SWEDISH MOOSE MANAGEMENT AND HARVEST DURING THE PERIOD 1964-1989

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ABSTRACT: The history, development, management and harvest of the Swedish moose population before 1964 are presented. Changes in land use and management were essential for the development. In the 1970's the population and harvest increased due to new harvest regulations. The harvest (174,000 in one year) and the population (around 315,000) peaked in the early 1980's. Due to problems with forest damage and road accidents the population has been reduced in recent years. Management and harvest in the future will include locally adopted and followed plans.

ALCES VOL. 25 (1989) pp. 58-62

The history of moose and moose management in Sweden before 1830 tells us that the first hunting regulations were introduced as early as 1347 and that moose hunting in the 16th century in most areas was a privilege accorded to the king and his men. Poaching was of course common at that time in spite of severe penalties (Dahl 1979, Markgren 1974). The population decrease had already started in the 1400 - 1500 period. Thus the population was already very low when the right to hunt moose was given to all landowners in 1789. The famous scientist Linnaeus (1707-1778) who travelled throughout the country never saw a wild moose (Dahl 1979). The low point for the Swedish moose population came around 1825 - 1835 when only a few hundred animals remained in the central portion of the country. The moose population started to grow due mainly to rigorous hunting restrictions and in the beginning of the 20th century moose were found all over the country even if animals were scarce in many areas (Ekman 1918, Markgren 1974).

In the beginning of the 20th century 2,000 - 3,000 animals were legally shot. The lowest number (400) was taken in 1923 due to restrictions invoked after the first world war. From that year onward the harvest increased and about 30,000 moose were shot in the beginning of the 1960's (Lykke 1974). Populations were estimated at 47,000 in 1945 (Hamilton 1945, 1953, 1962) (Fig. 1). Hunting pressure was increased in the 1940's and 1950's due to forestry damage and the populations declined in many areas especially in the northern parts (Lavsund 1987). The reasons for the population development in this period are discussed in detail by Lykke (1974), Markgren (1974), Lavsund (1987), and Strandgaard (1982).

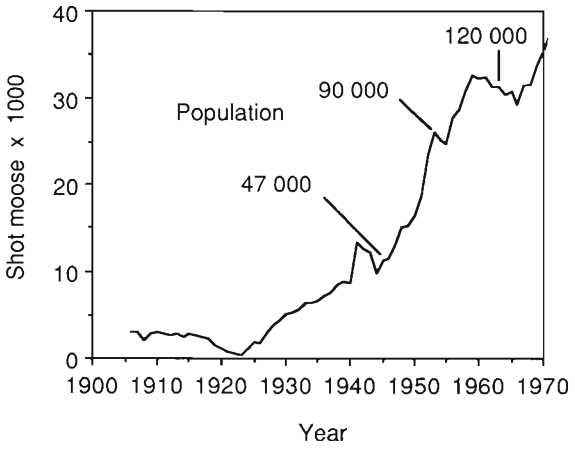

Fig. 1. Number of shot moose in Sweden 1905-1970. Estimated population size is indicated for certain years.

The decrease stopped in the beginning of the 1960's and the population started to increase again with the rate accelerating in the 1970's. The background for this increase is as follows. In the 1940's clear cuts as the dominating method for regeneration of forests developed and during 1940 - 1960 the area increased two to three times. The annual

clear cut area in the period 1940 - 1960 increased from 1,000 km² to 3,000 km² and the amount of young forests from 10,000 km² to 30,000 km² - about 10% of the total moose habitat area in Sweden. Meanwhile 10,000 km² of farmland were abandoned throughout Sweden which in many areas created excellent moose habitat. Besides these very favorable habitat changes moose predators were virtually exterminated throughout the country at this time (Lavsund 1987, Strandgaard 1982).

Experiments with new moose hunting regulations including harvest quotas and a long open season started in 1967. Prior to this, moose were normally hunted during a short open season with no restrictions on the numbers harvested. The 1967 experiments covering entire counties showed that protection of cows and an increased harvest of calves increased population growth very much thus permitting an increased harvest (Lykke 1974, Stålfelt 1970). Following the 1967 experiments the new harvest strategy was introduced throughout the country. In many areas however this strategy was introduced on a low scale prior to 1967. This means that moose productivity had increased by the early 70's throughout the country. Details on the management methods used were described by Cederlund and Markgren (1987), Haagenrud *et al.* (1987), and Lykke (1974). Poor census methods and lack of good information on population size and growth resulted in an accelerated population increase in the late 70's. The winter population increased from around 100,000 to slightly more than 300,000 between 1970 and the early 80's. Simultaneously, the moose harvest increased from 35,000 to 132,000 between 1970 and 1980. The maximum harvest occurred in the fall of 1982 with 175,000 being shot. The maximum size of the population may have been around 315,000 in the winter of 1981-82 (Fig. 2). The rapid increase in the number of licenses issued and moose shot in the period 1976 to 1982 was

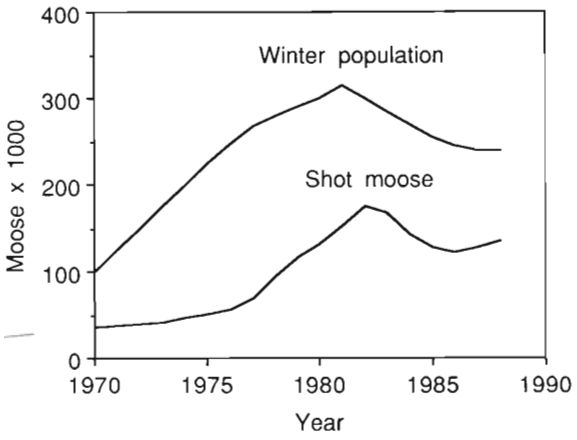

Fig. 2. Number of shot moose in Sweden 1970-1988, and estimated population size.

due to the need to reverse the population increase. This was a result of many forestry, farming and traffic problems (Cederlund and Markgren 1987, Sandewall 1988). Many have pondered about the reasons for the somewhat remarkable increase in the moose population. The increase in good moose habitat is discussed in detail by Markgren (1974, 1978) and Cederlund and Markgren (1987). Furthermore, the new hunting regulations with harvest quotas, calf harvest and restrictions on adult animals, especially cows played a major role. This gave winter populations with a potential rate of increase ranging between 30 and 70%. Furthermore information on moose numbers and their changes were often not reliable (Cederlund and Markgren 1987). This frequently resulted in underestimates of moose numbers. Moreover, far too many decisions on harvest quotas were made at a high administrative level where knowledge about local populations was lacking. In an effort to reduce moose numbers, the number of licenses issued was increased dramatically. Thus, the harvest peeked in 1982 (Fig. 3). In many areas the number of licenses issued was much higher than what was possible to shoot. Among other things this was due to local differences in moose habitat and moose density. Many

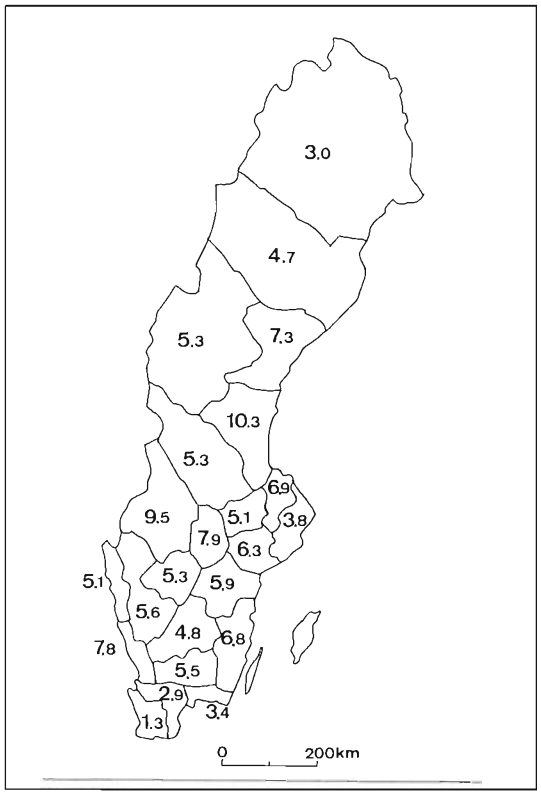

Fig. 3. Number of shot moose per 10 km² in different counties 1982 (after Cederlund and Markgren 1987).

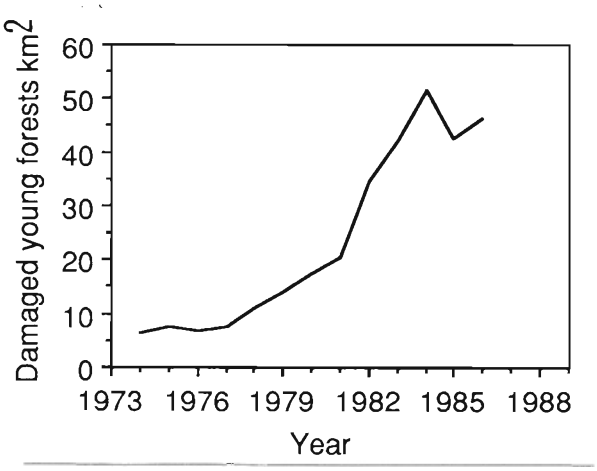

Fig. 4. Area of young forests damaged by moose 1974-1986.

local populations were simply out of control during this period.

Forestry is very essential for the Swedish economy and almost all moose habitat is used for commercial forestry (Lavsund 1987). Forest damage at the peak level of the moose population has been estimated by forestry people to be $200 - 500 million per year, which means more than $1,000 per moose shot (Lavsund 1989). The development of the damage situation was presented by Sandewall (1988) (Fig. 4). The amount of damage increased and the population increased. To make things even worse 6,000 moose were reported killed on the roads in the peak years (the actual number could have been 10,000!) costing $50 million per year due to personal injury and vehicle damage. About 15-20 people were killed each year and many more were seriously injured. Another $3 million worth of damage was caused to farmlands. Farmland damage is covered by a special fee on each moose shot ($15-150 per animal). Compensation is not paid for forestry damage and car damage has to be paid by the car insurance program.

The 1989 Scenario

Figure 5 illustrates that populations in many areas have decreased to 60% or even less of the peek numbers (Sandewall 1988). Still, there are intense discussions between foresters and hunters about present moose densities, what is acceptable in terms of moose densities and levels of forestry damage in the future. We know (Bergström unpublished, Lavsund unpublished) that the tolerance level to moose damage by the forest industry is far below the ecological-habitat tolerance level in most areas. Thus the amount of forestry damage will often determine the tolerance for moose. Traffic accidents and damage to farmland will set the limits in some cases. Thus few areas will be permitted to have moose populations regulated only by available moose habitat and hunting. No doubt the harvest will have to be much lower in the future than that possible if the forests were used only for moose production!

Recently a joint committee of hunters, foresters, and moose biologists have been

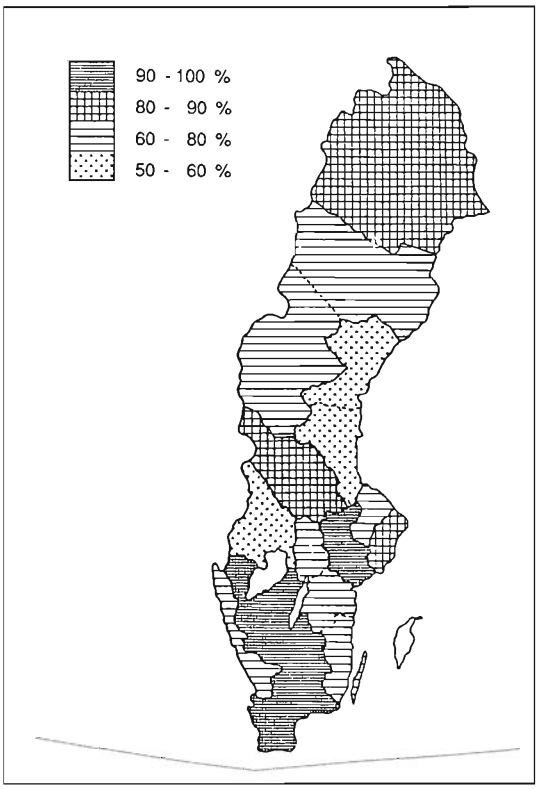

Fig. 5. Moose population in winter 1987 in relation to the highest level during the 1980's, percent.

discussing solutions to the current moose problems. Their report "Älgen och skogen" (Moose and Forestry) was presented in 1988. It recommended, in future, moose management should be more decentralized to be able to utilize local knowledge of moose numbers and forestry damage. In addition, Sweden should be divided into moose management units each with a moose hunting strategy based on local experience and knowledge. Discussions on moose harvest levels in relation to regional differences in moose densities and forestry, farming and traffic problems should be based on local experience after discussions between forestry/landowners and hunting/hunters within the moose management unit. Within each unit the moose hunting must be adjusted to the real number of moose and the productivity and distribution of the population. What is needed is reliable information on the number of moose within each unit, the productivity and migratory behavior of populations and the amount of damage occurring. For that purpose aerial surveys (Tärnhuvud 1988) will be used if possible. In northern Sweden where moose seasonally migrate, such surveys will only give the total number of moose in winter and not their numbers and distribution at the time of hunting in the autumn. In the southern parts of the country the milder climate will only permit aerial surveys in cold years. To help this situation a hunter observation survey method was developed. Following special instructions the hunters record all moose observations during the first week of hunting. The moose observations material are then used to simulate the moose population and its growth. A certain model called Cersim is used (Pedersen *et al.* 1988). Material from shot moose will give additional information on fecundity and age structure. The level of forestry damage will be followed using certain survey methods (Skogsstyrelsen 1983).

With hard work in the 1990's and cooperation on all levels this decade might be better than the last when Sweden's moose management program faced serious problems. The next decade is essentially a challenge for moose managers and hunters as if the problems are not solved, foresters will demand fewer moose resulting in fewer forestry problems.

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