MOOSE, WOODLAND CARIBOU, AND WOLF INFORMATION FOR THE MAYO AND SELKIRK BAND AREAS

A Status Report

By

D.G. Larsen
Department of Renewable Resources
Whitehorse, Yukon

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BACKGROUND

Under the Framework Agreement for the Yukon Land Claim, Renewable Resources Councils will be established as the primary instrument for fish and wildlife management at the local, or Band level. The local Councils will be actively involved in the preparation and review of management plans for key wildlife species. Many of the future wildlife management actions implemented by the Department of Renewable Resources (DRR) will be based on the direction provided by these local management plans.

To be effective, the plans need to integrate the scientific knowledge normally used to manage game with the knowledge and needs of local residents and particularly those of the aboriginal people. Without their active and meaningful involvement, the long-term conservation and wise use of Yukon wildlife will remain in doubt.

The purpose of this document is to briefly summarize the technical wildlife information that is currently available for key big game species in the Mayo and Selkirk Band Area (moose, woodland caribou, and wolf) and to address some of the local concerns. For now, information on traditional knowledge has been summarized from comments received during the Indian harvest survey. Further integration of traditional knowledge and local concerns will occur after a workshop planned with Mayo and Selkirk Band members. The technical information will also be explained in more detail at that time. The resulting document will provide the basis for preparing local big game management plans for public review.

BAND AREAS

The areas used to describe the Mayo and Selkirk Band areas are based on lands claimed by individual Bands (Figure 1). Band areas overlap as boundary disputes have not yet been resolved. We have used maximum Band areas (ignoring overlap) to summarize harvest information, except in Figure 9 and 14. In those figures, the overlap was arbitrarily eliminated by the author (Appendix 1). In some cases, Band boundaries have been changed to conform to Game Management Subzone (GMS) borders in order to make it easier to calculate harvest levels.

DATA COLLECTION PROCEDURES

Population Data

Population distribution, abundance and composition have been collected using a variety of aerial survey techniques, depending on the species, year, and the objective of the survey. Moose populations have been censused using four different techniques:

1) Early winter, stratified random sampling - This is the most intensive type of survey which has been conducted in the Yukon since 1981. Briefly, the technique involves the stratification (or rating) of small blocks (approx. 30 km^2) into high, medium, or low strata. This is done by flying over each block with a fixed wing aircraft and rating it according to moose seen, tracks and habitat. This phase is called stratification. Each survey area is typically made up of approximately 100 blocks. The stratification is followed by a census, or intensive search, of randomly selected blocks within each stratum. Those blocks are searched with a helicopter, for the purpose of counting all moose within the block.

2) Early and late winter extended stratification - This is the least intensive type of survey and involves only the stratification phase of the above technique. These surveys have been conducted in the Yukon since 1987. Unlike the stratified random sampling technique, which estimates abundance, composition and distribution, the extended stratification only assesses distribution. Extended stratification surveys are flown in conjunction with, and usually in an area immediately next to the intensive survey.

3) Early winter trend surveys - These intensive surveys have been conducted since 1988 in small localized areas (approx. 250 km^2). The entire area is searched with a fixed wing aircraft. Composition, abundance and distribution information from these surveys are used as an index of the population over a much larger area.

4) Late winter river surveys - These surveys were flown along drainages, usually encompassing several kilometers on either side of a river. The intent was to determine major wintering areas. River surveys were flown only during the mid and late 1970's.

Caribou have been censused using three different techniques:

1) Late winter stratified random sampling - This is the most intensive type of survey and is identical to the stratified random sampling techniques described for moose. These surveys have been carried out in the Yukon since 1986.

2) Rut counts - Rutting areas are searched with a helicopter for the purpose of obtaining composition, distribution data and in some cases has been used to determine abundance. This technique has been used in the Yukon since the late 1970's.

3) Radio-collaring - This technique involves capturing and radio-collaring a small sample of the caribou population (usually females) for the purpose of determining the area inhabited by a herd. Collared animals are also used to determine mortality rates and provide a test to estimate how many animals are sightable on the stratified random sampling and trend surveys. This technique has been used in the Yukon since 1979.

Wolves have been censused using two techniques:

1) Late winter aerial surveys - Wolf abundance and distribution is estimated through observations of wolves and wolf tracks as determined by intense aerial searching. A fixed wing aircraft is used. These surveys have been conducted in the Yukon since 1982, and are flown in areas where moose or caribou have been censused.

2) Radio-collaring - This technique involves capturing and radio-collaring a small sample of the population for the purpose of determining pack size and the area inhabited by a pack, and therefore provide an estimate of density.

The potential effect of wolves on moose and caribou are assessed by comparing the numbers of moose and wolves in an area. The rule of thumb is that if there are less than 20 moose/wolf, predation is likely sufficient to cause a decline in the moose population. If there are more than 30 moose/wolf, predation is likely not significant enough to cause a decline. These ratios were developed in Alaska and apply to fairly simple moose/wolf systems. These ratios become harder to interpret in multi-predator-prey systems, like we have in the Yukon, and may not apply to caribou.

Harvest Data (references 10,14,18,19)

Moose and caribou harvest data is presented for resident non-Indians and outfitters since 1979. Harvest data were collected prior to 1979 but records are incomplete. The licensed resident harvest is estimated annually through a voluntary questionnaire while the outfitters harvest is determined through compulsory submissions. The Indian harvest has been estimated from a separate voluntary questionnaire in 1987 and 1988. All Indian Bands, except Mayo and Carmacks, participated in the Indian harvest survey in the first two years. Carmacks joined the survey in 1989.

The number of animals killed in each year, by the different user groups, is recorded by game management subzone (gms). The number of days spent hunting is recorded for only resident non-Indians and outfitters. Success rate, expressed as the average number of days it takes to kill an animals, is calculated on a gms basis. Success rate can be used as supportive evidence of population declines (i.e. as populations decline, animals become scarce, and it therefore takes an increasing number of days to find and kill an animal). Success rate must be interpreted with caution as a decline in the success rate may reflect a decline in the population which has occurred from factors other than overhunting. Also, this statistic assumes that hunters do not increase their hunting efficiency within a gms, over time. If hunters do become more efficient through increased access, it is possible that game populations along new access roads could be systematically depressed, but that the number of days to kill an animal in the overall area remains the same. This problem is minimal in the Yukon because harvest is reported on a small area basis (gms), and access is limited.

The level of hunting that a population of animals can support without depressing the population is called the sustainable yield. Two approaches are used to determine sustainable yield. The first, and the most rigid, is to compare the number of yearlings being added (recruited) to the population, to the number of adults dying from natural mortality (non-hunting mortality). If recruitment is higher than adult mortality, the surplus is considered available to hunting. If recruitment is lower than natural mortality, there is no surplus. In order to use this method, one needs to know the natural mortality rates of adults, and numbers of adults and yearlings in the population. The latter is determined from aerial surveys. Natural mortality rates, however, are rarely assessed. We have estimated natural mortality rates for adult moose in the southwest Yukon to be 11% annually. Similar rates have been calculated for Alaskan moose populations. In this paper, we have assumed an 11% annual natural mortality rate for all moose populations. Based on this assumption, there must be between 10-15% yearlings in the population to maintain a staple population without hunting. In order for a sustainable harvest to occur, the proportion of yearlings must be higher than the above rates. Yearling recruitment rates are averaged over at least three years, due to annual fluctuations.

The second approach to estimating sustainable harvest is to apply a harvest rate (e.g. 2-4%) and monitor game population levels. If populations remain stable or grow under this harvest rate they are considered sustainable. In the southwest Yukon, a 4% harvest rate was considered sustainable.

The woodland caribou harvest in the Mayo Band area was separated from the barrenground caribou harvest (these herds overlap in the northern portion of the Mayo Band area) by excluding any caribou harvest which occurred in GMZ 1 or along the Dempster highway.

RESULTS AND DISCUSSION

Yukon-wide Harvest and Population Status

Moose:

Only 20% of the Yukon has been surveyed for moose since 1981 (Figure 2). Densities range from 417 moose/1000km^2 west of Teslin Lake, to 40 moose/1000 km^2 west of Minto. The average density of all surveyed areas is 165 moose/1000 km^2 (Table 1). In nine of the 16 areas surveyed moose populations were either stable or increasing.

Moose harvest (excluding Indians) has declined by 23% between 1982 and 1988, the result of 37% reduction in the resident non-Indian harvest and a 54% increase in the non-resident harvest (Figure 3). In 1988, resident non-Indians killed an estimated 430 moose, Indians killed at least 295 moose, and non-residents 193 moose. Indian harvest, however, is incomplete and does not account for the harvest from the Mayo and Carmacks Bands.

Woodland caribou:

Much of the Yukon has been surveyed for caribou since 1980 (Figure 4). Twenty-three herds have been identified. Five of the 11 herds surveyed were either stable or increasing in numbers (Table 2). Woodland caribou harvest (excluding Indians) has remained about the same between 1979 and 1988 (Figure 5), despite a decline in the resident non-Indian harvest. In 1988, outfitters killed 207 woodland caribou, resident non-Indians 125, and Indians at least 108. Again, these proportions must be viewed with caution as the Indian harvest is underrepresented.

Wolves:

Wolves occur throughout the Yukon, with natural densities ranging from 3.2 wolves/1000 km^2 west of Carmacks to 18.0 wolves/1000 km^2 west of Teslin (Figure 6). Low densities in the Ross River area (1.3 wolves/1000 km^2) in 1989 are the result of seven years of intensive wolf reduction. Harvest of wolves by all user groups is low.

Mayo Band Area

Moose distribution and abundance (references 11,13,15,16)

Approximately 9% of the Mayo Band area has been surveyed for moose between 1975 and 1988 (Figure 7). Earlier surveys (1975 and 1979) were flown along the Stewart River, while the most recent and intensive survey (1988) was flown between the Pelly and McQuesten Rivers. Due to differences in techniques, periods, and areas between the historical and recent surveys, it is not possible to compare densities between years.

The importance of burns to the moose population in the Mayo area is not clear. Burns were more prevalent and moose densities were slightly higher in the area south of Mayo (148/1000 km^2) compared to north of Mayo (128/1000 km^2). However, only half of the moose seen in November were observed in burns. The year round utilization of burns by moose and the effects of burns on moose numbers in this area needs to be studied.

Late winter surveys (1975,1979, and 1989) indicated that moose concentrate along the valley bottoms in the Mayo area. This late winter behavior is likely in response to deep snow at higher elevations. Also, large numbers of moose were also observed upstream from Fraser Falls, on the Stewart River, compared to below the Falls. This is likely due to a combination of deeper snow towards the east, possibly higher natural densities of moose, and less hunting east of Mayo.

Only the best population information for the Mayo Band area are discussed (i.e. 1988 survey results from Mayo N. and Mayo S., Figure 7). Low numbers of moose were found during early winter 1988 on the Mayo survey (Table 1). Densities

were lower (128-148 moose/1000 km^2) than the Yukon average of 165 moose/1000 km^2. The population north of Mayo was likely growing in 1988, but the population south of Mayo appeared to be stable or declining. This conclusion was based on the high number of yearlings north of Mayo (16% of the population) compared to the low numbers south of Mayo (4%)(Table 1). Both areas had high calf ratios (56-68 calves/100 cows) compared to the Yukon average of 38 calves/100 cows (Table 1).

A trend survey was established in 1988 in the Mayo South area and was reflown in 1989. Similar numbers of moose were recorder in both years, however, there were differences in composition. The most obvious difference was the higher proportion of yearlings (31%) in the 1989 survey compared to the 1988 survey (10%). Calf proportions were the same in both years (20%). These results indicate that most of the large calf crop in 1988 survived to early winter 1989.

Moose densities in the MacArthur sanctuary (no hunting) were higher (151 moose/1000 km^2) compared to the rest of the Mayo South survey area (106 moose/1000 km^2). This suggests that hunting has lowered moose density over the long term, assuming all other factors were the same in both areas.

Woodland caribou distribution and abundance (references 1,3):

Two herds have been censured in the Mayo Band area (Hart River and Bonnet Plume Herds). Other herds in GMZ 4 are currently being evaluated (Figure 8).

Hart River/Bonnet Plume Herds: Population size, movement patterns, home ranges, and composition of these two herds were assessed in the early 1980's.

Aerial surveys were flown at various times of the year and 32 females were collared and tracked between 1980-1982. Winter ranges occurred along the southern portions of the Hart River (Hart River Herd) and along the Wind, Bonnet Plume, and Snake Rivers (Bonnet Plume herd) (Figure 8). Both herds were thought to be stable or increasing in numbers in the early 1980's. Population size was estimated to be 1200 animals in the Hart River herd and approximately 5000 animals in the Bonnet Plume herd.

GMZ 4 Herds: Twenty-nine female caribou were radio collared in 1989 and are being monitored. The preliminary results from this work suggest that there may be several herds which occupy this area, ranging in size from a few hundred (Ethel Lake herd) to a few thousand (Tay herd). Our information is insufficient at this time to assess sustainable harvest levels. Management priorities are to assess herd range size, population size, composition, and habitat characteristics over the next 3 years.

Redstone Herd: Very little is known about this herd, which likely numbers between 5 and 10 thousand caribou. Only a small portion of this herd's range occurs in the Yukon (Fig. 8). In summer, part of the herd migrates to the N.W.T./Yukon border, but leaves again by late September.

Wolf distribution and abundance (references 6, 7, and 8):

Wolf densities vary from 9.2 to 10.4 wolves/1,000 km^2 in the southern portion of the Mayo Band area. These densities are similar to those found in most other areas of the Yukon (Fig. 6). Moose to wolf ratios in the Mayo North and South areas combined, were between 13 and 15 moose/wolf.

Moose Harvest:

The harvest information for the Mayo Band area presented here was based on data collected from Indians who do not belong to the Mayo Band (i.e. the harvest is from adjacent bands). Obviously, the harvest would be higher if the Mayo Band harvest was known.

Even without the Mayo harvest, the Mayo Band area had one of the highest Band harvests in the Yukon in 1988 (Fig. 9). This Band area also had the highest outfitter harvest and the fourth highest resident non-Indian harvest of all Band areas. The outfitter harvest is high not because these outfitters take more game/outfitter but because about half of all Yukon outfitting areas are either totally or partially within the Band area (Fig. 10).

The outfitter harvest has increased substantially (219%) in the Mayo between 1983 and 1988 while the resident non-Indian harvest has remained more or less stable (Fig. 11). The outfitter harvest trends in Mayo are similar to those in the rest of the Yukon. The resident non-Indian harvest, however, has not decreased as it has in the rest of the Yukon (Fig. 3).

Moose harvest distribution in the Mayo Band area is shown in Figures 12 and 13. Figure 12 shows the resident non-Indian and non-resident harvest from 1979-1988, while Figure 13 illustrates the most recent harvest (1988) for resident non-Indian, outfitter, and Indians. In addition, the number of moose harvested by each user group is listed for GMS's which received moderate to heavy harvests.

Based on trends in hunter success of outfitter and resident non-Indian in the Mayo-Selkirk Band areas, our data suggests that harvest levels in the most heavily harvested GMS's (greater then 4 moose/1,000 km^2) have not affected moose numbers. In the early 1980's it took longer to find and kill a moose (24 days), as compared to the late 1980's (14 days). Presumably if moose were declining, it would take more days to find and kill an animal.

The sustainable yield in the Mayo North moose survey area, based on yearling recruitment rates, was calculated to be between 15-26 moose in 1988. In this same area, the average resident non-Indian and outfitter harvest (1979-1987) was 6 moose/year. Six moose represent 2% of the population. Based on these figures, this population was harvested by licensed hunters within sustainable yield in 1988. We do not know the Indian harvest. Without this information, we are unable to determine the true effects of hunting on this moose population.

The sustainable yield in the Mayo South moose survey area, based on yearling recruitment rates, was zero in 1988. Any harvest would have been in excess of the sustainable yield. Hunting restrictions were not imposed in 1989 as a large number of calves were born in 1988 and we were optimistic that the recruitment of yearlings in 1989 would be substantially higher than in 1988.

Woodland Caribou Harvest:

As with moose, the Mayo Band area had one of the highest licensed harvests, and the highest outfitter caribou harvest of any Band area in the Yukon in 1988 (Fig. 14). Again, this is due to the large size of the Mayo Band area which included half of all Yukon outfitting areas. The outfitter caribou harvest has

increased from 47 to 81 (72%) in the Mayo Band area between 1979 and 1988, while the resident non-Indian harvest has remained stable (Fig. 15). These trends are similar to those in the rest of the Yukon (Fig. 5).

The distribution of the caribou harvest in the Mayo Band area is shown in Figures 16 and 17. Figure 16 shows the resident non-Indian and outfitter harvest from 1979-1988, while Figure 17 illustrates the most recent information (1988) for resident non-Indian, outfitter, and Indian harvests. In addition, the number of caribou harvested by each user group is listed for GMS's which received moderate to heavy harvests.

As with moose, based on licensed hunter success in the Mayo/Selkirk Band areas the harvest levels in the most heavily harvested GMS's (greater then 4 caribou/1,000 km^2) have likely not affected caribou populations. In the early 1980's, it took on average 12 days and in the late 1980's it took 9 days to find and kill a caribou.

Licensed harvest levels on the Hart River and Bonnet Plume herds are well within sustainable levels. The current licensed harvest is less than 20 caribou/herd/year which represents 2% of the Hart River herd and less than 1% of the Bonnet Plume herd. The current two caribou/year regulation implemented by the D.R.R. in 1984 reflects the fact that these herds are underharvested (Table 3).

Management Concerns

We have three management concerns for the Mayo area:

1. The lack of clearly defined management objectives.
2. The lack of information on Indian caribou and moose harvest.
3. The effects of existing burns on moose numbers.
4. The potential effects of predators on moose numbers.
5. Identifying both consumptive and non-consumptive demand levels for moose and caribou.

The most important factors keeping the Mayo moose and caribou population from growing have not been determined. The large numbers of moose calves in November indicates that calf production and survival to 6 months of age was good. Although high numbers of calves were observed, about half the calves were lost prior to the survey. Moose in the southwest Yukon give birth at a rate of 112 calves/100 cows and in interior Alaska, 111-116 calves/100 cows. Wolves, black bear, and grizzly bear have been documented as major causes of calf mortality during the first few weeks after calving in the southern Yukon and Alaska.

Traditional Information and Local Concerns

The D.R.R. has been unable to obtain any traditional information from the Mayo Band. We hope to secure this information through the workshop and from the field worker over the next few months. When this information becomes available, we will incorporate it into the next draft of this report. Likewise, local concerns of the Mayo Band are not known, however, it is commonly recognized that the outfitter harvest is a major concern to all Indian Bands. The information on outfitter harvest presented in this report will likely further stimulate this discussion.

Selkirk Band Area

Moose Distribution and Abundance (references 9, 13, and 17):

Approximately 28% of the Selkirk Band area has been surveyed for moose between 1975 and 1988 (Fig. 7). The earliest survey (1975) was flown along the Macmillan and Pelly Rivers, while more recent surveys were flown in the Dromedary Mountain (1982), Casino Trail (1987), and Pelly (1988) areas. Intensive surveys were flown in the Dromedary Mountain and Casino Trail areas, and a stratification survey was flown in the Pelly area. Note that the Dromedary and Pelly survey areas partially overlap, making it possible to compare data between years (Fig. 7).

Few moose were seen on the 1982 Dromedary Mountain survey (Table 1). The density (64 moose/1,000 km^2) was the second lowest recorded in the Yukon to date and well below the average density (165 moose/1,000 km^2) for combined areas surveyed in the Yukon. Based on a low recruitment rate of yearlings in 1983, this population likely declined from 1982-83. More moose were observed per minute of flying in 1988 compared to 1983; therefore, we suspect the population has grown over the long term (1983-1988).

During the late winter (March) survey in 1975 (Fig. 7), concentrations of moose were seen along the Pelly and Macmillan Rivers but during the early winter (November) surveys in 1983 and 1988, few moose were seen along these same rivers. Instead, concentrations of moose were seen at higher elevations. Movement into the valley bottom in late winter is likely in response to deeper snow levels at higher elevations.

Little is known about moose in the Pelly survey area (Fig. 7), as only information about moose distribution was collected on the 1988 early winter stratification survey. Based on that survey, moose were distributed in a similar pattern to moose in the Mayo N and S areas (i.e., the population was clumped with most of the moose found in habitats at high elevations).

Extremely low moose densities (40 moose/1,000 km^2) were recorded in the Casino Trail area in November 1987 (Fig. 7). In fact, this is the lowest density found in the Yukon to date (Table 1). The number of moose seen was so low (20) that reliable age and sex ratios could not be determined.

Caribou Distribution and Abundance (references 2, 3, and 20):

Klaza Herd: Four hundred and thirty-nine (439) caribou were counted in this herd during a D.R.R. aerial survey in March, 1989. Composition results suggest that this population is likely stable or slowly increasing. Based on the movements of 17 radio collared female over the past 3 years, the Klaza herd ranges between the Nisling and the Yukon Rivers (Fig. 8). In winter, the herd concentrates in two areas, along the Klaza River in the south and along the Selwyn River/Hayes Creek in the North.

Game Management Zone Four: (see Mayo Band area)

Fortymile Herd: Although this herd does not currently overlap with the Selkirk Band area, historically it did and will hopefully again in the future (Fig. 8). In 1975, the herd numbered 5,000 animals and was restricted to an area in Alaska just across the Yukon border. In 1988, the herd was up to 20,000 animals and is now starting to move into the Yukon during the winter months.

If it continues to increase, it may spread into the Selkirk Band area in the foreseeable future.

Wolf distribution and abundance (reference 8):

Wolf aerial surveys have been flown in much of the Selkirk Band area (Fig. 6). Densities range from a Yukon low of 3.2 wolves/1,000 km^2 in the southwest portion of the Band area, to more normal densities of 9-10 wolves/1,000 km^2 in the northern portion. The lower densities are a reflection of the low numbers of moose and caribou in this area. Although wolf densities are low, the moose:wolf ratios (13:1) is skewed towards a large number of wolves for each moose in the area. Similar ratios (13-15 moose/wolf) were documented in the Mayo North and South survey areas.

Moose Harvest:

The Selkirk Band area harvest is incomplete because this area overlaps with both the Mayo and Carmacks Band areas, for which we have no Indian harvest information. Keeping the above limitation in mind, the Selkirk Band area has one of the lowest Band harvests in the Yukon in 1988 (Fig. 9). It does, however, have the second highest outfitter moose harvest. A high proportion (7 out of 21) of the Yukon outfitting areas fall within the Selkirk Band area, which explains the high proportion of the Yukon wide outfitter harvests in this area (Fig. 10).

The moose harvest by outfitters has increased, from a low in 1979 of one to a high in 1988 of 36 moose (Fig. 18). The resident non-Indian harvest increased during the mid-1980's but has declined in recent years. These trends are consistent with harvest trends in the rest of the Yukon (Fig. 3).

The distribution of the moose harvest in the Selkirk Band area is shown in Figures 12 and 13. Figure 12 shows the resident non-Indian and outfitter harvests from 1979-1988, while Figure 13 illustrates the resident non-Indian, outfitter, and Indian harvest for 1988. The number of moose harvested by each user group is listed for GMS's which received a moderate to heavy harvest.

The harvest in the Dromedary survey area has averaged 18 moose/yr. between 1979-1988 (11 moose/yr. by Indians [1987-88], 4 moose/yr. by resident non-Indians, and 3 moose/yr. by outfitters). Based on the 1983 estimate (228 moose), this population has been harvested at 8% of the estimated population.

The harvest in the Casino Trail survey area has averaged 4.4 moose/yr. between 1979-1988 (1.5 moose/yr. by Indians (1987-88), 2.7 moose/yr. by resident non-Indians, and 0.2 moose/yr. by outfitters). The average annual harvest has been 3% of the estimated populations. Although this rate is low, it is still undesirable, given the extremely low density of moose in this area. Moose hunting was closed to resident non-Indians in 1989 (Table 3).

The harvest of moose along the Macmillan River was a major concern of the Selkirk Band (see Traditional Information section). We have compiled the following information on this area (GMS's 4-10,11,18,19,27,33,37,38). Moose kills by both resident non-Indians and outfitters have generally increased along the Macmillan River since 1979 (Fig. 19). Resident non-Indian kills went from 2 to 6 per year in the early 1980's to 8 to 17 per year in the mid and late 1980's. The outfitter kill has followed the same trend as the resident kill. Although there have been more moose taken along the Macmillan river in recent years, the number of days to find and kill a moose have remained the same over the past 10 years (i.e., variations occurred among years but no

trends were evident). These results suggest the moose population has not declined over that time period.

Caribou Harvest:

Caribou harvest in the Selkirk Band area is very low in comparison to all other band area (Fig. 20). Trends are difficult to assess because of the small number of caribou estimated to have been killed each year in this area (generally less then 20). Like the Mayo area, the outfitter harvest exceeds the resident non-Indian harvest. The distribution of the caribou harvest in the Selkirk area is shown in Figures 16 and 17.

The estimated harvest for the Klaza herd has averaged 11 caribou/year between 1979 and 1988 (resident non-Indians 8/yr., Indians 2/yr. [1988], and outfitters 1/yr.). This harvest represents approximately 3% of the estimated herd. Hunting restrictions were imposed on resident non-Indians in 1988 in response to low numbers of caribou and moose (Table 3).

Management Concerns (references 2, 5, and 14):

We have six management concerns for the Selkirk Band area:

1. The lack of clearly defined management objectives.
2. The lack of Indian harvest information on caribou and moose.
3. The lack of recent, intensive moose survey information, or trend survey data from the Dromedary Mountain and MacMillan River areas.
4. The extremely low moose and caribou populations in the Casino Trail area.
5. The increased access and thus increased unrestricted Indian harvest created by the exploration activities in the Casino Trail area. Although these

activities will affect both caribou and moose, the major impact will be on caribou, as the proposed road will bisect the major winter range of this herd. Development has been stopped until the spring of 1990 when an assessment of the potential impact on this herd, and recommendations on future development will be made.

6. The high number of wolves and possibly grizzly bears, compared to the prey base may be a significant factor keeping the caribou and moose populations from increasing.

The major factor limiting the moose and caribou populations in the Casino Trail area is likely predation by grizzly bear and wolves. Studies in both the southwest Yukon and Alaska (Tok) have identified these two predators as the main source of moose mortality. As the Casino survey area lies in close proximity to, and between these study areas, predators probably have a significant regulatory affect on the Casino populations. Because both moose and caribou densities are extremely low, any management program to significantly enhance these populations would be expensive and time consuming. One potential solution would be to encourage the Fortymile caribou herd to continue to expand into the S.W. Yukon. The effect would be to increase the prey base, thereby releasing the local moose and caribou populations from excessive predation. This would take a number of years and therefore should be viewed as a long-term management program initiative.

Traditional Information and Local Concerns (references 18 and 19):

During the 1987 and 1988 Indian harvest surveys in Pelly, hunters were asked to comment on changes in game abundance over the past ten years, as well as any concerns they might have regarding wildlife management in their band area.

Following is a summary of those comments. This section will be expanded after further discussions with the Band.

Forty-three percent of the Pelly hunters felt that moose have declined and felt they had either increased or remained the same over the past 10 years. Only (25%) felt that caribou had declined and (38%) felt caribou numbers had either increased or remained the same. Observations made by Indians in Pelly, that moose and caribou numbers have not declined in recent years, is consistent with the D.R.R. data.

Sixty-three percent of hunters believe that black bear have increased, but only 43% felt that grizzly bear had increased and 36% felt that wolves increased. Predation, overhunting, and emmigration were the primary reasons given by those individuals who believed moose and caribou numbers had declined.

The management concerns most often raised by the Pelly hunters were the increase in moose hunting upstream on the Macmillan River, the high number of predators, and the excessive kill by outfitters in their Band area.

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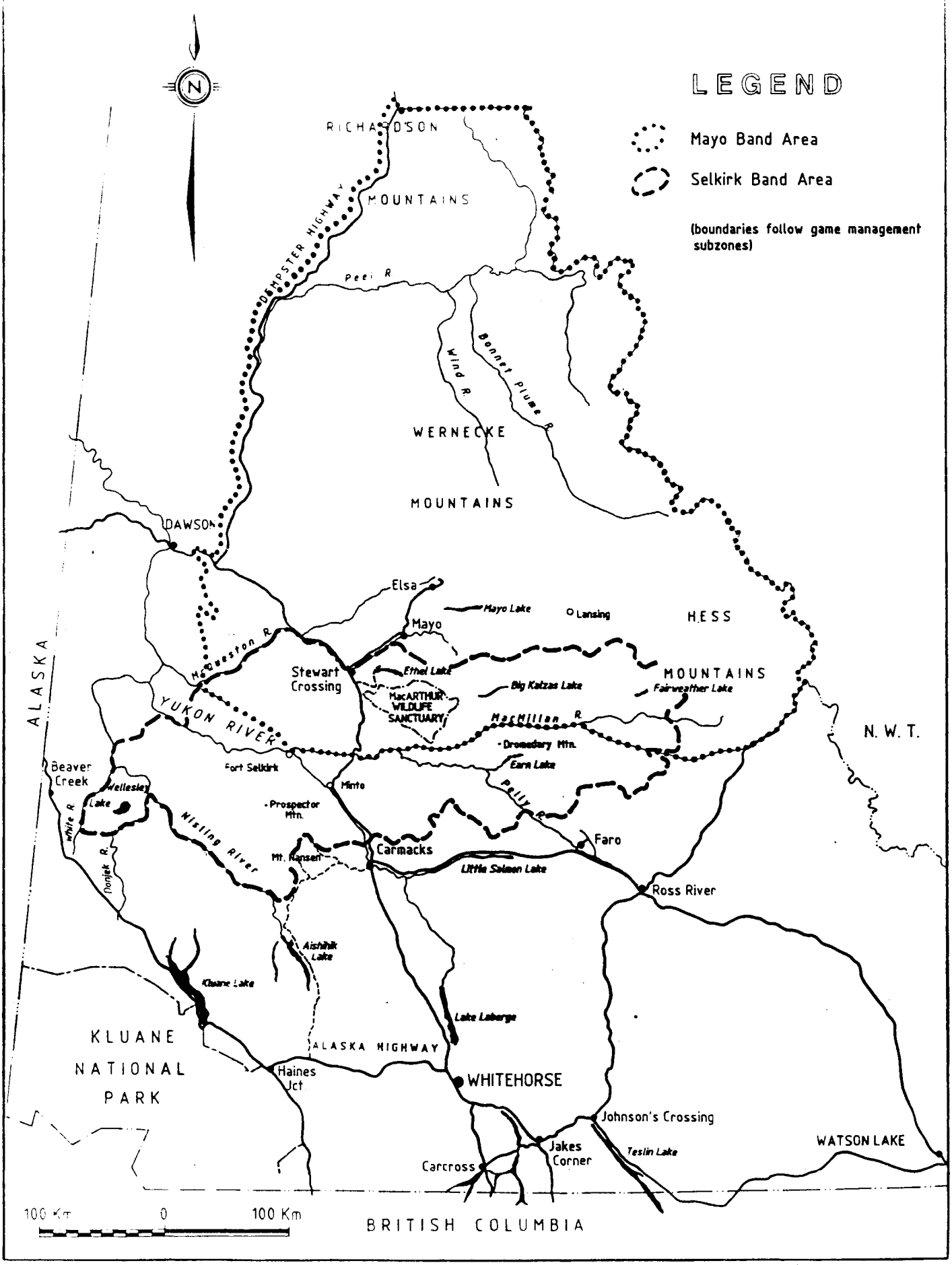

LEGEND
Mayo Band Area
Selkirk Band Area
(boundaries follow game management subzones)
N
RICHARDSON MOUNTAINS
DEMPSTER HIGHWAY
Peel R.
Wind R.
Bonnet Plume R.
WERNECKE MOUNTAINS
DAWSON
Elsa
Mayo
Mayo Lake
Lansing
HESS MOUNTAINS
Fairweather Lake
Big Kalzas Lake
Ethel Lake
Stewart Crossing
MacArthur Wildlife Sanctuary
MacMillan R.
Dromedary Mtn.
Earn Lake
Pelly R.
Faro
Ross River
Little Salmon Lake
Carmacks
Mt. Nansen
Prospector Mtn.
Fort Selkirk
Minto
YUKON RIVER
McQuesten R.
ALASKA
N.W.T.
Beaver Creek
Wellesley Lake
White R.
Donjek R.
Nisling River
Aishihik Lake
Kluane Lake
Lake Laberge
KLUANE NATIONAL PARK
ALASKA HIGHWAY
Haines Jct.
WHITEHORSE
Johnson's Crossing
Teslin Lake
WATSON LAKE
Jakes Corner
Carcross
100 Km
0
100 Km
BRITISH COLUMBIA

Figure 2. Moose aerial surveys in the Yukon 1981 - 1989.

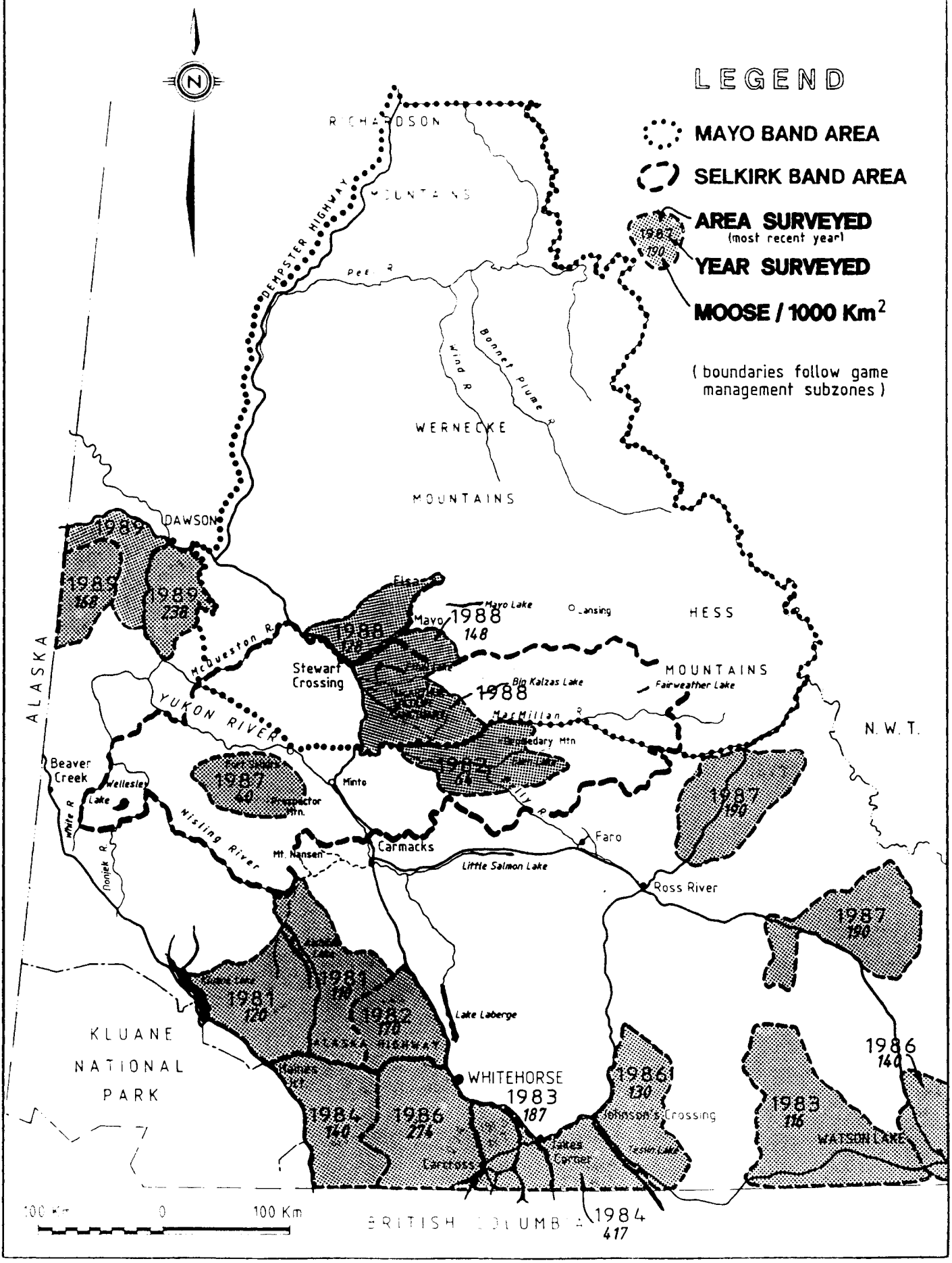


Figure 3. Trends in Yukon moose harvest by user group, 1979-1988. Note that Indian harvest information was not collected prior to 1987.

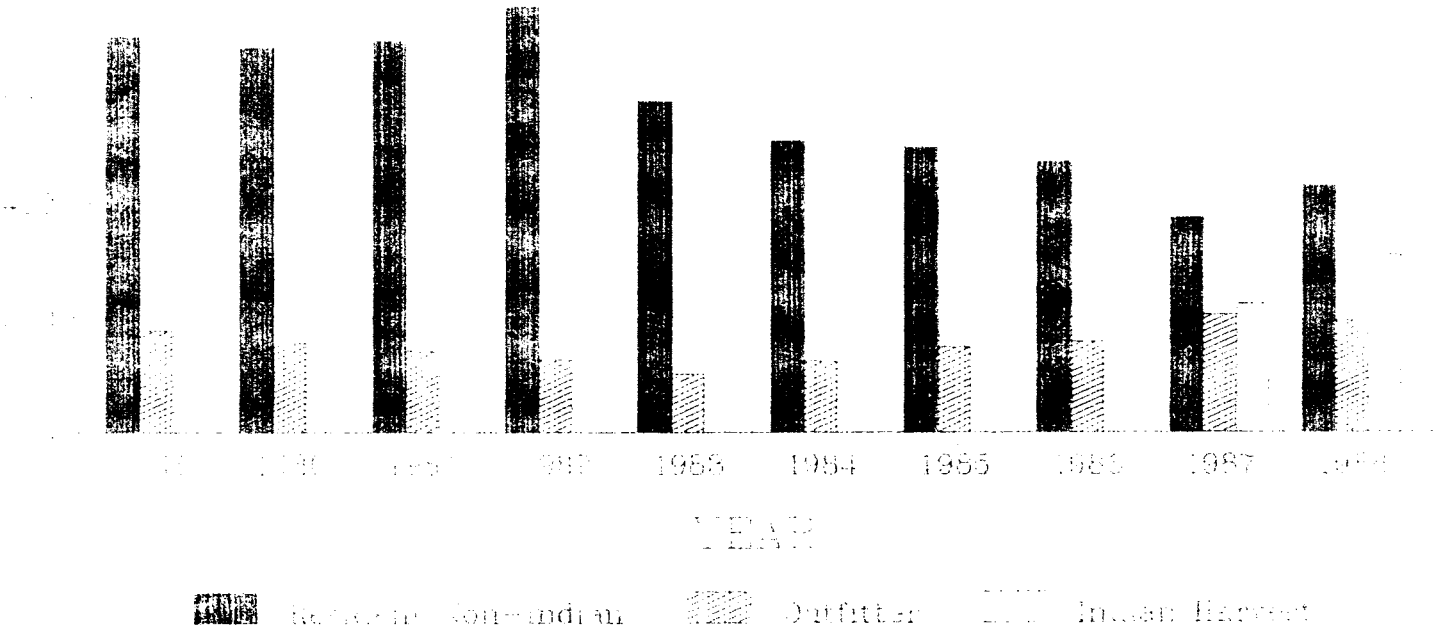


Figure 4. Woodland caribou surveys in the Yukon, 1980-1989.

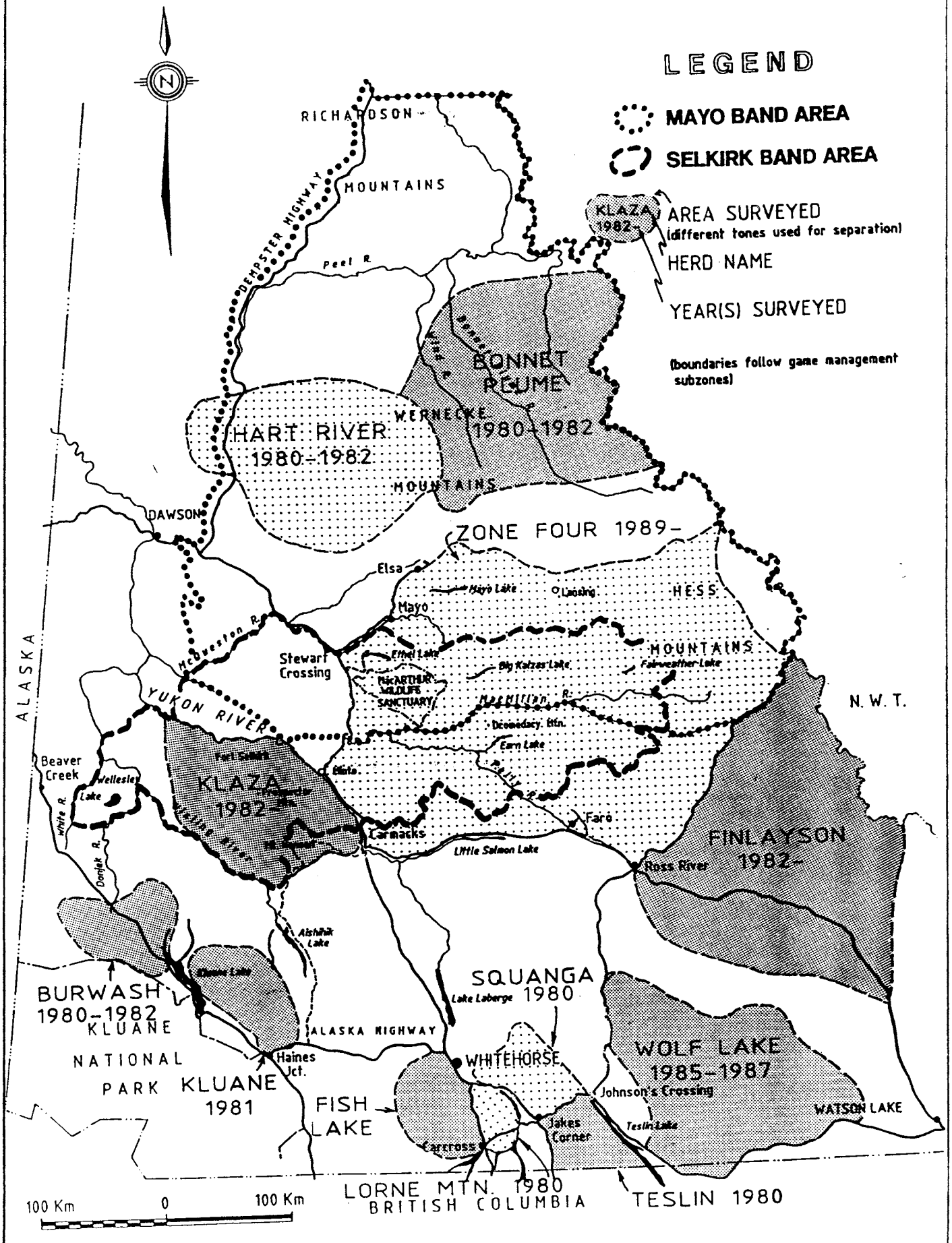


Figure 5. Trends in Yukon Woodland Caribou harvest by user group, 1979-1988. Note that Indian harvest information was not collected prior to 1987.

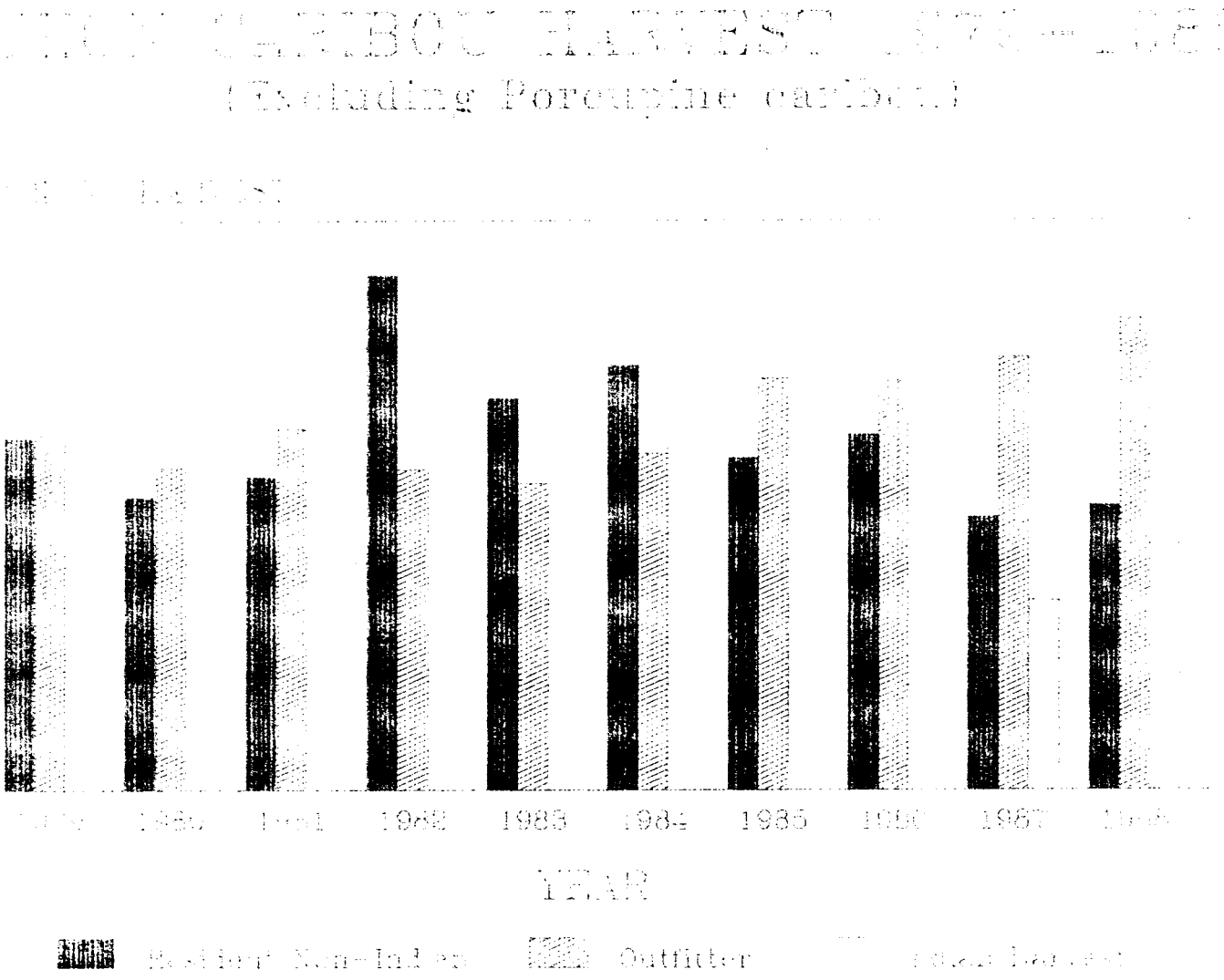


Figure 6. Wolf surveys in the southern and central Yukon, 1983-1989.

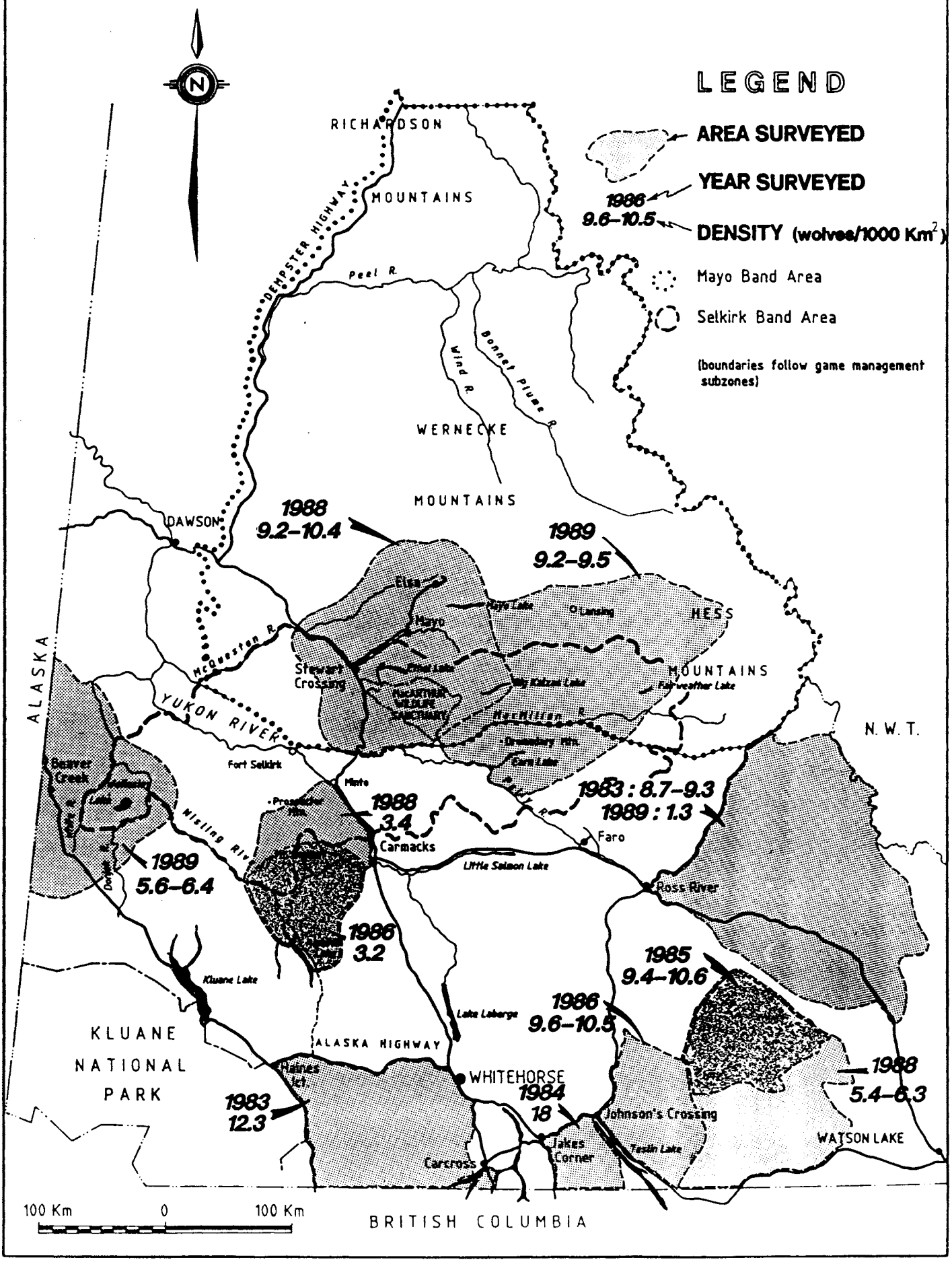


Figure 7. Recent and historical moose surveys in the Mayo and Selkirk Band areas.

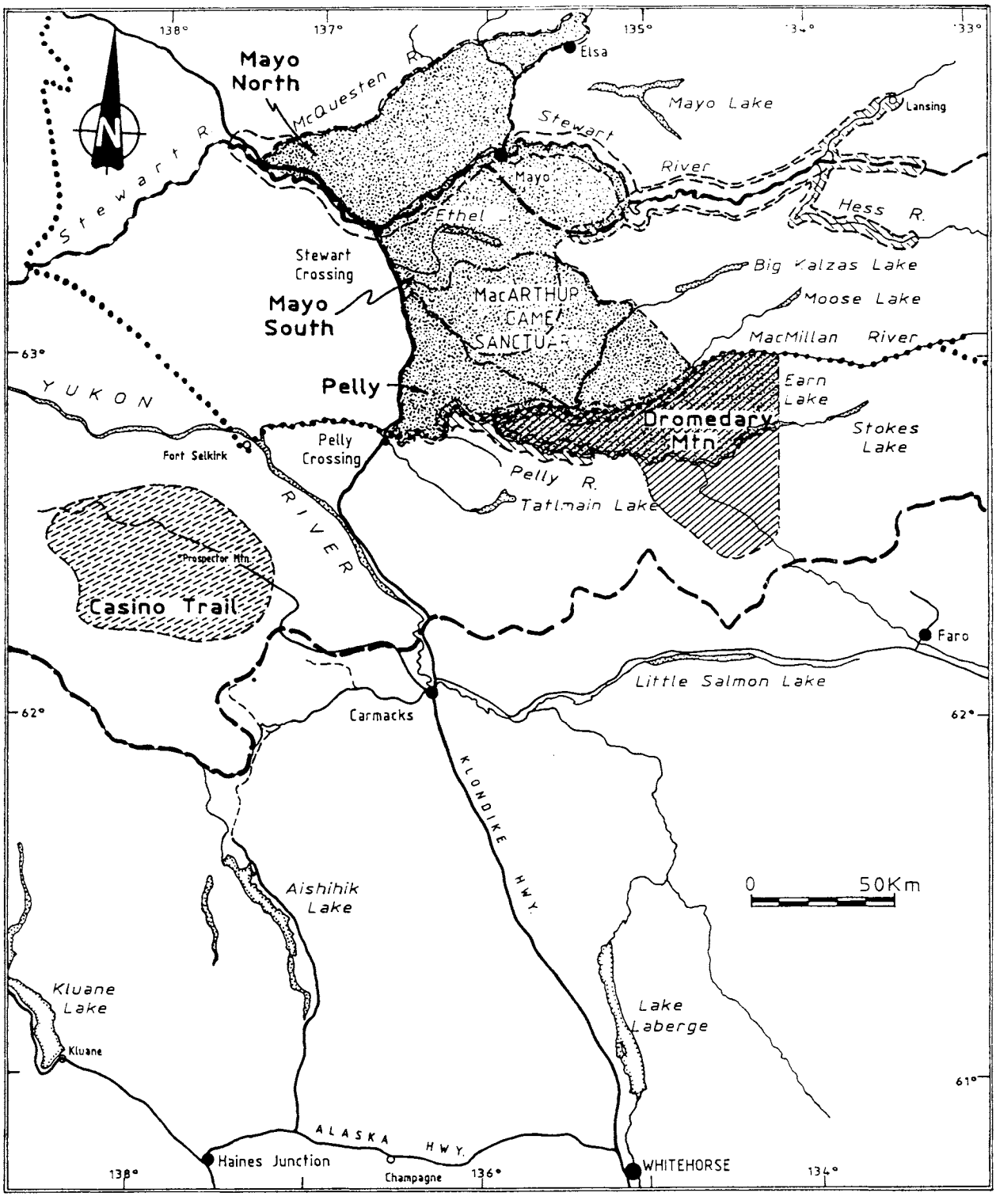


Figure 8. Woodland caribou surveys in the Mayo and Selkirk Band areas.

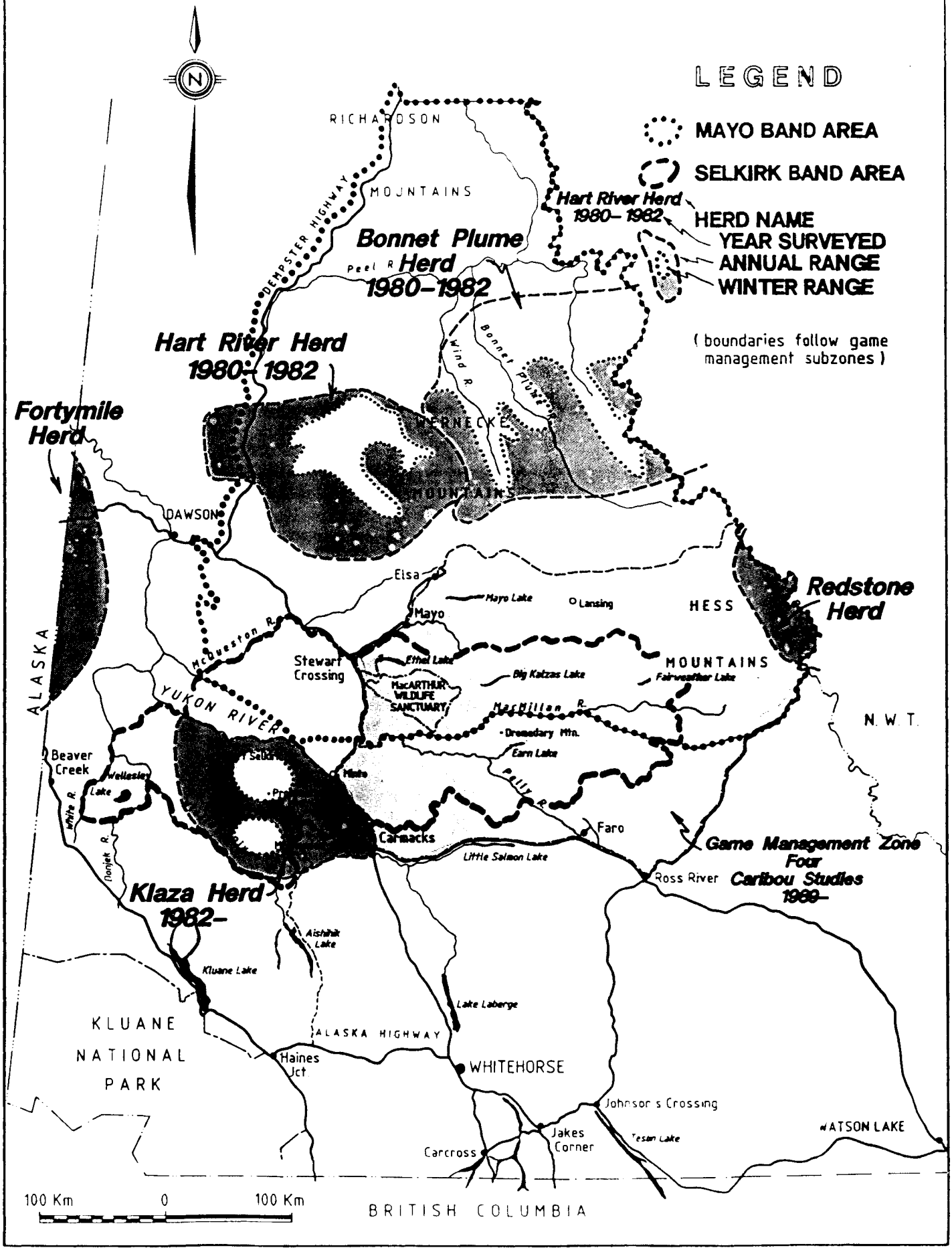


Figure 9. Yukon-wide moose harvest in 1988 by Band areas, and user group. Overlap amongst Band Areas were arbitrarily eliminated (Appendix 1).

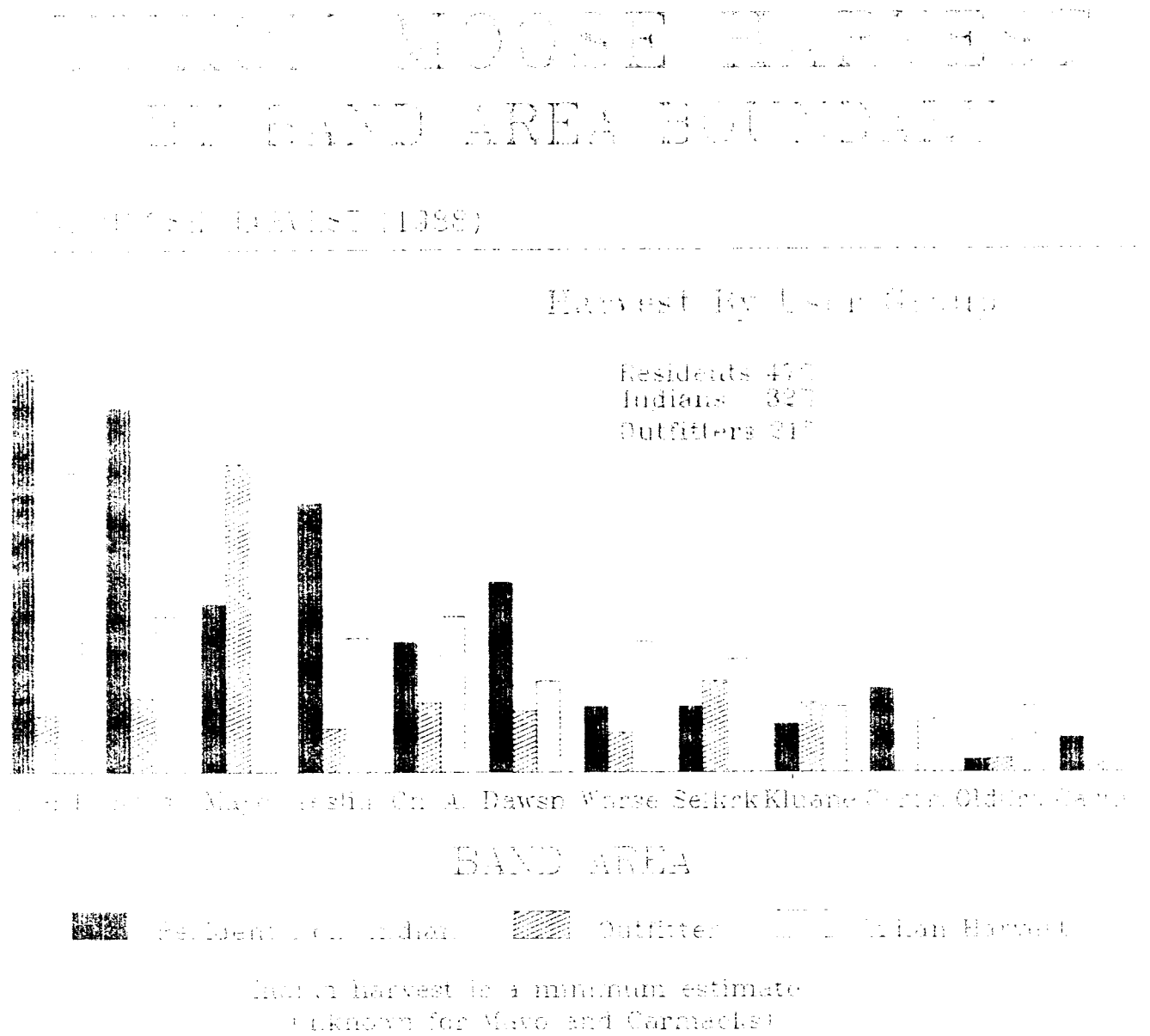


Figure 10. Location of Yukon outfitting areas in relation to the Mayo and Selkirk Band areas.

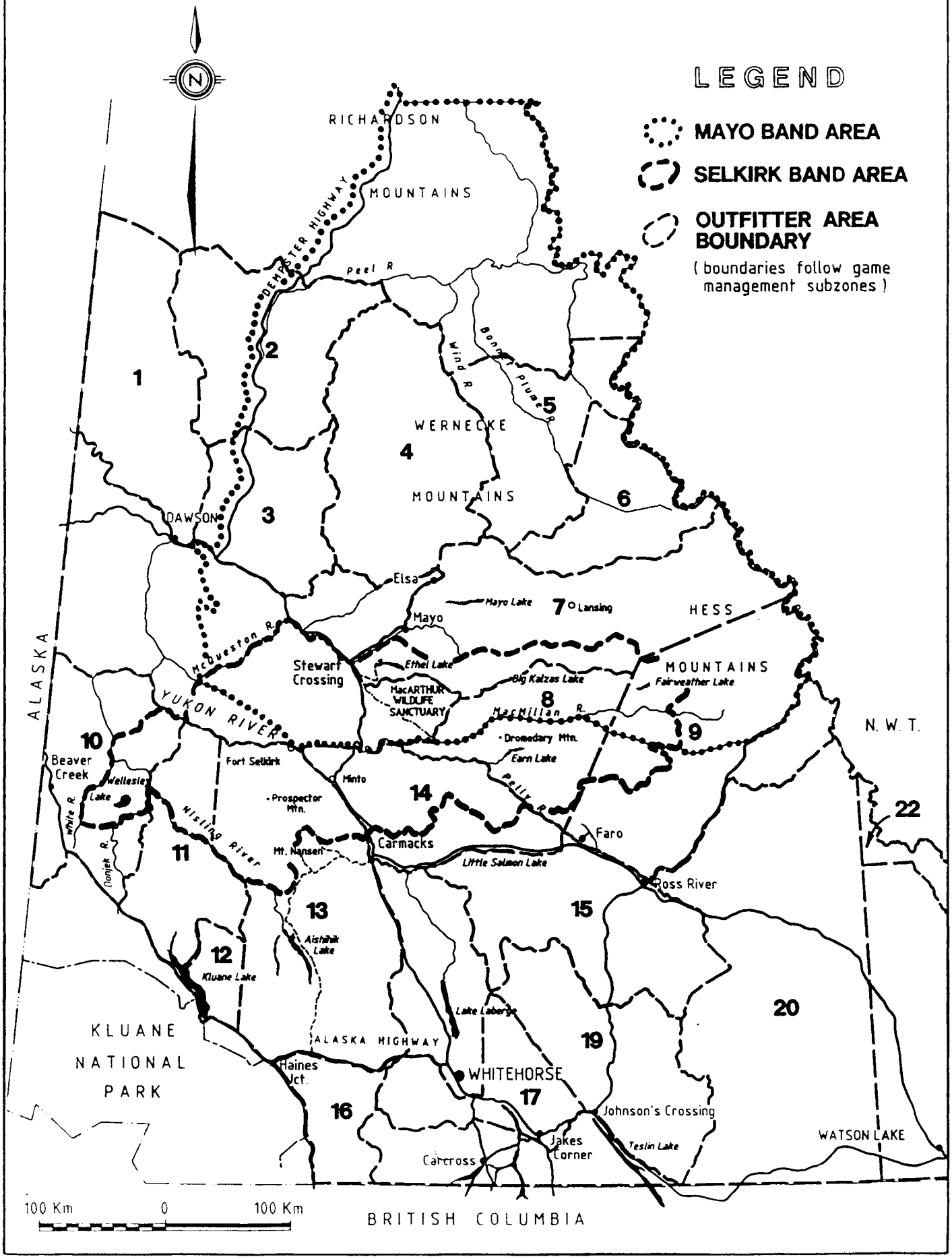


Figure 11. Moose harvest trends in the Mayo Band area, 1979-1988.

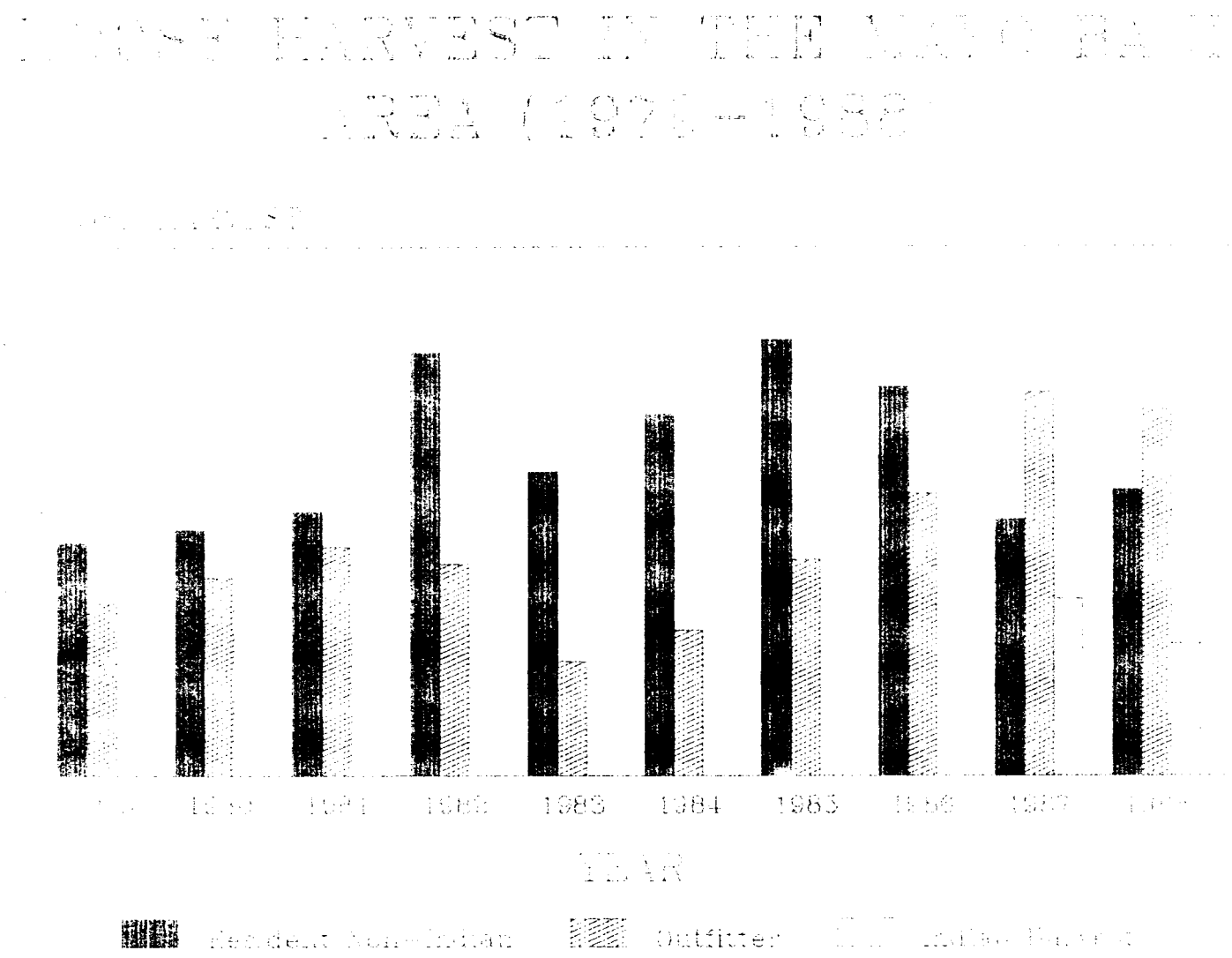


Figure 14 . Yukon-wide Woodland Caribou harvest in 1988, by Band area and user group. Overlap amongst Band areas were arbitrarily eliminated (Appendix 1).

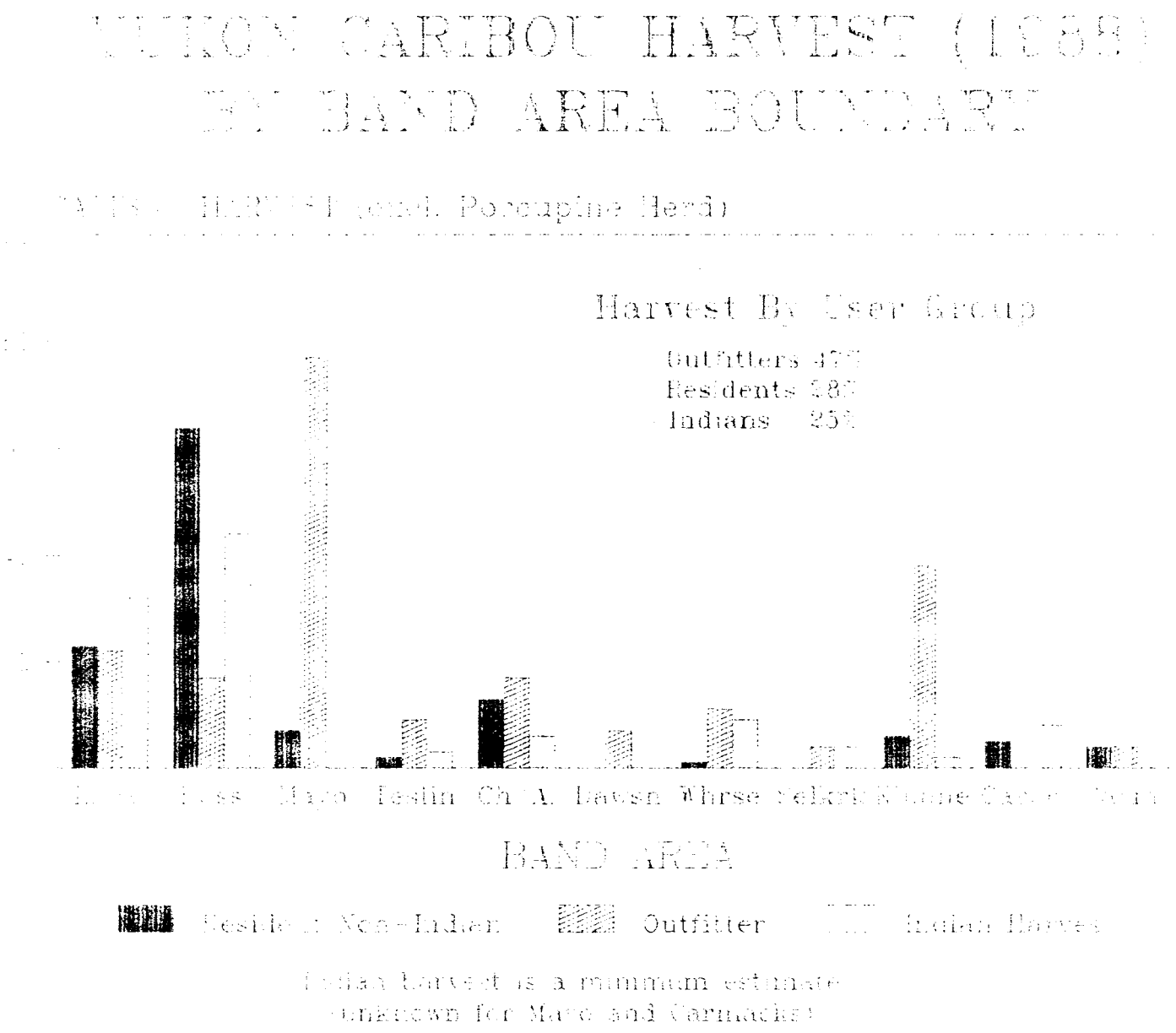


Figure 15. Woodland Caribou harvest trends in the Mayo Band area, 1979-1988. Note that Indian harvest information was not collected prior to 1987.

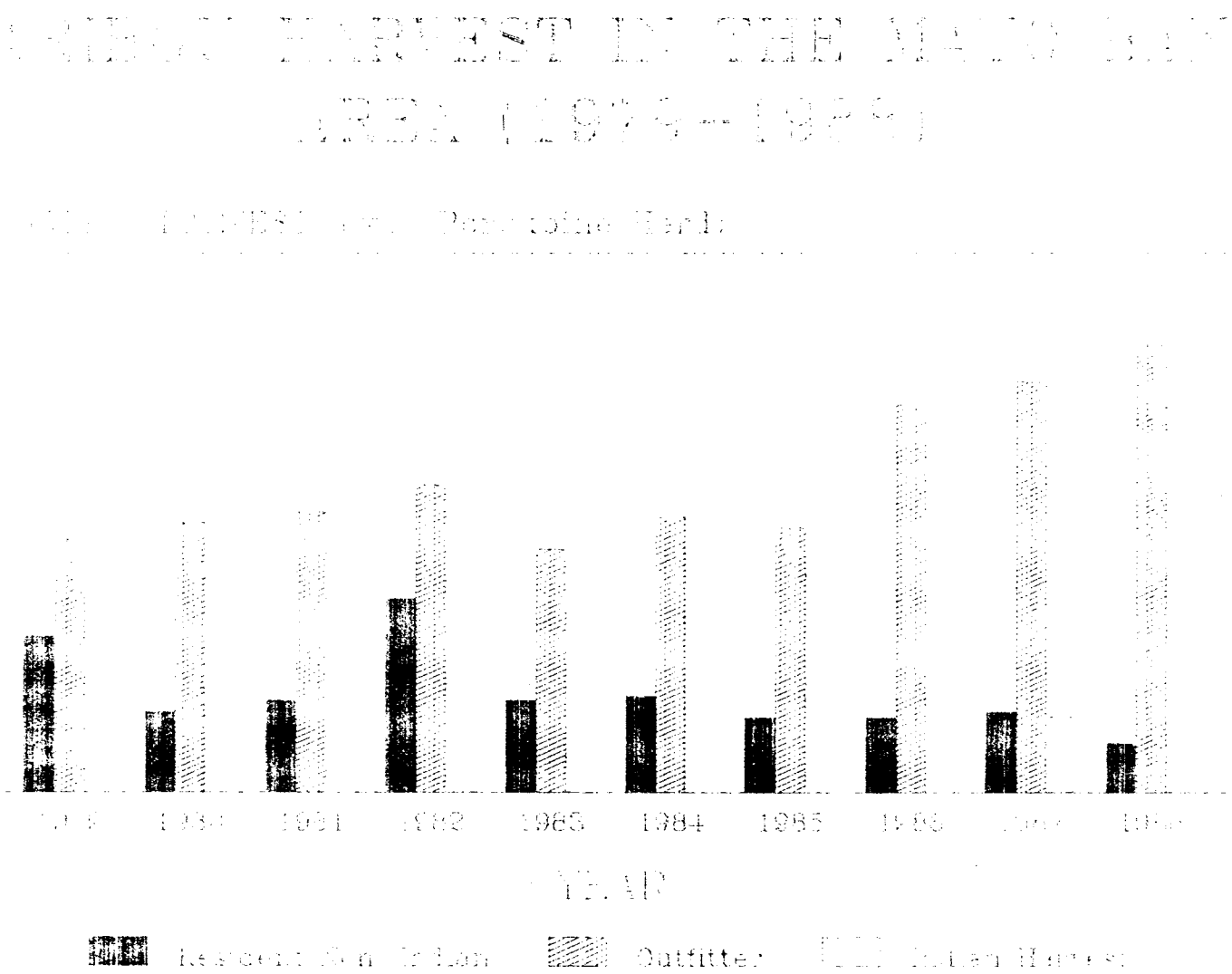


Figure 16. Woodland caribou harvest by resident non-Indians and outfitters by gms in the Mayo and Selkirk Band areas, 1979-1988.

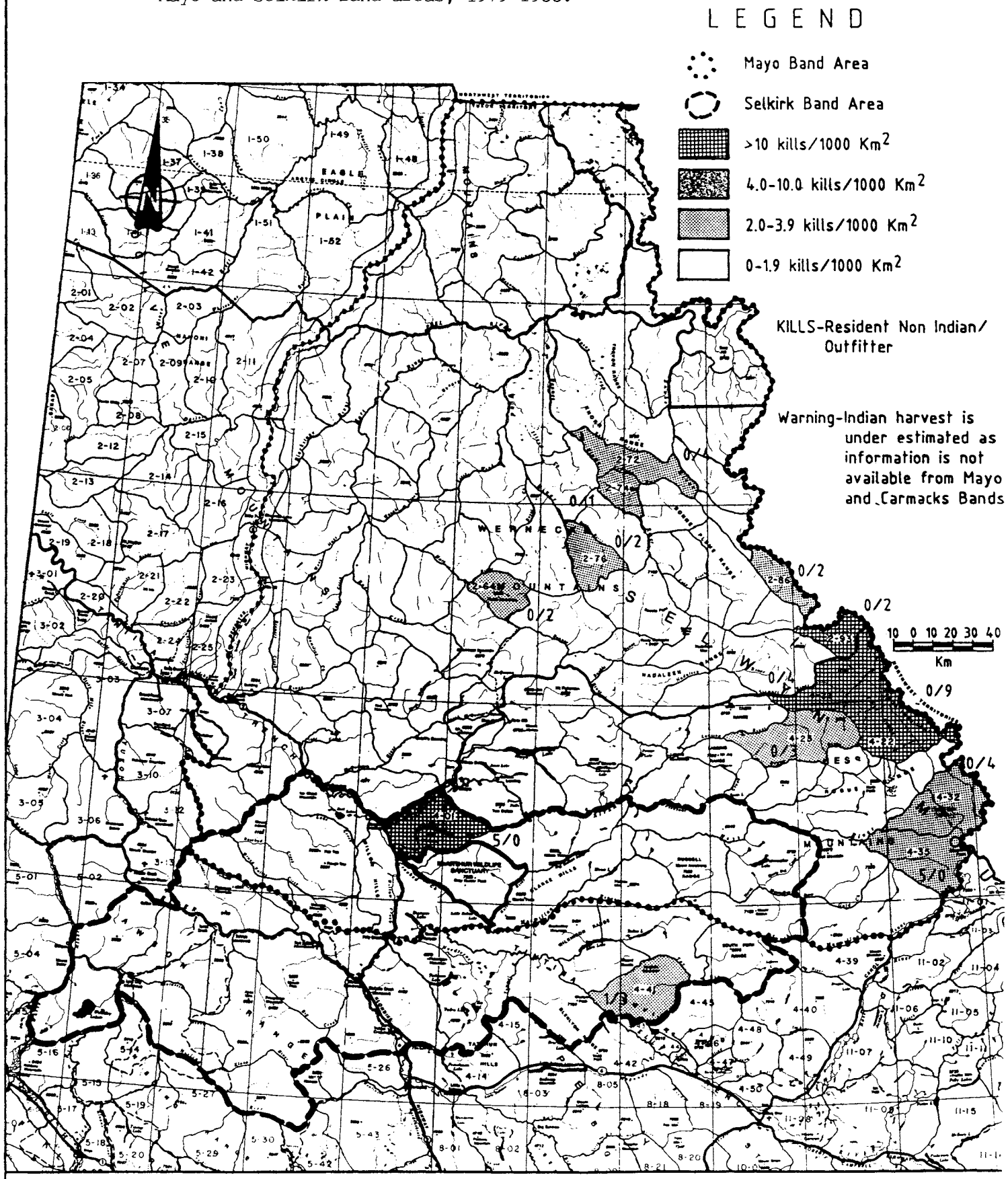


Figure 17. Woodland caribou harvest by Indians, resident non-Indians, and outfitters by gms in the Mayo and Selkirk Band areas, 1988.

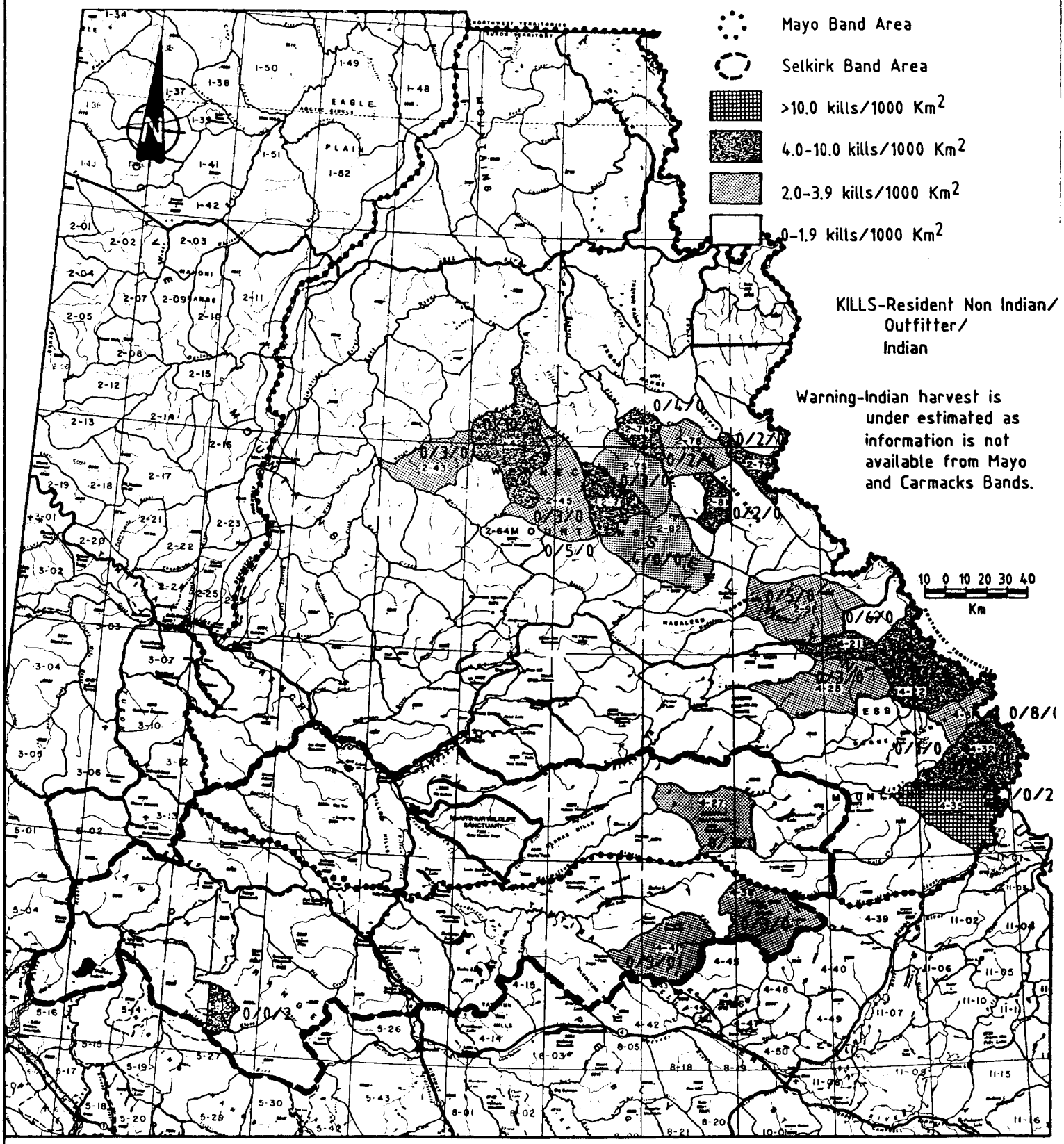


Figure 18. Moose harvest trend in the Selkirk Band area, 1979-1988.

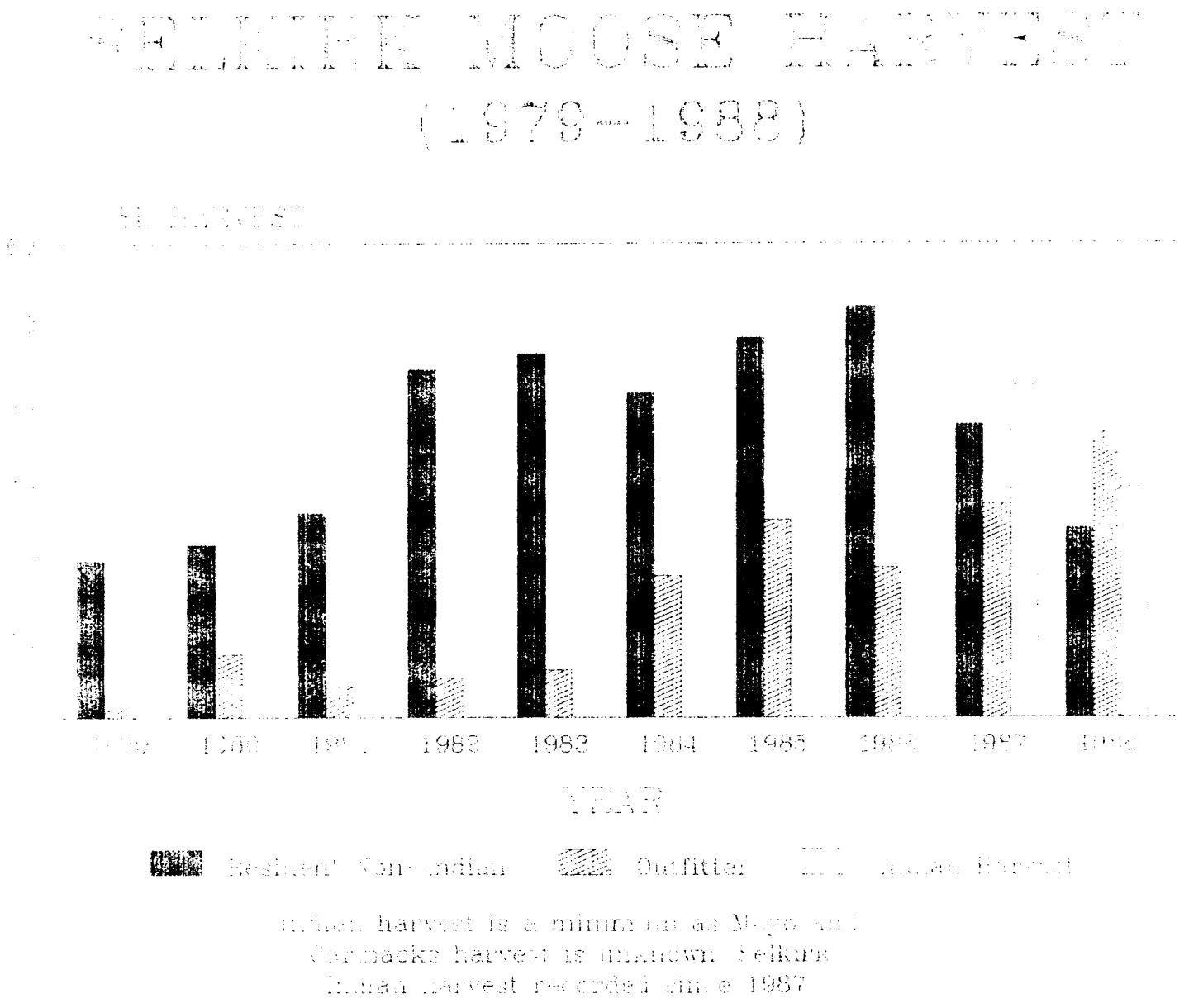


Figure 19. Moose harvest trends along the Macmillan River, 1979-1988.

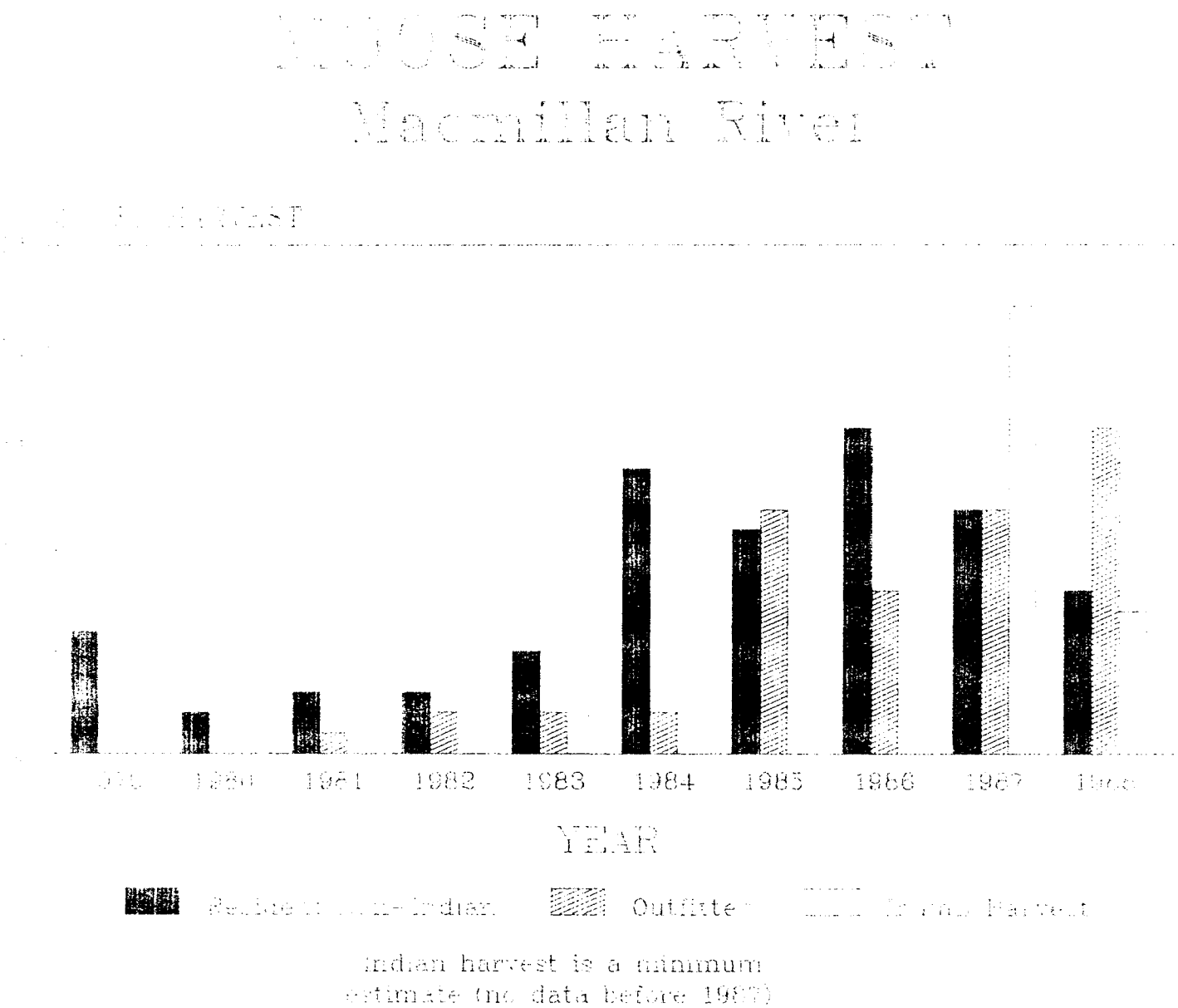
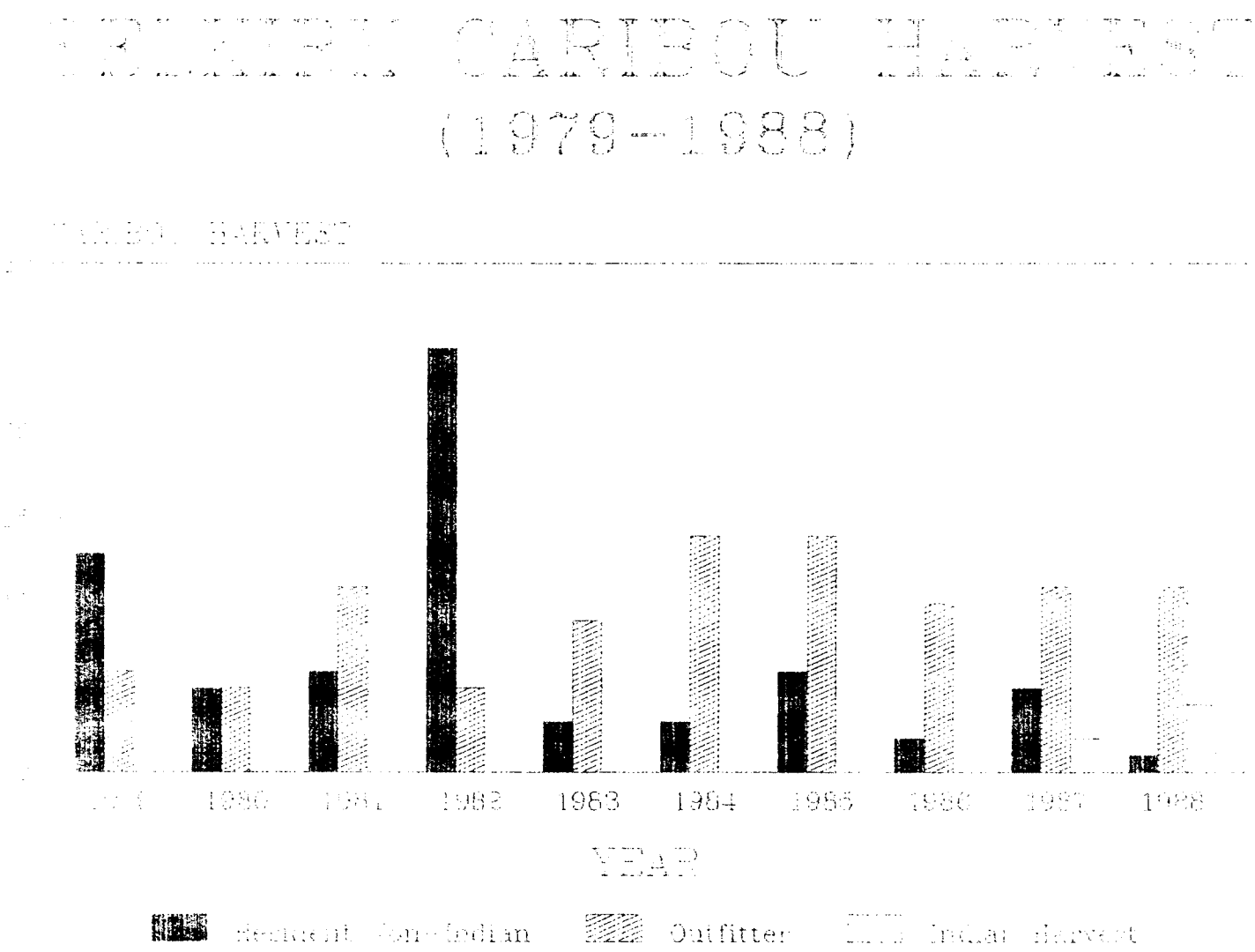


Figure 20. Woodland Caribou harvest trends in the Selkirk Band area, 1979-1988.



Indian harvest is a minimum as Mayo and Dawson harvest is unknown. Selkirk Indian harvest recorded since 1987.

able 1. Early winter moose population characteristics in surveyed areas throughout the Yukon, 1981-1989.

	Survey Areas[a]														
	Kluane	Aishihik	Whse. North	Haines Junction	Rose Lake[b]	Carcross	Teslin	Nisutlin	Liard West	Liard East	North Canol[d]	Frances Lake[d]	Dromedary	Dawson West	Dawson East
ear of most recent survey	1981	1981	1982	1984	1986	1983	1984	1986	1983	1986	1987	1987	1982	1989	1989
stimated population	434±113	377±78	533±117	329±66	717±143	171±62	1049±189	563±107	838±180	305±64	515±88	741±119	228±80	313±59	610±140
ensity (moose/1000 km^2)	120	110	170	140	274	187	417	130	116	140	190	190	64	168	238
ulls (≥30 mo.)/100 cows ≥30 mo.)	59	70	45	43	27	51	65	89	75	79	66	55	37	104	65
earlings/100 cows ≥30 mo.)	27	31	1	1	18	7	13	36	18	37	54	65	1	25	41
alves/100 cows ≥30 mo.)	17	23	6	20	31	4	39	49	18	51	64	69	15	45	78
ows/total moose (%)	50	46	66	61	57	63	46	36	47	37	36	34	65	36	36
earlings/total moose (%)	14	14	1	1	10	3	6	13	9	14	19	22	1	9	14
alves/total moose (%)	9	10	4	12	17	2	18	18	8	19	23	24	10	16	27
winning rate (%)[e]	5	15	0	0	4(28[f])	0	8	12	12	13	10	5	0	18	28
tatus[g]	stable to decline	stable to decline	decline	decline	stable to increase	decline	stable to decline	stable to increase	stable	stable to increase	increase	increase	decline	stable to increase	increase

Table 1 continued

	Survey Areas[a]			
	Casino Trail[c]	Mayo North	Mayo South	Mean
Year of most recent survey	1987	1988	1988	
Estimated population	137±81	286±72	387±77	n/a
Density (moose/1000 km^2)	40	128	148	165
Bulls (≥30 mo.)/100 cows (≥30 mo.)	n/a	50	75	62
Yearlings/100 cows (≥30 mo.)	n/a	42	11	25
Calves/100 cows (≥30 mo.)	n/a	68	56	38
Cows/total moose (%)	n/a	39	41	47
Yearlings/total moose (%)	n/a	16	4	10
Calves/total moose (%)	n/a	26	23	16
Twinning rate (%)[e]	n/a	19	10	9
Status[g]	n/a	stable to increase	stable to decrease	

able 1. continued

. References: Larsen (1982), Johnston and McLeod (1983b), Johnston and McEwen (1984), Markel and Larsen (1983, 1988), Jingfors and Markel. (1987), Jingfors (1988), and Larsen et al. (1988, 1989, in prep.).
. This population was likely influenced by localized moderate wolf control.
. Sample sizes were too low to generate reliable ratios.
. This population was influenced by extensive wolf control.
. Cows with twins/cows with calves in November.
. Twinning rate at birth.
. Status is based on the composition from a single survey, except for the areas between Haines Junction and Teslin, south of the Alaska Highway. In these areas, multiple surveys were flown, allowing us to determine trends in the population status.

Table 2. Woodland caribou population status in areas surveyed throughout the Yukon, 1980-1989.

HERD	STATUS
Hart River	stable to increasing
Bonnet Plume	stable to increasing
Klaza	stable to increasing
Burwash	unknown
Kluane	unknown
Fish Lake	stable to decreasing
Lorne Mountain	unknown
Squanga	unknown
Teslin	unknown
Wolf Lake	stable to increasing
Finlayson	increasing

Table 3. Summary of hunting regulations for moose, woodland caribou, and wolves in the Mayo and Selkirk Band areas (GMS's 2, 3, 4, and 5).

SPECIES	1979	CHANGES	1989
Moose	male - Aug. 1 - Oct. 31 except 5 miles on either side of the Stewart and Yukon Rivers from Mayo to Dawson. Oct. 1 - Oct. 15 Bag limit one moose.	1980 - corridor along Stewart and Yukon Rivers - season dates changed to Sept. 10-20 1984 - all areas went to an Aug. 1 - Oct. 31 season.	Male - Aug. 1 - Oct. 31 except 522 to 526 closed. Bag limit one moose.
	female - closed except for GMZ 5. Sept. 17-23. Bag limit one moose.	1980 - closed except parts of GMZ's 4 & 5 (Sept. 10-20 along 5 mile corridor on Yukon River between Carmacks and White River, along Stewart River between Stewart Crossing and Mayo.) 1984 - all areas closed.	female - closed.
Caribou	male - Aug. 1 - Oct. 31, bag limit one caribou.	1984 - 2 caribou of either sex taken in parts of GMZ 2 from Aug. 1 - Oct. 3 and a second male caribou between Nov. 1 - Jan. 31. 1986 - GMS 301-306 Aug. 1 - Sept. 30. GMS 307-320 closed.	male - Aug. 1 - Oct. 31 bag limit one except: parts of GMZ 2 where 2 caribou of either sex can be taken, and a second male caribou can be taken between Nov. 1 - Jan. 30; GMS 301-306 Aug. 1 - Sept. 30; GMS 307-320 closed.

Table 3. continued

SPECIES	1979	CHANGES	1989
	female - closed	1983 - Aug. 1 - Oct. 31 1986 - Aug. 1 - Oct. 31 except GMZ 3 closed. 1987 - Aug. 1 - Oct. 31 except GMZ's 3, 4, and 5 closed.	female - closed, except parts of GMZ 2 which is open to either sex with a bag limit of 2 which may be taken from Nov. 1 - Jan. 31.
Wolves	Aug. 1 - Mar. 31 no bag limit	1982 - Aug. 1 - June 15	Aug. 1 - June 15 no bag limit.

Appendix 1. Game Management Subzones (GMS) used to define Band areas* for figures 9 and 14.

Band	GMS
Carcross	722-723, 728-736, 902-909
Carmacks	414-415, 524, 526, 543-544, 801-803, 805-806
Champagne/ Aishihik	530, 533, 535, 537-542, 545-549, 610-613, 701-714
Dawson	204-229, 251-252, 301-313, 501-503
Kluane	504-508, 514-521, 527-529, 531-532, 534, 536
Kwanlin Dun	550, 715-721, 724-727, 804, 807-808, 811-816
Liard	1008-1009, 1015-1020, 1028-1032, 1116-1117, 1119-1146
Mayo/McPherson	153-170, 230-250, 253-293, 401, 404-409, 420-426, 428-434
Old Crow	112-152, 201-203
Ross River	435-450, 809, 818-821, 1001-1002, 1005-1007, 1011-1012, 1101-1115, 1118
Selkirk	314-316, 318-320, 402, 410-413, 416-419, 427, 509-513, 522-523, 525
Teslin	810, 817, 822-827, 910-911, 1003-1004, 1010, 1013-1014, 1021-1026

* These areas do not necessarily correspond to traditional lands claimed by individual bands. Overlaps among bands were arbitrarily divided by the Department of Renewable Resources solely for the purpose of some analyses in this status paper.

Selkirk Band areas, 1979-1988.

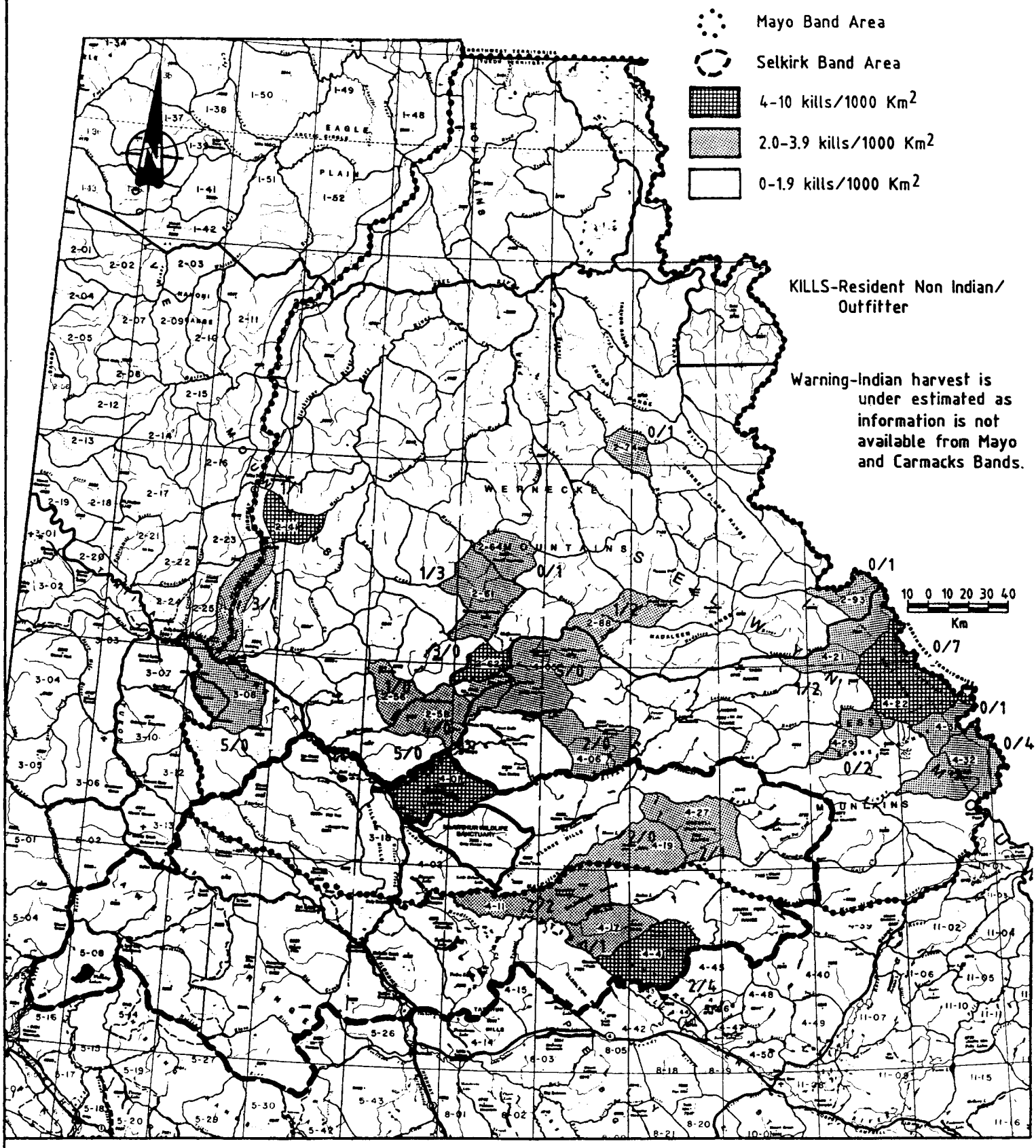


Figure 13. Moose harvest by Indians, resident non-Indians, and outfitters by gms in the Mayo and Selkirk Band areas, 1988.