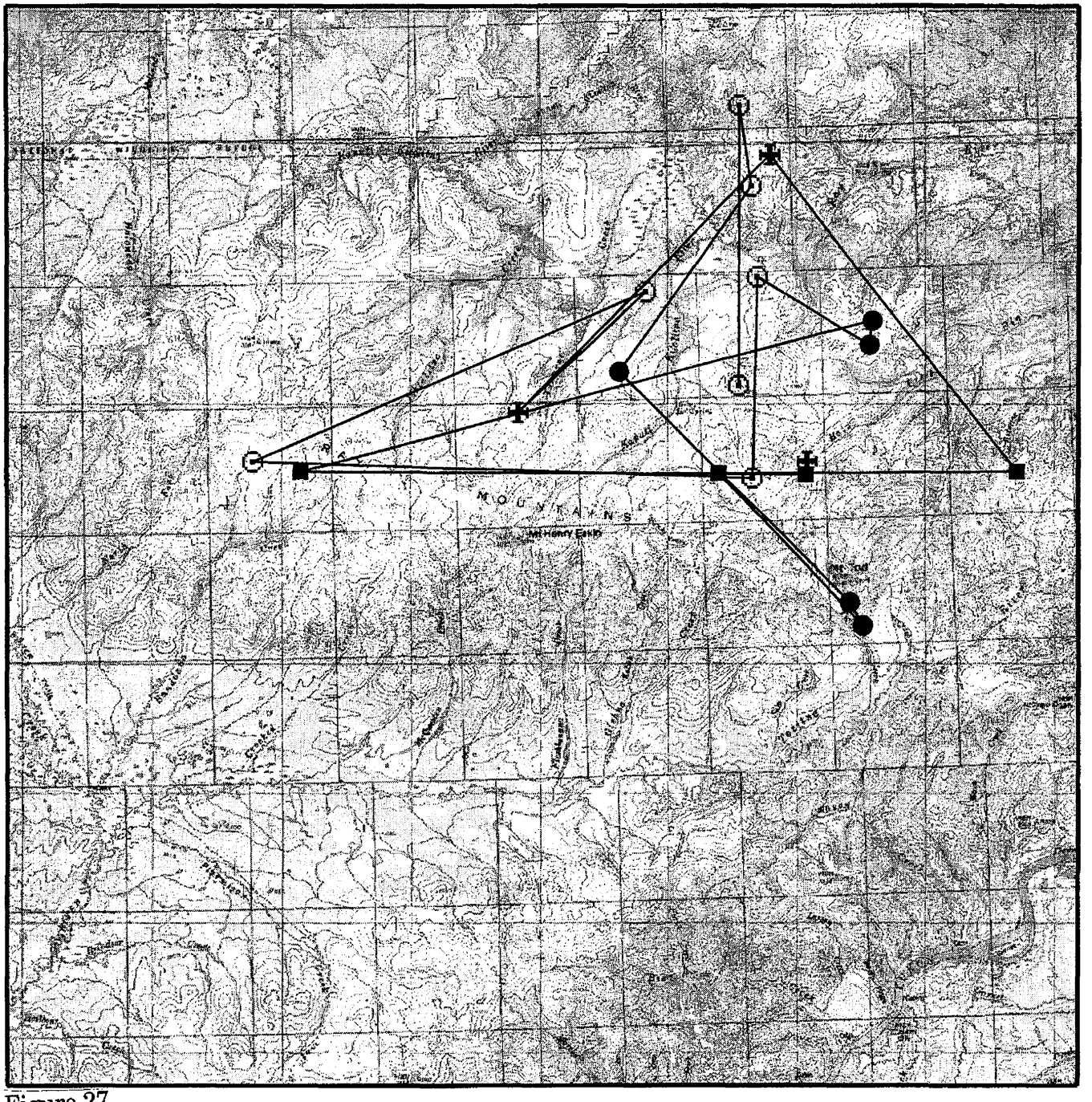

Ray Mountains Caribou Herd
Collar 46
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 26.

Ray Mountains Caribou Herd

Collar 51



- Calving
- Summer
- Fall
- Winter
- connected by observation date

0 5 10 15 Kilometers

N

Figure 27.

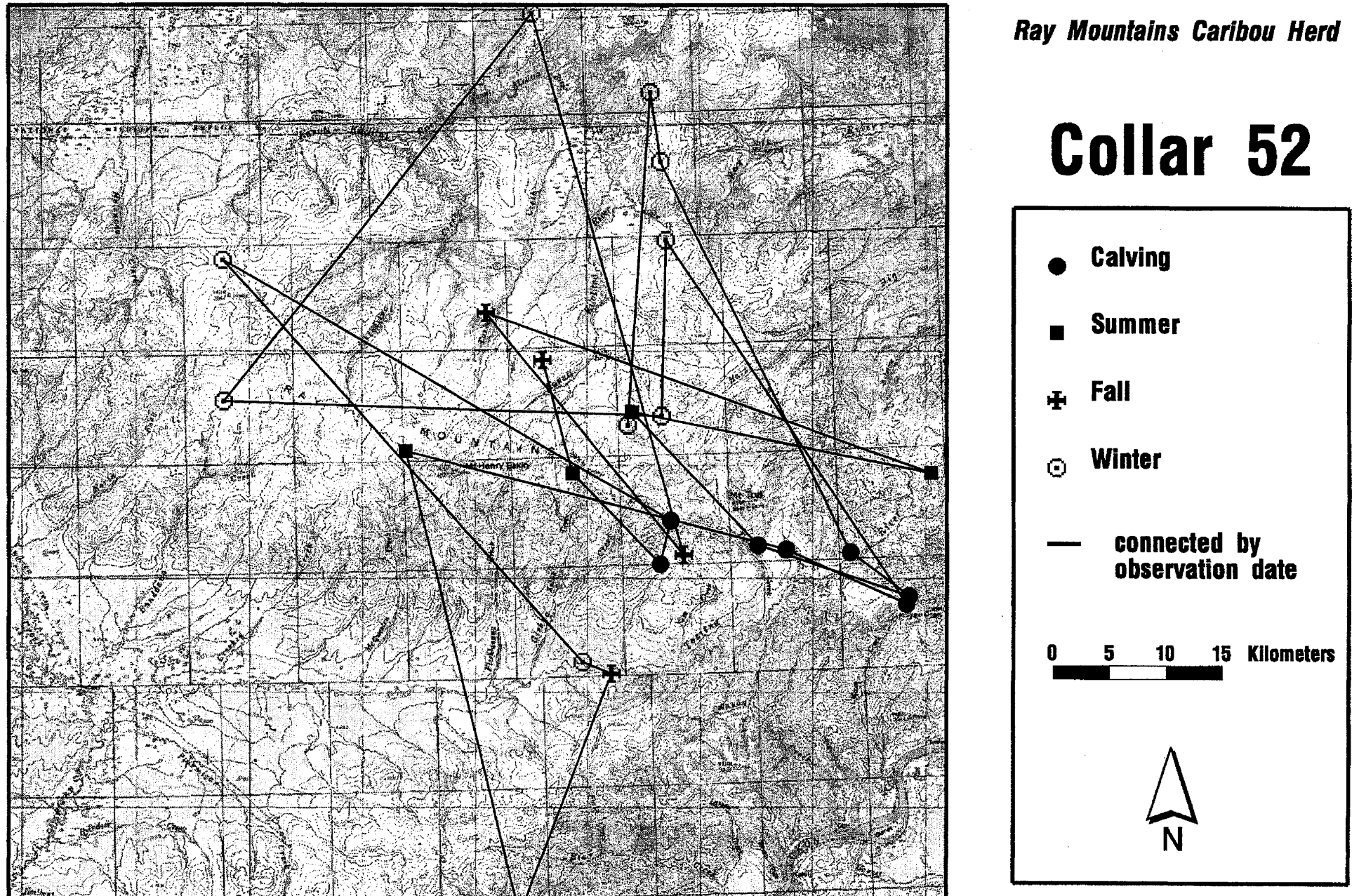
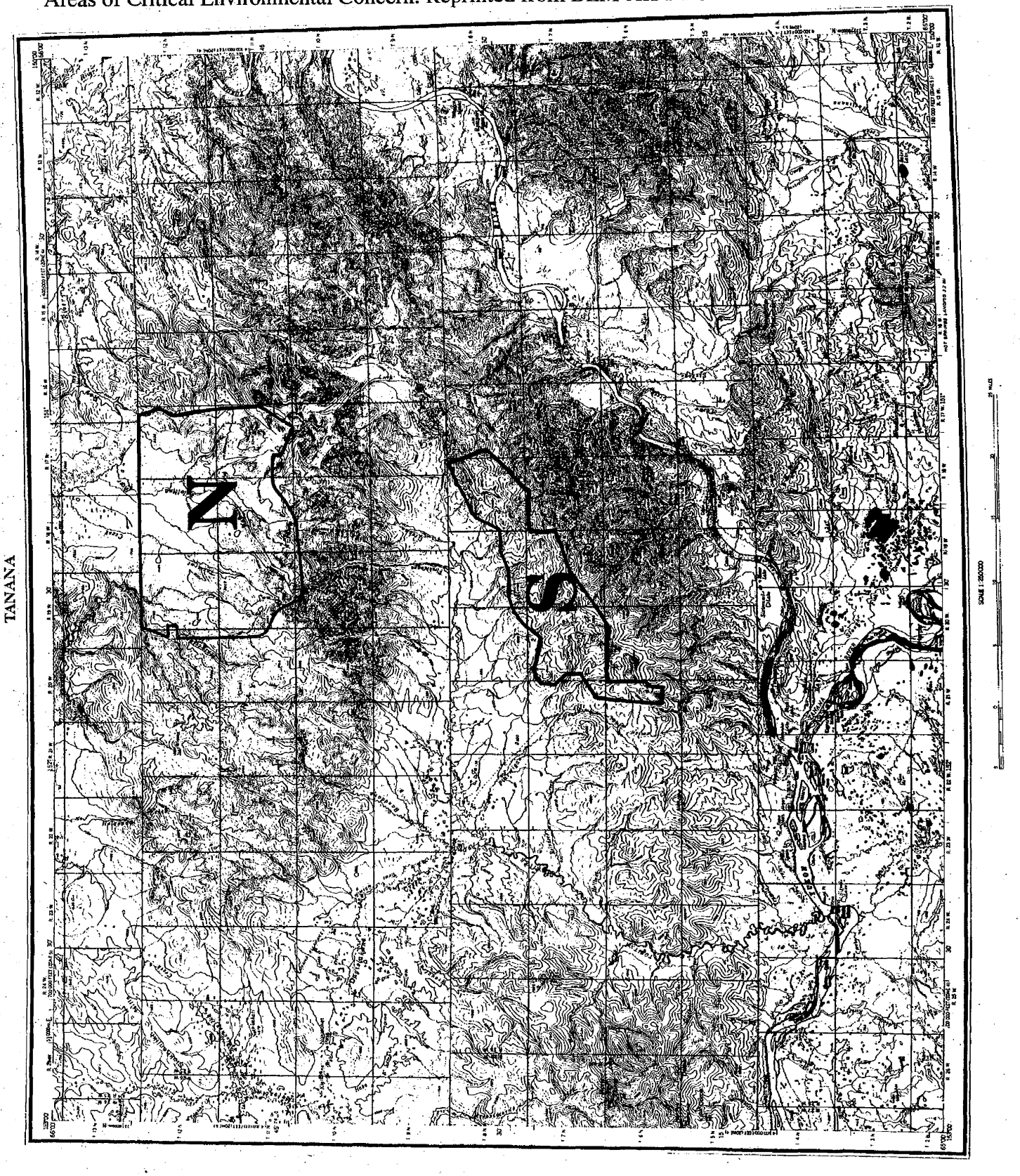

Ray Mountains Caribou Herd
Collar 52
Calving
Summer
Fall
Winter
connected by observation date
0 5 10 15 Kilometers
N

Figure 28.

Appendix B ACEC Boundaryies Source: Final Management Plan for Tozitna North and South Areas of Critical Environmental Concern. Reprinted from BLM-AK-PT-88-020-2050-070-1988



The BLM Mission

The Bureau of Land Management is responsible for the stewardship of our Public Lands. It is committed to manage, protect and improve these lands in a manner to serve the needs of the American people for all times.

Management is based on the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology.

These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness, air, and scenic, scientific and cultural values.