1996 MOOSE SURVEY SUMMARY: NORTH CANOL, FRANCES LAKE, AND WOLVERINE LAKE

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1996 NORTH CANOL MOOSE SURVEY SUMMARY

We surveyed approximately 2954 square kilometers of habitable moose range along the North Canol Road using our standard stratified random block technique between November 2 and 10, 1996 (Figure 1). A wolf control program was carried out in this area between 1983 and 1990. Moose numbers increased dramatically throughout the area during the 1980's and early 1990's (Figure 2). This survey was part of the Yukon Governments ongoing monitoring of wolf and ungulate populations in the area to determine the long term effects of the wolf control program. The area has been previously surveyed in 1987 and 1991.

Based on the 1996 survey data, there are an estimated 818 (±19%)[1] moose in the North Canol Survey area. Although this is less than the 1991 estimate of 988 (±18%)[1] the change is not statistically significant. The 1996 estimate translates to a density of 277 moose per 1000 square kilometers. This density is high by Yukon standards. The average moose density observed in 22 areas surveyed throughout the Yukon to date is approximately 185 moose per 1000 square kilometers. The Yukon wide average density is estimated to be about 140 moose per 1000 square kilometers.

Recruitment into the moose population (calves and yearlings/100 mature cows), has shown a consistent downward trend since the first survey in 1987 (Figure 2). The proportion of calves in the population in 1987, when wolf numbers had been reduced, was 64 calves per 100 cows. In 1991, the year after the wolf control program ended, the ratio had declined to 52 calves per 100 cows. A ratio of 28 calves per 100 cows was recorded during the 1996 survey. About 30 calves per 100 cows are generally considered necessary to maintain a stable moose population.

The yearling recruitment rate (yearlings/100 mature cows) has also declined since the first survey in 1987. In 1987, there were 50 yearlings for every 100 cows in the population. By 1991 the ratio had dropped to 38 yearlings for every 100 cows. In 1996 there were 41 yearlings for every 100 cows. It is interesting to note that exceptionally high calf survival rates were recorded in a number of areas throughout the Yukon in 1995. Last year's high calf survival has, in turn, lead to high yearling recruitment in these populations in 1996. Ratios in excess of 30 yearlings for every 100 cows are usually sufficient to produce growth in moose populations.

The mature bull:mature cow ratio has continued to increase since the area was first surveyed in 1987 (Figure 2). In 1987 there were 66 bulls for every 100 cows. By 1991 this had increased to 90 bulls for every 100 cows. In 1996 there were 102 mature bulls for every 100 mature cows in the area. The current ratio is unusually high. Bulls have comprised a larger proportion of the population than cows during only 2 of 42 surveys carried out to date throughout the Yukon. The

[1] 90% confidence interval in parentheses

average ratio, in harvested moose populations surveyed elsewhere in the Yukon, is about 68 mature bulls per 100 mature cows. Ratios as low as 27 bulls per 100 cows have been seen in heavily harvested moose populations elsewhere in Yukon. A ratio of 30 mature bulls per 100 mature cows is generally considered sufficient to ensure that all cows are bred during the rut.

Based on the above population estimate and composition data, the North Canol area moose population has likely stopped increasing and is now stable or declining slowly.

It is unlikely that harvest is responsible for the end of the period of rapid growth in the North Canol moose population. Harvest, both along the North Canol road and over the wider area, appears to have remained within sustainable limits throughout the last decade. The estimated sustainable harvest for the wider area of game management subzones (GMSs) that were partially or completely surveyed is between 70 and 90 moose per year. The average annual harvest reported in this area between 1991 and 1994 was 25 moose, well below the sustainable limit.

The harvest immediately adjacent to the North Canol Road also appears to have been within sustainable limits. The sustainable harvest for the survey area, which generally follows a band approximately 10 to 30 kilometers on each side of the North Canol Road, is estimated to be approximately 25 to 33 moose per year. Based on harvest data collected at the North Canol check station between 1991 and 1996, about 22 moose are harvested each year along the road and within the survey area, again within sustainable limits. A final indication that harvest has not been excessive in the area is the fact that the bull:cow ratio has continued to increase since the late 1980's.

A more likely cause of the end of moose population growth in the area is increasing wolf predation. During the period of the Finlayson wolf control program (1983 to 1990), wolf numbers in the survey area were reduced by 50% to 85% (from 9 to 3 wolves/1000 Km^2). During this period moose abundance grew by approximately 17% per year (83% between 1987 and 1991). Since the end of the wolf control program in 1990 wolf abundance has rebounded to approximately 10 wolves per 1000 Km^2. Concurrent with the recent increases in wolf numbers, recruitment and moose population growth rates have declined.

Continued monitoring will be required to assess the long-term trends in wolf and ungulate populations in this area. Additional regulations to ensure that the harvest continues to be within sustainable limits may also be appropriate.

1996 Frances Lake Moose Survey Summary

We surveyed approximately 3918 square kilometers of habitable moose range in the Finlayson - Frances Lake area using our standard stratified random block technique between November 9 and 19, 1996 (Figure 1). A wolf control program was carried out in this area between 1983 and 1990. Moose numbers increased dramatically throughout the area during the 1980's and early 1990's (Figure 3). This survey is part of the Yukon Governments ongoing monitoring of wolf and ungulate populations in the area to determine the long term effects of the wolf control program. The area has been previously surveyed in 1987 and 1991.

Based on the 1996 survey data, there are an estimated 1323 ($\pm$15%)[2] moose in the Frances Lake Survey area. Although this is somewhat lower than the 1991 estimate of 1454 ($\pm$21%)[2] the change is not statistically significant. The 1996 estimate translates to a density of 338 moose per 1000 square kilometers. This density is high by Yukon standards. The average moose density observed in 22 areas surveyed throughout the Yukon to date is approximately 185 moose per 1000 square kilometers. The Yukon wide average density is estimated to be about 140 moose per 1000 square kilometers.

Recruitment into the Frances Lake survey area moose population (calves and yearlings/100 mature cows), has shown a consistent downward trend since the first survey in 1987 (Figure 3). In 1987, when wolf numbers had been reduced, there were 69 calves for every 100 cows in the area. In 1991, the year after the wolf control program ended, the ratio declined to 44 calves for every 100 cows. By 1996 the ratio had dropped further to 30 calves for every 100 cows. A ratio of 30 calves for every 100 cows is generally considered sufficient to maintain a stable moose population.

The yearling recruitment rate (yearlings/100 mature cows) has also declined since the mid-1980's. In 1987, there were 65 yearlings for every 100 cows in the population. In 1991 the ratio dropped to 42 yearlings for every 100 cows. Only 18 yearlings for every 100 cows were seen during the 1996 survey. It is interesting to note that this is substantially lower than the yearling:cow ratio observed in the North Canol area during the 1996 survey. The reason for this difference in recruitment rate is not immediately obvious and further analysis will be required to evaluate possible explanations. Ratios of between 25 and 30 yearlings per 100 cows are usually required to maintain stable moose populations.

There were 46 mature bulls for every 100 mature cows in the Frances Lake area during the 1996 survey. This is slightly lower than the ratios observed in 1987 and 1991 (56 and 57 bulls/100 cows respectively; Figure 3). It is also much lower than the 102 bulls for every 100 cows observed in the North Canol area. It is also

[2] 90% confidence interval in parentheses

lower than the average observed during other surveys throughout the Yukon. The average ratio in harvested moose populations surveyed to date elsewhere in Yukon is about 68 mature bulls per 100 mature cows. No explanation for the relatively low bull:cow ratio in the Frances Lake area is immediately apparent. As discussed below, harvest rates within the Frances Lake survey area has remained well within sustainable limits. In any event, the bull:cow ratio in the Frances Lake area is not low enough to create an immediate management concern. A ratio of 30 mature bulls per 100 mature cows is generally considered sufficient to ensure that all cows are bred during the rut.

Based on the above population estimate and composition data, the Frances Lake area moose population has likely stopped increasing and is now stable or declining slowly.

It is unlikely that harvest is responsible for the low bull:cow ratio and the decline in recruitment and population growth rates in the Frances Lake moose population. Harvest has remained within sustainable limits throughout the last decade. The estimated sustainable harvest for the area of game management subzones (GMSs) that were completely or partially surveyed is between 55 and 72 moose per year. The average annual harvest reported in this area between 1991 and 1994 was 29 moose, well below the sustainable limit.

A more likely cause of the decline in recruitment and population growth rates in the area is increasing wolf predation. During the period of the Finlayson wolf control program (1983 to 1990), wolf numbers in the survey area were reduced by 50% to 85% (from 9 to 3 wolves/1000 Km^2). During this period recruitment rates were high (Figure 3) and moose abundance grew by approximately 18% per year (90% between 1987 and 1991). Since the end of the wolf control program in 1990, wolf abundance has rebounded to approximately 10 wolves per 1000 Km^2. Concurrent with the recent increases in wolf numbers, moose recruitment and population growth rates have declined.

Continued monitoring will be required to assess the long term trends in wolf and ungulate populations in this area. Additional regulations to ensure that the harvest continues to be within sustainable limits may also be appropriate.

1996 Wolverine Lake Extended Stratification Survey Summary

We used only the stratification portion of our regular stratified random block technique to survey approximately 2738 square kilometers in the Wolverine-Fire Lakes area (Figure 1). While this technique does not provide a precise estimate of moose abundance it does allow us to assess relative moose abundance and distribution.

A total of 1438 minutes of fixed-wing aircraft time was used to survey the Wolverine-Fire Lakes survey area, for a search intensity of approximately 0.53 minutes per square kilometer. This is similar to the 0.50 minutes per square kilometer used to stratify the Frances Lake survey area to the north and west. Between 0.40 to 0.50 minutes per square kilometer is the normal range of search intensities used on stratification flights.

A total of 320 moose were seen in the Wolverine-Fire Lakes survey area. This translates to an observation rate of 0.22 moose per minute and an observed density of 117 moose per 1000 square kilometers. In contrast, the observation rate in the Frances Lake area was 0.42 moose per minute and the observed density, based on stratification data, was 208 moose per 1000 square kilometers. It is therefore likely that moose abundance in the Wolverine-Fire Lakes area is somewhat lower than that in the Frances Lake area. The actual density in the Frances Lake area, based on our census data, is approximately 338 moose per 1000 square kilometers.

Significant post-rut aggregations of moose were observed in a number of subalpine areas during the Wolverine-Fire Lakes survey. These included: areas north, east and south of Wolverine Lake; along Money Creek; in the headwaters of the Tuchitua River; west of Fire Lake; and north, east and west of North Lakes.

Although analysis of past survey data has shown that recruitment data from stratification surveys is generally unreliable, individuals were classified as either adults or calves whenever possible during all stratification flights. Eighty-seven percent of animals observed during the Wolverine-Fire Lakes area survey were classified as either adults or calves. Of these 17% were calves. In contrast, 83% of moose observed during the Frances Lake area stratification were classified. Of these 21% were calves. Based on these data, recruitment into the Wolverine-Fire Lakes area was likely similar to, or slightly lower than that in the Frances Lake area. In general, 20% to 25% calves is sufficient to ensure a stable to increasing moose population.

In Summary:

- Moose surveys were done in the North Canol and Frances Lake areas in 1987, 1991 and 1996
- Wolf numbers were reduced by 50% to 85% between 1983 and 1990
- Moose abundance increased by 85% to 93% between 1987 and 1991
- Wolf numbers rebounded to pre-wolf control numbers by 1995
- Moose recruitment rates have declined since the end of wolf control
- Moose populations stopped growing by 1996
- 1996 moose abundance is similar to 1991 levels
- Harvest has remained within sustainable limits throughout both areas
- Bull:cow ratio is unusually high (102 bulls/100 cows) in North Canol area
- The bull:cow ratio in the Frances Lake area is substantially lower (46 bulls:100 cows)
- Moose populations in both areas are now stable or declining slowly
- A less thorough survey of the Wolverine-Fire Lake area was also conducted in November, 1996
- Moose abundance in the Wolverine-Fire Lakes area is probably lower than in the Frances Lake area to the north and west
- Calf recruitment in the Wolverine-Fire Lakes area was similar to or lower than the Frances Lake area
- Several post-rut concentration areas were noted in the Wolverine-Fire Lakes survey area

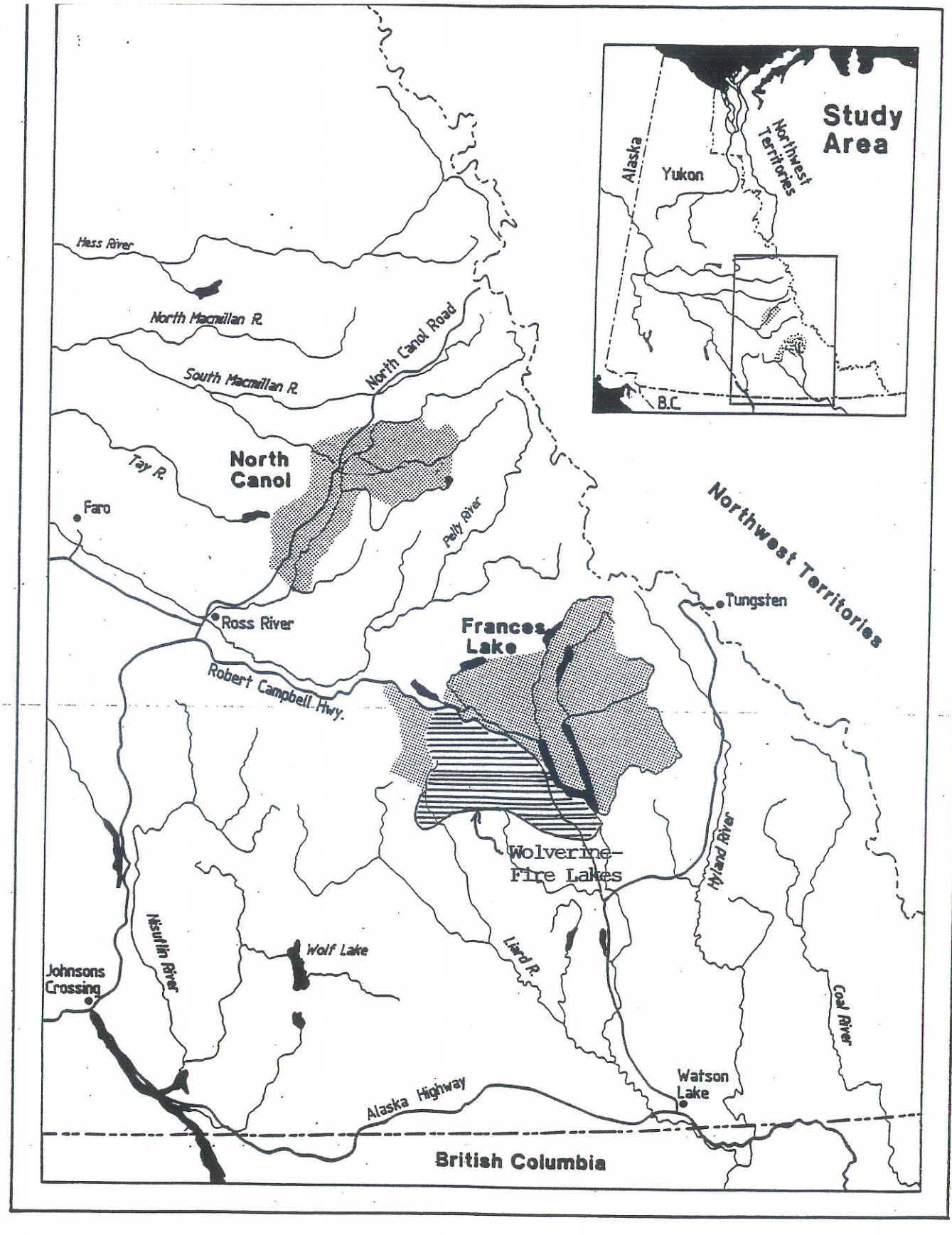

Figure 1. 1996 North Canol and Frances Lake moose survey areas.

Figure 2. Summary of North Canol Moose Survey Data

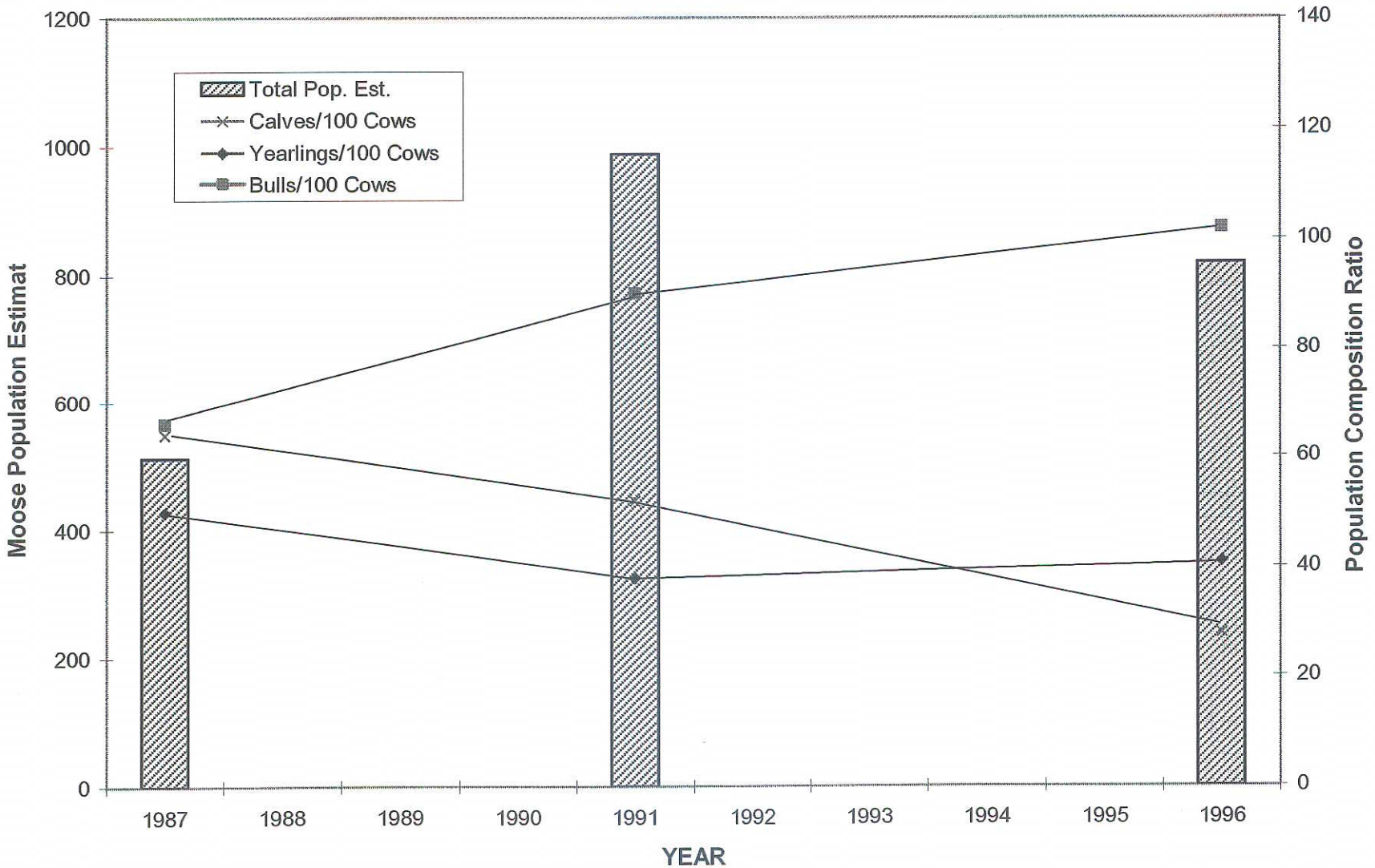

Figure 3. Summary of Frances Lake Moose Survey Data