MOOSE MANAGEMENT IN NEWFOUNDLAND 1972 - 1977

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Abstract: Moose licences have been issued throughout insular Newfoundland on an area quota basis since 1973. Analysis of population trend indices and population density estimates indicate that moose populations in practically all 38 areas responded in the direction that management intended.

After moose were successfully introduced to Newfoundland in 1904, the basic management strategies used were (1.) a period of total protection to 1945, (2.) unlimited bull-only hunting 1945-1952, (3.) unlimited either-sex hunting (except for selected areas) 1952-1972 and (4.) limited either-sex and male-only licences on an area basis between 1973 and 1977.

Management of moose in Newfoundland prior to 1973 was reported on by Pimlott (1953), Bergerud (1962), and Mercer and Manuel (1974). This report will appraise the results of quota system management in the Province during the period, 1972-77.

METHODS

Population Density Estimates

Prior to 1964, moose were censused using aerial strip-census surveys in winter. Between 1964 and 1972, we used a quadrat-census technique with stratified random sampling and fixed-wing aircraft. Counts were always made with 100 percent snow cover and if possible,

immediately following snowfalls. Only experienced observers were used. After 1972, we used helicopters (mainly Bell 206 aircraft) to count moose on 4 km^2 quadrats (1.544 mi^2). In 1973, we flew over 500 hours in an attempt to obtain 8 - 12 percent ground coverage of about one-half of insular Newfoundland. In 1977-78, we were able to duplicate some of the earlier counts. We feel that given good weather conditions and with the greater maneuverability of helicopters, we obtain accurate results over most Newfoundland terrain.

Population Trend Data

Kill data were obtained from licence returns. Hunters were required by law to submit returns to the Wildlife Service within seven days of the date of kill or within seven days of the end of the season, if no kill was made. Although the law was not enforced, returns averaged 82 percent. Information on the return included the hunter's name and address, area hunted, date and sex of kill, number of antler points, length of time hunted, the number and sex of moose and caribou seen and whether animals were adults or calves.

Although some biases exist in the above data, we feel that number of moose seen per hunter per day and number shot per unit effort are reliable indicators of population trends, particularly if some exaggerations are eliminated from the data (Strapp & Mercer, 1978) and if only information from residents hunting with either-sex licences is used.

During 1956 to 1976, hunters submitted reports which were analyzed using computer programs.

Annual Recruitment Estimates

During 1953-56 and 1963-77, lower jawbones for aging were collected at check stations on logging roads, augmented by small samples mailed from other areas. Estimates of productivity and sex ratios were also obtained from aerial classification of calves, adult bulls and cows during fall and winter.

Quota Calculation

During 1973-77, Newfoundland-Labrador had an area quota system of moose management (Mercer & Manuel, 1974). Under this system, the Island was divided into 38 hunting areas (Fig. 1). Either-sex licence quotas were set based on estimates of maximum sustainable yield and trend data from hunter returns. Calculations involved census data, annual recruitment and mortality rates, success ratios and vegetation analyses to estimate carrying capacity. Male-only licence quotas were generally set on a 1:1 ratio with either-sex quotas. We considered 20 percent adult bulls to be the lowest permissible sex ratio in hunting areas and directed management towards keeping sex ratios above that level. Licences were distributed on the basis of a random draw giving preference to hunters who had applied unsuccessfully in previous years and to hunters who wished to hunt with a partner.

RESULTS AND DISCUSSION

Population Trends

Moose populations in insular Newfoundland generally increased until 1960 after which populations began to decline (Fig. 2). This

decrease resulted from over-browsing in inaccessible areas which are generally marginal habitat, and from over-harvesting in the accessible areas which contain productive moose habitat. Following 1973, when the area quota system was introduced to all Newfoundland and an attempt made at more precision in quota calculations (mainly as a result of census data), the moose population began to increase in Newfoundland generally (Fig. 2) and in practically all accessible areas (Fig. 3). Individual hunting areas (Fig. 3 and 4) followed similar trends. It seems that hunting effort (Fig. 5) in the accessible areas increased at a faster rate than the moose population to the extent that by approximately 1960, it precipitated a decline in population size. Productivity (Fig. 6 and 7) was correlated with population change and may have been an important contributing factor. Productivity increased in Millertown from the early 1960's until the mid 1970's. Northwest Gander-Gambo showed an increase in productivity during the mid 1960's until the early 1970's, after which productivity decreased. Hence, a compensatory change in productivity may have resulted from increased densities.

In the 10 inaccessible areas (3, 10, 11, 12, 13, 18, 19, 20, 37 and 26), (Fig. 1), stabilizing to increasing trends were apparent. In the accessible areas, we were managing for increases, while in the inaccessible areas, we attempted to stabilize or decrease populations. The data indicate that we were able to increase populations but were not always successful in stabilizing or decreasing populations on over-browsed range. Hence, future management goals will be directed towards increasing kill quotas there. In the accessible areas, 31, 32, 33, 36, 9 and 24, we are also attempting to stabilize densities since we feel

that we are approaching carrying capacity there. We have generally had closed seasons in areas 1, 14, 29 and 39 (St. Anthony, Baie Verte, Bonavista and Port au Port Peninsulas). This is due to low populations in the accessible areas, combined with illegal kills. A small poaching effort in an area of low population can be very effective in keeping the population down, while large populations can absorb considerable poaching mortality. We will attempt to stabilize populations in other areas in the next two years (especially area 6 and part of area 3), and foresee the day when all Newfoundland will have moose populations at or near carrying capacity.

Population Density Estimates

During 1977-78, we were able to census 10 areas (2 on the west coast, 5 in central Newfoundland and 3 in eastern Newfoundland), (Table 1). These data indicate that in areas 6, 8, 22 and 24, we managed successfully for increases. This was supported by the trend data (Fig. 9). In areas 16 and 17 where we also attempted to increase populations, the census data indicated that populations stabilized while the trend data indicated small increases (Fig. 10). It is possible, if sample sizes are large, that trend data are more sensititve to population change than population counts. In the east coast areas, 26, 32 and 33, which were managed for stable populations, populations increased in the Salmonier (33) (2.09 - 3.00 moose/mi^2) and Long Harbour (26) areas, stabilized in the Placentia (31) area and decreased in the Cape Shore (32) area, (Table 1 and Fig. 11). On the Cape Shore we relied too heavily on census data and were overly cautious in attempting

to keep browsing pressure at a level in harmony with browse supplies - or below carrying capacity. The salient conclusion from the above population data is that using the area quota system, moose can be managed successfully under Newfoundland conditions. That is, using the quota system, one can increase or decrease moose populations on small areas to desired density levels commensurate with habitat and social demands as has been demonstrated in Norway and Sweden (Lykke and Mct. Cowan 1968 and Lansund 1978).

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Table 1: Moose population counts and trend data in selected hunting areas 1973-4 & 1977-8

Area No.	Name	Moose /mi^2 1973-4	Moose /mi^2 1977-8	%change	Trends /1 1960-72	Trends /1 1973-77
Accessible Areas						
16	Sandy	1.5/6	1.5/2	0	-/4	0
17	Millertown	0.8/7	0.7/2	-13	-	-0
22	Lewisporte	0.3	2.2/2	+633	-	+
24	N.W. Gander	1.65	2.7/3	+64	-	+
32	Cape Shore	2.62	1.2/3	-54	0	-
33	Salmonier	2.09	3.0-/2	+44	0	0
6	Corner Brook	1.0	2.77/2	+177	0	+
8	St. Georges	1.0	1.56/2	+56	0	+
31	Placentia	0.9	1.04/2	+16	0	+
Inaccessible Areas						
26	Long Harbour	0.40	0.64/2	+60	-0	+
37	Grey River	0.91	1.0/2	+10	-	0
Means		1.20/5	1.66	+38	0-	+0

/1 From hunter reports /2 1978 count /3 1977 /4 — decreasing, + increasing, 0 stable /5 unweighed /6 1964 /7 1972

Fig. 1. Hunting areas and regions in Newfoundland.

Fig. 2. Moose population trend statistics for either-sex, resident licences in insular Newfoundland 1956-77. Data calculated from licence returns.

Fig. 3. Moose seen per hunter per day per hunting area for all hunters with either-sex licences.

Fig. 4. Authors interpretation of moose population trends depicted in Fig. 3.

Fig. 5. Licence sales and estimated legal kill in Newfoundland 1936-77.

Fig. 6. Percent yearlings (Y/Y+A) in the Millertown hunting area. Calculated from moose lower mandibles collected from hunters.

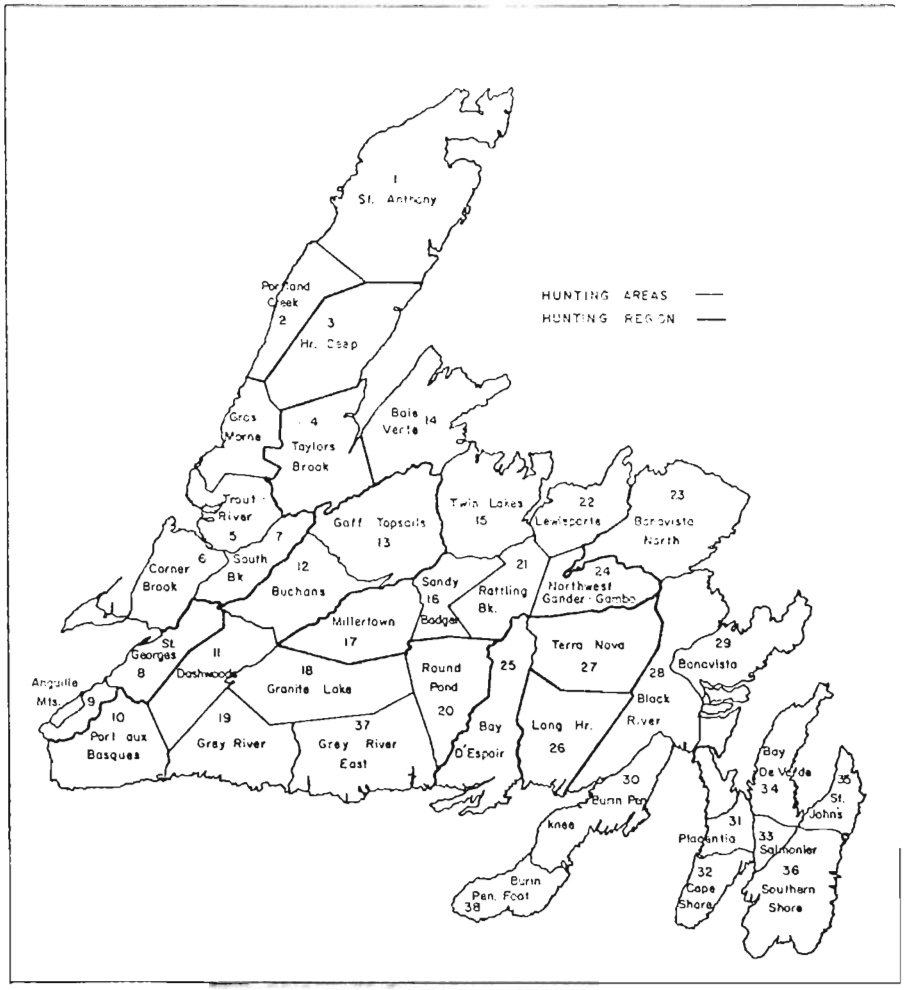
Fig. 7. Percent yearlings (Y/Y+A) in the Northwest Gander hunting area. Calculated from moose lower mandible collected from hunters.

Fig. 8. Accessible and inaccessible areas in relation to hunting pressure.

Fig. 9. Moose population trend statistics for either-sex, resident licences in hunting areas 6, 8, 22 and 24, 1956-76.

Fig. 10. Moose population trend statistics for either-sex, resident licences in hunting areas 16 and 17, 1956-76.

Fig. 11. Moose population trend statistics for either-sex, resident licences in hunting areas 26, 31, 32 and 33, 1956-76.



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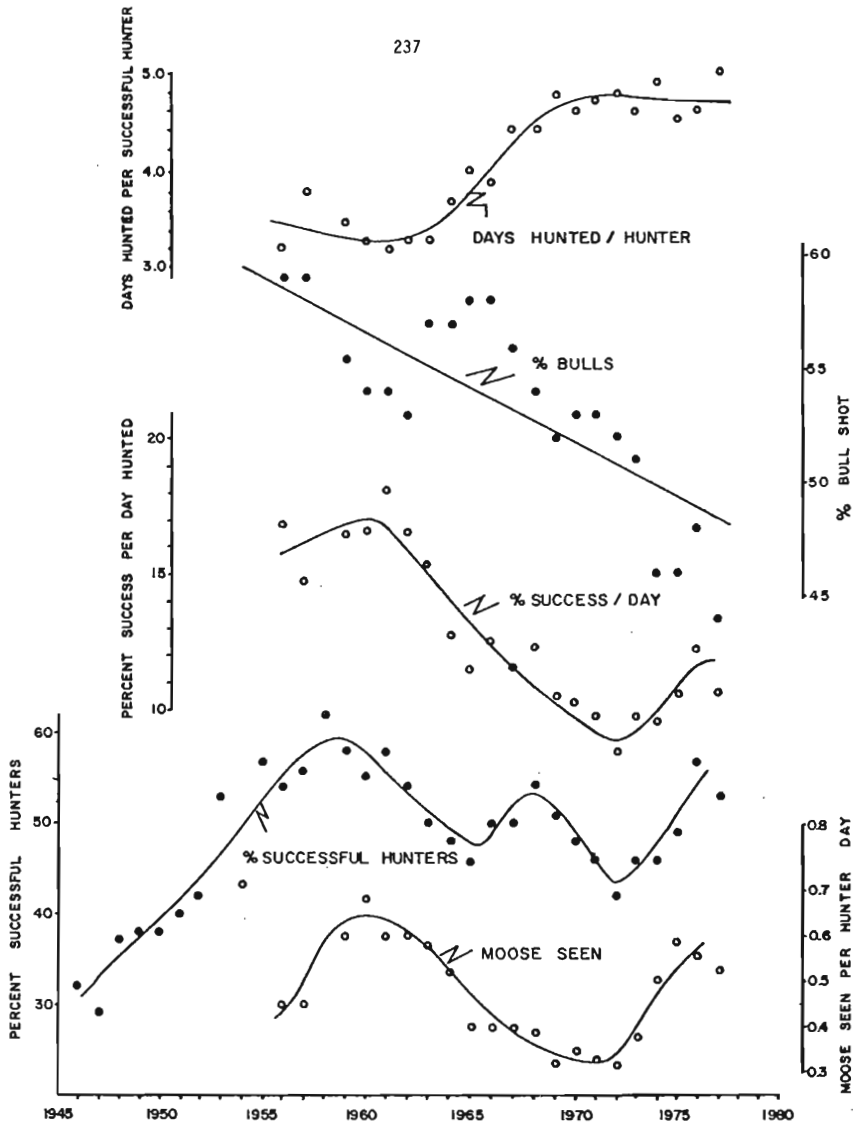

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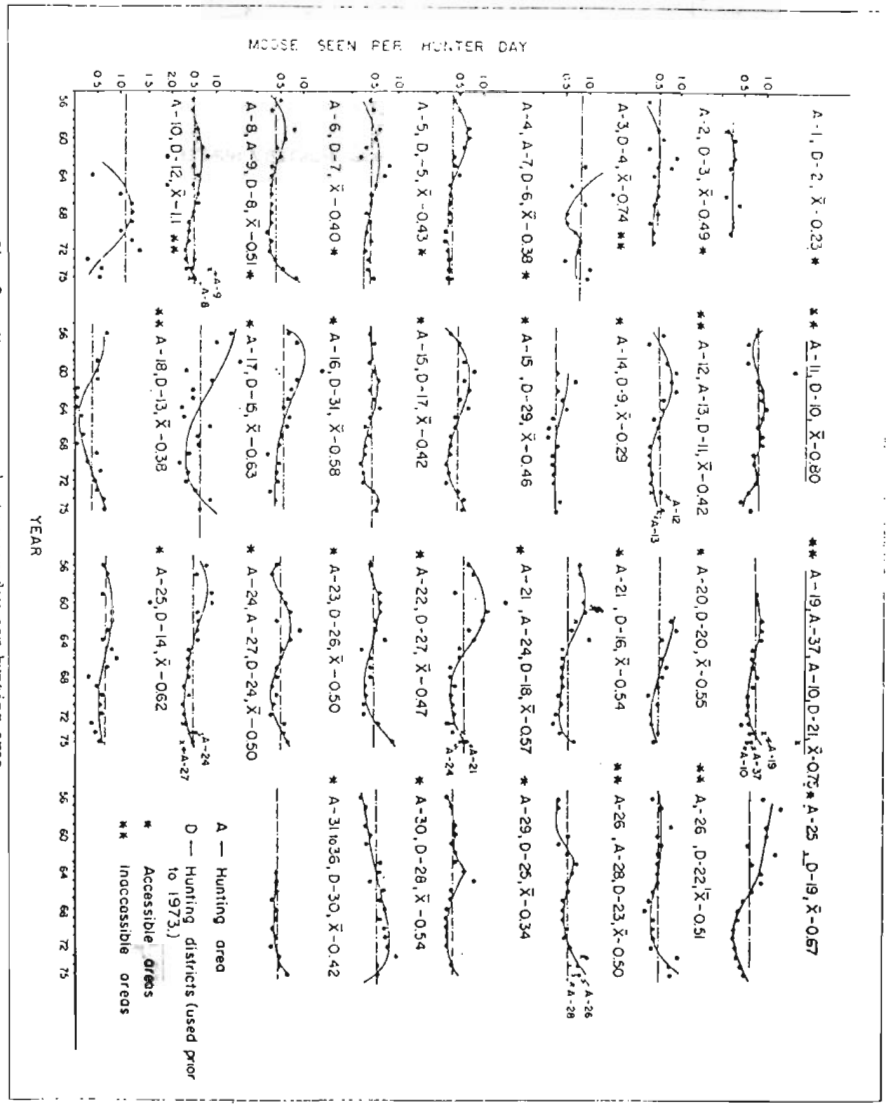

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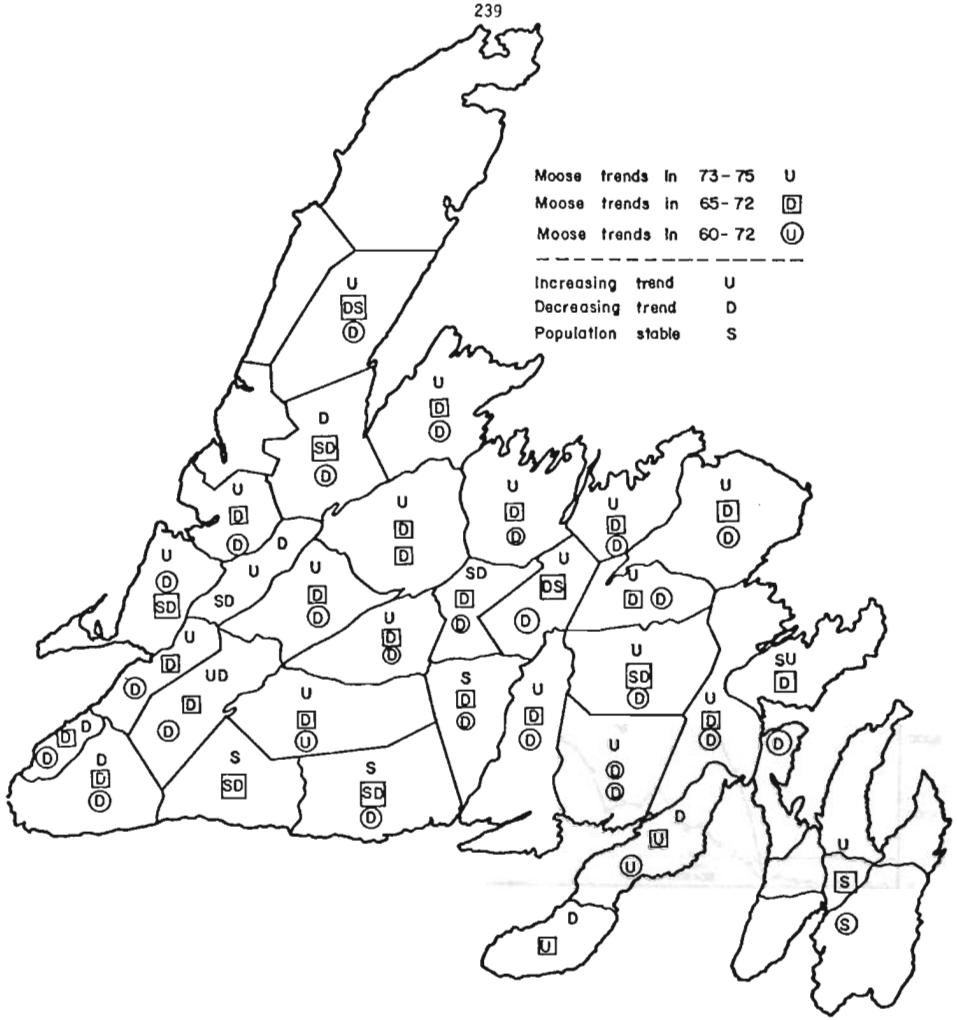

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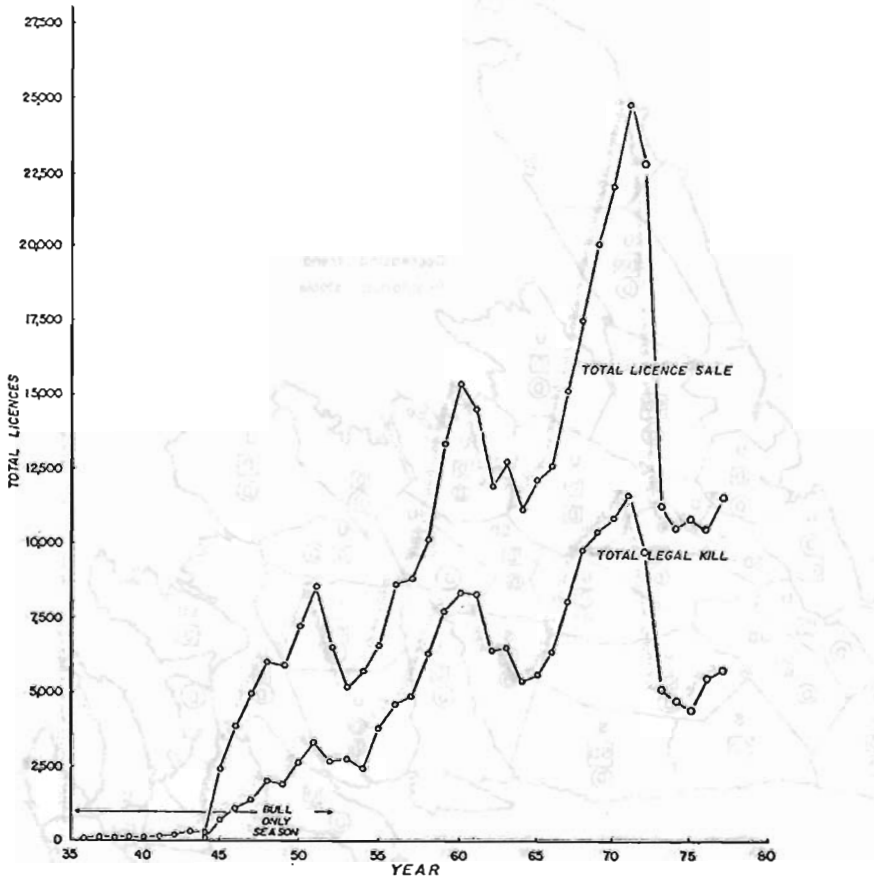

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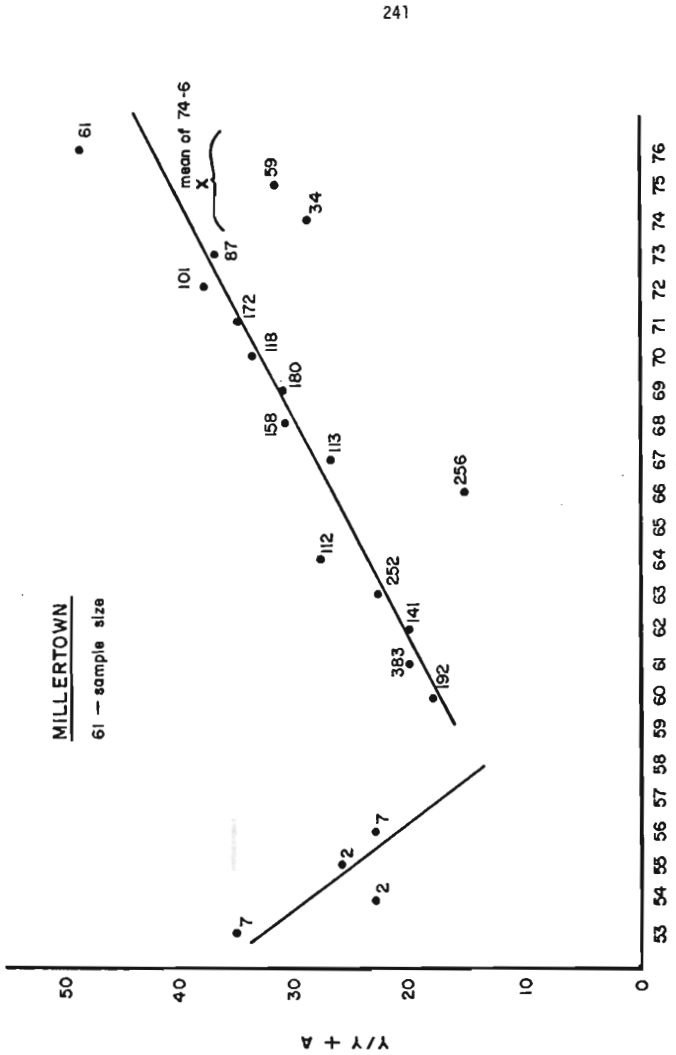

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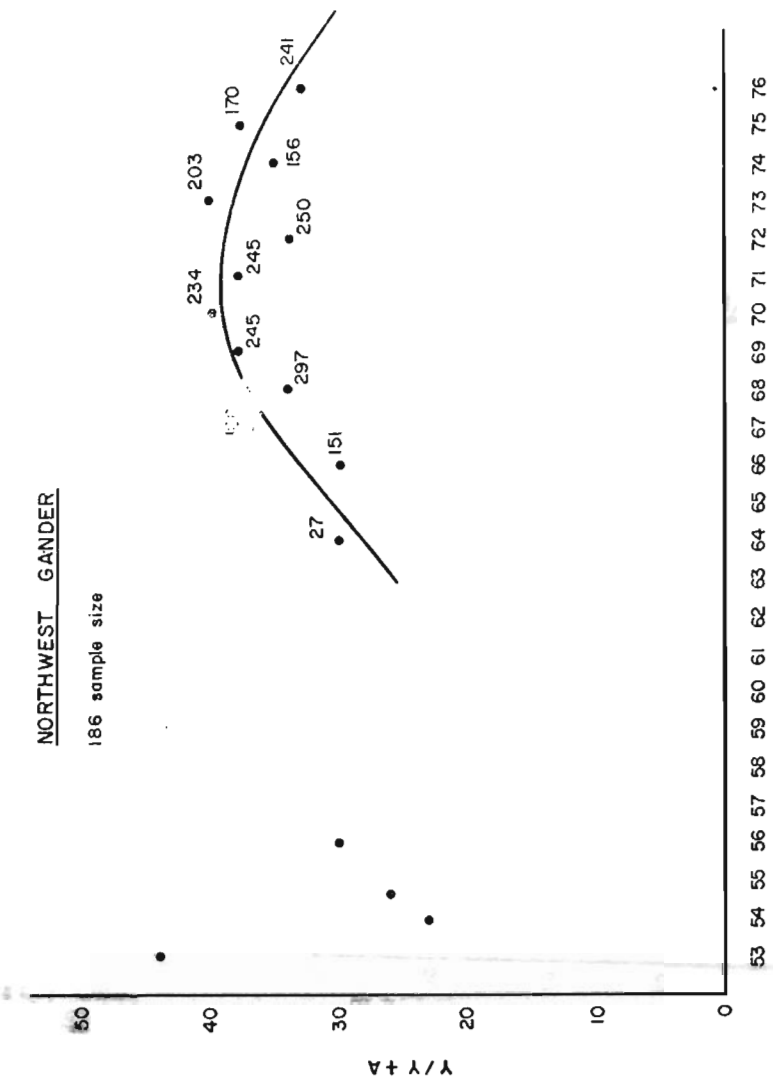

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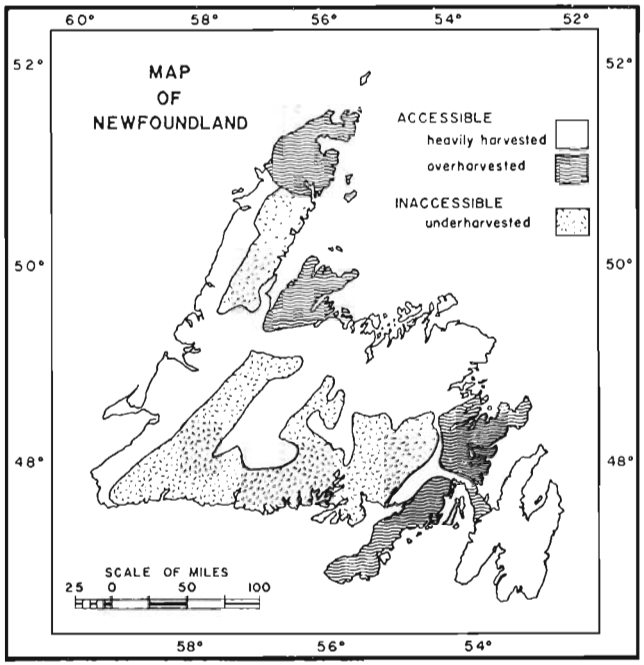

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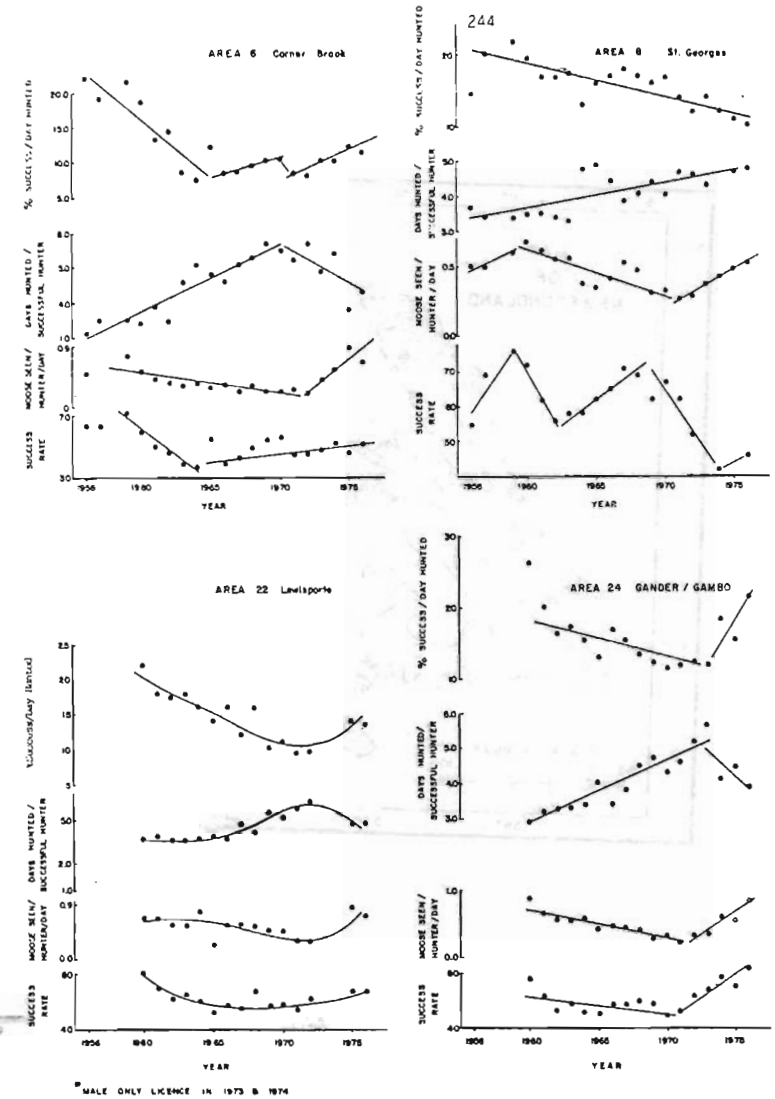

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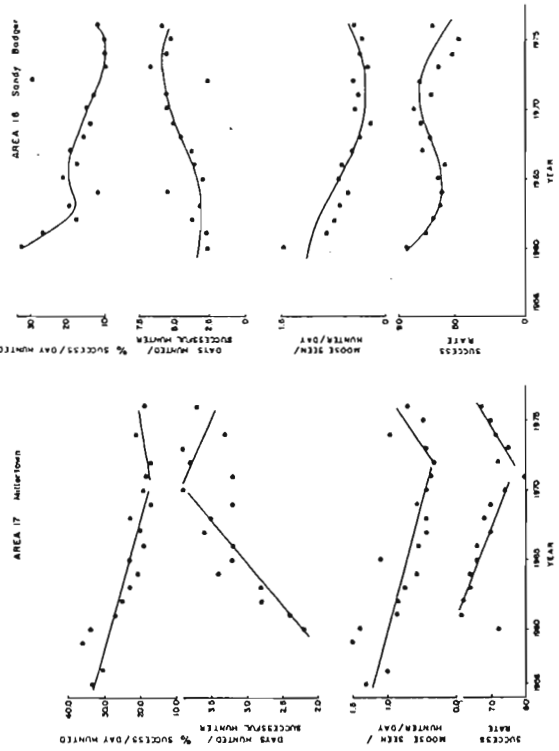

Fig. 10. Moose population trend statistics for either-sex, resident licences in accessible hunting areas 16 [illegible]

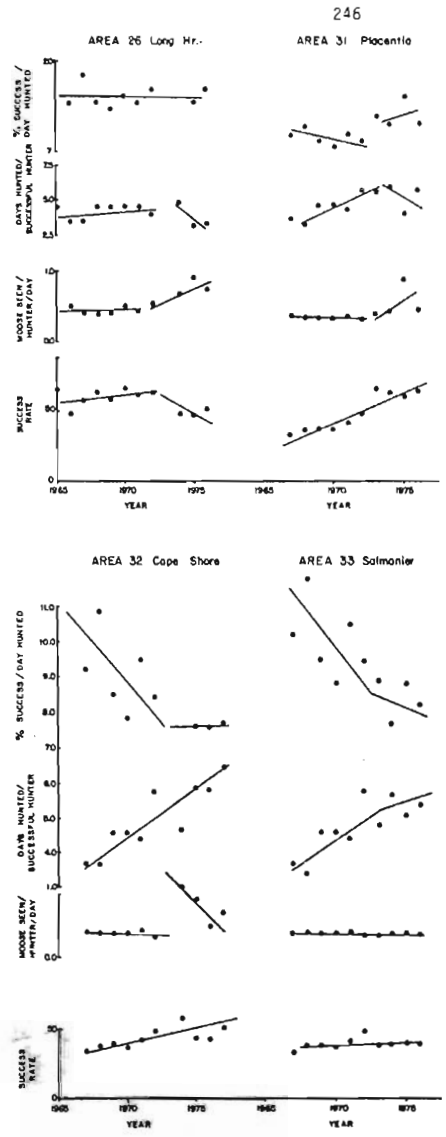

Fig. 11. Moose population trend statistics for either-sex, resident licences in accessible hunting areas 31, 32 and 33, inaccessible area 26, 1956-76.