EXTENSION REPORT

YUKON MOOSE INVENTORY RESULTS

A Summary of 1980 to 1989 Surveys
July, 1990

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Renewable Resources

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Introduction

To properly manage wildlife populations, good information on abundance (numbers) and composition (age/sex ratios) is important. Two types of aerial surveys are used to collect this type of information on moose populations in Yukon; intensive surveys and trend surveys.

Intensive surveys began in priority areas, around the communities (generally those experiencing the most intense hunting pressure) in 1980. They provide very detailed and reliable information but are time consuming and expensive. Each priority area is intensively surveyed about once every 5-7 years.

Trend surveys were established within some of the larger intensive survey blocks in 1988. They do not provide the same high quality information as intensive surveys, but are much cheaper and less time consuming. They are conducted annually with the intent of gathering general information on regional moose population trends.

This report describes when, how, and why surveys are done in particular areas. It also briefly summarizes survey results from 1980 to 1989.

1. When are surveys done?

Both intensive and trend surveys are done in early winter (November) when the animals tend to aggregate in mixed groups in open areas. New snow and the lack of leaves on trees and shrubs makes it much easier to spot moose from the air. The bull moose still have their antlers in November which helps us distinguish between sexes. Surveys in late winter or spring are

not nearly as effective as moose move into areas of heavier cover where they are more difficult to see and, since most bulls have lost their antlers, composition counts become less reliable.

2. How are surveys done?

Intensive survey areas, usually between 2,000 - 4,000 square kilometers are divided into smaller blocks (or sample units) ranging in size from 15-35 km^2. A crew of four (pilot, navigator, and two observers) in a small airplane (Cessna 185 or similar) will first fly quickly through the entire area and record observations of moose or moose tracks. This information is then used to stratify (divide) the whole survey area into blocks of low, medium, or high moose density to reduce the variability of the final estimate. Immediately after this stratification, the survey crew will use a helicopter to intensively search for moose in a number of randomly selected blocks. Most of the high and medium density blocks are covered; these usually represent between 15-20% of the entire survey area and 75-85% of the animals sighted. A sample of low density blocks is also searched intensively. From the information, we can estimate the total number of moose in the survey area as well as the composition of the population, i.e. the proportion of adult bulls, cows, yearlings, and calves present. If our estimate is based on a representative sample of the total population, we do not need to find and count every individual to get an idea of how many animals are in a particular area. Besides, it would be much too expensive.

Trend survey areas are established by selecting a representative block of sample units used in the intensive surveys which encompasses about 250 to 350 km^2. This entire area is intensively searched for moose using a Piper

Supercub (PA 18), Maule (M-7) or similar aircraft with a single observer.

Although this technique may not provide managers with an accurate estimate of the total number of moose over a large area, the changes in population density in a trend area is a reflection of the status in a much larger geographical area. If the trend survey is repeated over several years using the same technique, managers can determine if the population is stable, increasing, or declining.

3. How reliable are the surveys?

The intensive survey technique has been used successfully in many northern areas, including Alaska, Yukon, and NWT. While moose can often be difficult to spot, particularly in heavily timbered areas, the use of a helicopter in early winter to survey small areas very intensively makes our counts more reliable. This reliability is expressed using confidence limits (90%) around the estimate. For instance, we may conclude there were 500 $\pm$ 100 moose in an area which is the same as saying we are confident, 90% of the time, there were between 400-600 moose in the area and that our best estimate is 500 moose. The quality of the surveys will also depend on the experience of the observers and their ability to spot, and classify moose from air. The survey crews now used in the Yukon have several thousand hours of flying experience between them. Whenever possible, we also try to include local residents in the survey crew.

We are presently developing the trend survey technique here in the Yukon, and their accuracy is still being assessed. Several more years of

comparison will be necessary to provide a good assessment of the accuracy of trend surveys.

4. What do surveys mean?

Survey data provides a regional perspective of moose distribution which is helpful when trying to predict land use impacts and the overall importance of localized hunting. Information from the moose surveys is used to calculate a harvestable surplus that we can later match the hunter harvest to. While this is the ultimate management objective, several things can be said about a population just by looking at composition (age/sex) data. For example, a large proportion of calves and yearlings in the population suggests good survival and recruitment and possibly an increasing population. In areas that are hunted heavily for adult bulls, a skewed sex ratio in favour of cows may eventually affect calf production. In the Yukon, we like to maintain a ratio of at least 30 bulls/100 cows to ensure that all cows have a chance of being bred.

Repeated surveys also provides for a more accurate measure of harvestable surplus. The surplus will depend on the number of moose desired in an area. If the objective is to keep the population stable at this present level, then the "surplus" animals are simply the extra animals present after recruitment has balanced adult mortality, i.e. after surviving calves have replaced those adults dying. If the objective is to increase the population from its present level, the harvestable surplus would be reduced or eliminated until the desired population level was reached.

An example of how this works is seen in Game Management Zones 7 and 9 (south of the Alaska Highway). Repeated surveys between 1981-86 documented changes in population size and associated calf/cow ratios. These populations had either declined (Haines Junction and Carcross) or remained stable (Whitehorse South and Teslin Burn) with ratios of between 7 and 39 calves per 100 cows in early winter. Approximately 50 calves/100 cows would be required for these populations to increase. In the Haines Junction area, there was little or no harvestable surplus and harvest management was modified through the use of a permit hunt system to reduce the harvest.

5. What areas have been surveyed and what have we learned?

In 1980, a list of seven priority zones was established around the communities of Whitehorse, Haines Junction, Teslin, Watson Lake, Ross River, Mayo, and Dawson City. The survey areas are selected based on hunting pressure documented from harvest questionnaires. In the Yukon, most of the moose hunting pressure is concentrated in areas of easy access near settlements and along roads and rivers which make up only a small portion of the Territory. For instance, about one third of the resident hunters road hunt for moose. This localized hunting in addition to other natural causes of mortality can severely limit moose population growth and will undoubtedly result in poor hunter success. This seems to be the case along roads such as the South Canol which has some excellent moose habitat but very few moose.

The objective of the inventory program is to survey moose in areas that are potentially overharvested and match the harvest to sustainable yields. If

there is no harvestable surplus, local hunting restrictions become necessary and hunters would be encouraged to use other areas, that have surplus moose.

With the completion of Dawson area surveys during the fall of 1989, each priority zone has been intensively surveyed at least once. Several additional areas have also been surveyed in response to demands for information on moose in these areas. The location of areas surveyed is shown on Map 1. The plan now calls for the resurveying of the priority zones over the next 5-10 years starting in the fall of 1990.

The results of intensive surveys to date are summarized in Table 1. They have shown that local moose populations are quite variable in terms of density and population trend. Some appear to be decreasing, some increasing, and others stable, depending on a range of factors. Population densities have ranged from 40 moose/1,000 km^2 in the Carmacks/Casino Trail area to 550 moose/1,000 km^2 in the Teslin Burn. The most productive areas, and those capable of sustaining the largest annual harvest, are normally those with the highest density and highest calf/cow and yearling/cow ratios.

Equally important to gathering data on moose numbers is the collection of good harvest data, both from native and non-native users. A cooperative program to collect native harvest data on key game species is underway that involves local field-workers interviewing active hunters in the communities. The harvest by resident non-natives is reported through annual questionnaires sent out through the mail to all licensed hunters. The non-resident harvest is reported through outfitter declarations.

The final task in moose management is to encourage the public to distribute their hunting pressure to coincide with the areas most able to sustain the harvest. In the Yukon, this is done whenever possible through public education. Only in extreme cases, such as in Game Management Zone 7, are restrictions such as permit hunts imposed.

6. Cost/Benefit

The cost of a complete moose survey over a 1,500 km^2 area (e.g. Whitehorse South) is approximately $30,000 with about 80% of the cost attributed to aircraft charters. While the use of helicopters increases the cost, their use also increases the reliability and quality of the survey. A good survey repeated every 4-5 years will, in conjunction with accurate harvest data, provide the wildlife manager with enough information to evaluate population condition. This information, combined with active management programs (hunting restrictions, habitat enhancement, predator control, etc.), will ensure populations are thriving and used wisely.

Survey costs represent only a fraction of the total value of the moose resource. In addition to being a priority species for subsistence use, about two thirds of all recreational hunting days for big game species can be attributed to moose. In economic terms, an annual harvest of 600-1,000 moose by residents in the Yukon represents the equivalent of one million dollars in meat value alone. The annual harvest of 150 moose by guided non-residents, combined with hunts for other big game generate $6 million annually by the Yukon outfitting industry.

Table 1. Summary of Yukon Moose Survey Results.

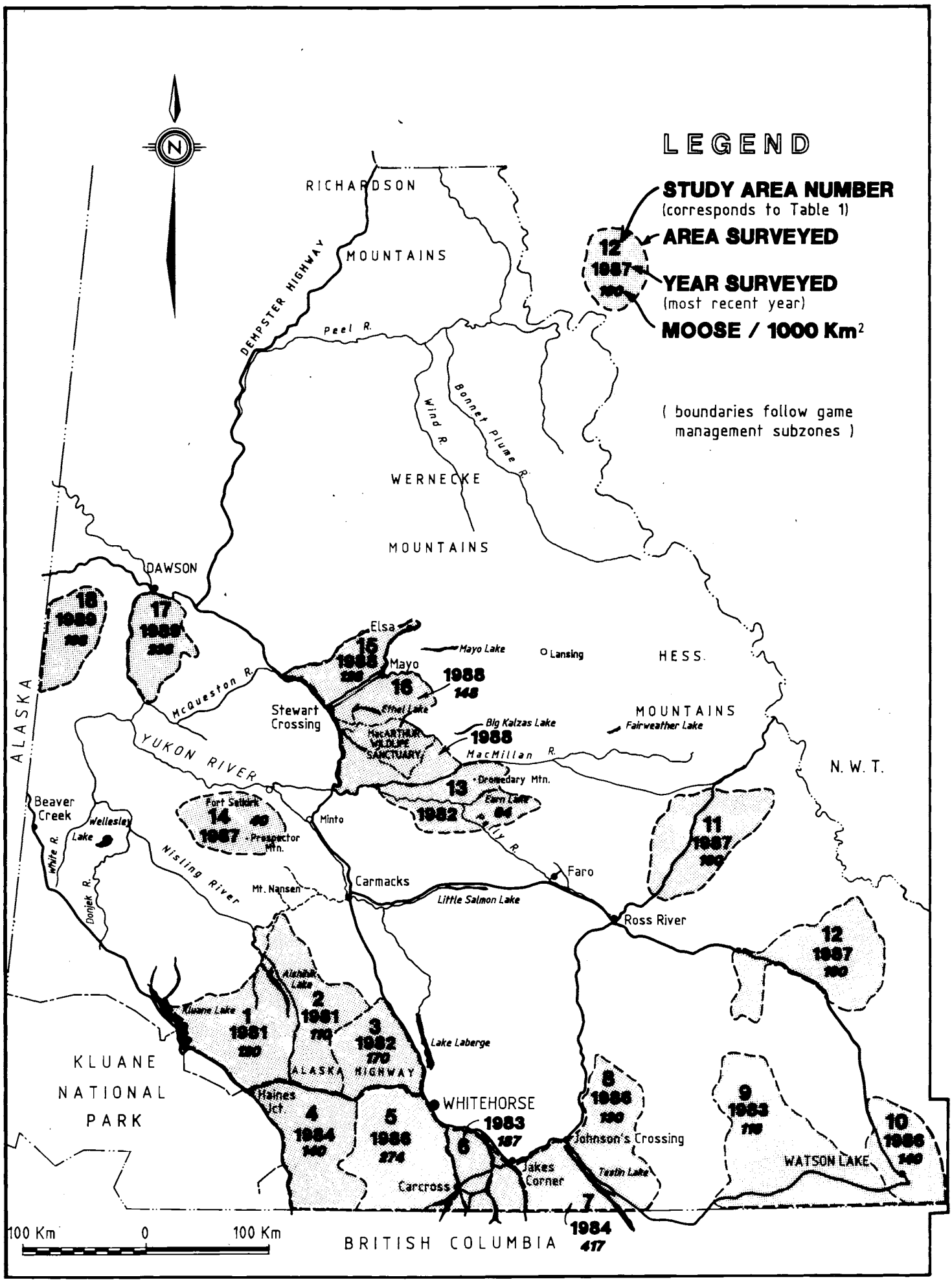
	SURVEY BLOCK	SURVEY AREA (KM^2)	YEAR	TOTAL MOOSE/ 1,000 KM^2	BULLS/ 100 COWS	YEARLINGS/ 100 COWS	CALVES/ 100 COWS	POPULATION STATUS
1	Kluane	3755	1981	120	54	27	17	stable to decline
2	Aishihik	3626	1981	110	66	31	23	stable to decline
3	Whitehorse North	3108	1982	170	45	1	6	decline
4	Haines Junction	2332	1981	244	35	23	28	decline
			1982	151	32	2	11	
			1983	145	32	1	7	
			1984	141	45	1	17	
5	Whitehorse South	2613	1981	232	37	22	18	stable to increase
			1982	223	27	6	24	
			1983	249	42	5	30	
			1986	274	27	18	31	
6	Carcross	916	1980	443	63	25	23	decline
			1983	187	52	9	4	
7	Teslin Burn	2515	1982	550	46	9	14	stable to decline
			1983	431	29	2	31	
			1984	417	66	13	39	
8	Nisutlin	4248	1986	130	89	36	49	stable to increase
9	Liard West	7236	1983	116	75	18	18	stable
10	Liard East	2227	1986	140	79	37	51	stable to increase
11	North Canol	2744	1987	190	66	54	64	increase
12	Frances Lake	3894	1987	190	55	65	69	increase

continued ...

Table 1 Continued ...

	SURVEY BLOCK	SURVEY AREA (KM^2)	YEAR	TOTAL MOOSE/ 1,000 KM^2	BULLS/ 100 COWS	YEARLINGS/ 100 COWS	CALVES/ 100 COWS	POPULATION STATUS
13	Dromedary	3700	1982	65	37	1	15	decline
14	Casino Trail	3055	1987	40	--[a]	--[a]	--[a]	?
15	Mayo North	2235	1988	128	59	42	68	stable to increase
16	Mayo South	2616	1988	148	76	11	56	stable to decline
17	Dawson East	2611	1989	238	65	41	76	increase
18	Dawson West	1870	1989	168	105	25	45	stable to increase
	Yukon Wide Average	51,601[b]	--	160	59	24	35	stable

[a]Sample size too small to accurately determine sex and age ratios.
[b]Total area surveyed = 15% of Yukon.


LEGEND
STUDY AREA NUMBER
(corresponds to Table 1)
AREA SURVEYED
YEAR SURVEYED
(most recent year)
MOOSE / 1000 Km²
(boundaries follow game management subzones)
RICHARDSON MOUNTAINS
DEMPSTER HIGHWAY
Peel R.
Wind R.
Bonnet Plume R.
WERNECKE MOUNTAINS
DAWSON
ALASKA
McQueston R.
Stewart Crossing
YUKON RIVER
Elsa
Mayo
Mayo Lake
Lansing
HESS MOUNTAINS
Fairweather Lake
Ethel Lake
MacARTHUR WILDLIFE SANCTUARY
Big Kalzas Lake
MacMillan R.
Dromedary Mtn.
Earn Lake
Hess R.
N. W. T.
Beaver Creek
White R.
Wellesley Lake
Fort Selkirk
Prospector Mtn.
Minto
Nisling River
Donjek R.
Mt. Nansen
Carmacks
Faro
Little Salmon Lake
Ross River
Kluane Lake
Aishihik Lake
Lake Laberge
KLUANE NATIONAL PARK
ALASKA HIGHWAY
Haines Jct.
WHITEHORSE
Johnson's Crossing
Jakes Corner
Tenlin Lake
Carcross
WATSON LAKE
BRITISH COLUMBIA
100 Km 0 100 Km