

LOCAL COMMUNITY BASED MOOSE MANAGEMENT PLANS IN NORWAY

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ABSTRACT: Since the 1940s, moose populations in parts of Norway have increased rapidly. This had led, by the 1990s, to increases in traffic accidents, damage negatively impacting the agricultural and forest industries, and reductions in growth and fecundity of moose. Local level management of moose (*Alces alces*), red deer (*Cervus elaphus*), and roe deer (*Capreolus capreolus*) has occurred for 45 years represented by The Wildlife Board in every municipality. This board, however, was a governmental institution. The national regulations seem unnecessarily detailed by today's standards. In 1996, the Directorate for Nature Management started a project aimed at making management of cervids increasingly community based. The project was completed in the year 2000. The vision is that local management plans developed by the landowners and hunters are going to direct future management and be the basis for solving many of the current challenges.

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Norway has pronounced latitudinal and altitudinal gradients. The country ranges from 57° 58' 43" to 71° 8' 1" N. The total area is 386,975 km², with roughly 27% covered by productive forest. As a result, moose management occurs under a wide range of vegetation types and climatic and topographic conditions. In addition, there is great variation in size, shape, and ownership of land properties. The size of properties used for moose hunting ranges from less than 1 ha to several thousand ha. Government land may consist of areas up to the size of a whole county. For example, Finnmark County, which is 46,499 km², is mainly government land.

Status of Moose

The population size and annual hunter harvest of moose have increased since 1900 (Fig. 1). The increase has been particularly rapid from the 1940s to 1992 (Jaren 1992). In 1992, data from the national monitoring program showed decreasing carcass

weights and lower fecundity among moose in southern and southeastern Norway. There was growing concern over decreasing quality of both summer and winter habitat. Damage to young growth forest stands was also increasing in most areas of southeastern Norway. This situation led to an initiative in August 1993 from the Directorate for Nature Management prolonging the hunting seasons for moose and red deer and urging the county governors and the municipalities

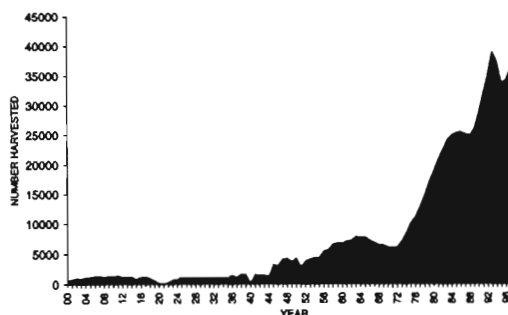


Fig 1. Annual moose bags 1900-1999. Snow conditions are responsible for much of the between year variation. (Source: Statistics Norway, Oslo, Norway).

to increase the harvest quotas. The annual national hunter kill increased. As a result, moose densities were reduced in the area of concern. Since then, populations and harvest of moose have increased. However, much of this increase occurred in areas which previously had low densities. Densities of moose are still higher than desired for both ecological and economic reasons in large parts of Norway.

Management on all levels had generally failed to adjust to rapid changes in moose density. In addition, seriously skewed sex and age ratios were caused by lack of knowledge at the local level of management.

Organization of Moose Management

Wildlife management in Norway is based on the precautionary principle that is included in "The Wildlife Act". Moose populations are managed according to "The Cervid Regulations" which are based on "The Wildlife Act". The management framework and objectives are derived from the best available knowledge and harvest targets are set with consideration for traffic accidents and damage to crops and forests. Harvest targets are the product of compromises among various interest groups.

Although wildlife has no owner in Norway, hunting rights belong to the landowner. The local municipality is the executive game management authority and issues annual licenses to landowners in accordance with a "minimum area" for each license. The "minimum area" is set by the County Governor (Jaren 1992). Management areas have to be larger than the "minimum area" in order to get 1 license for moose. The average size of privately owned land is 60 ha. The "minimum area" for moose varies between 70 and 2,000 ha. To some extent this forces the landowners to cooperate in moose management. Local 3-5 year long management plans made by the landowners

have been used effectively in some areas since the 1980s. The plans have primarily outlined local management goals and the desired harvest structure, i.e., the number of calves, adult males, and adult females to be harvested within the total quota. These plans have served as a contract between the landowners and the local authority within a defined management area. The government agencies, consisting of the Ministry for Environment, the Directorate for Nature Management, and the County Governors are responsible for legislation, setting national and regional goals and guidelines, and supervising the municipalities. The Directorate for Nature Management is also responsible for national monitoring programs and funding of research.

In 1991, the Directorate for Nature Management started a "Monitoring program for cervids" which monitors moose, red deer, and wild reindeer (Jaren 1992). At the national level, 7 moose populations are monitored annually (Fig. 2) (Jaren 1992). For local management purposes, the collection of "hunter observations" is essential to monitor population trend and structure (Solberg and Saether 1999). The majority of moose hunting in Norway is done by hunting teams. Although these teams hunt using different techniques, selective harvest practices usually result in hunters observing numerous moose before shooting a moose appropriate for their license. This situation provides a good opportunity for recording hunter observations. Hunter observations provide knowledge about relative changes in density (an index) and proportions of animals of different age and sex in the population (Jaren 1992, Solberg and Saether 1999).

The Wildlife Board as a governmental institution elected by the municipality was terminated in 1992 and the municipality is now the local public wildlife management authority. This model makes wildlife man-

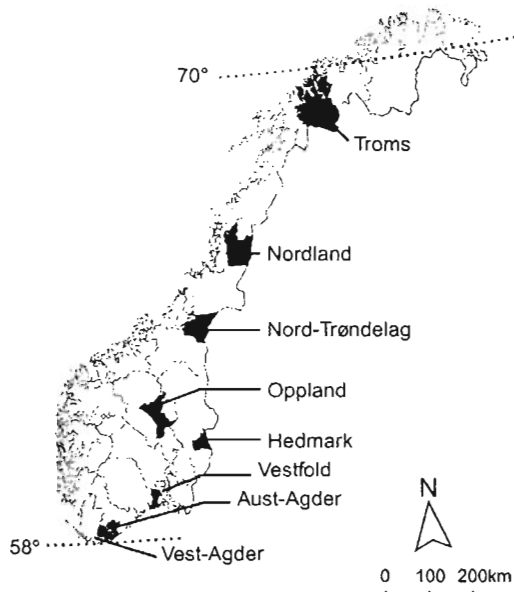


Fig 2. The 7 moose populations monitored annually within the national monitoring program for moose. The map shows 8 areas, as the monitoring area in Aust-Agder was discontinued in 1995 due to local difficulties and replaced by a new area in Vest-Agder in 1997.

agement part of local politics within the municipality. The municipality also has the responsibility for land management through "The Planning and Building Act". Thus, wildlife habitat is managed through land management and land development.

The municipality now issues the licenses to the landowners who own the right to hunt. However, where migrating populations exist, there is a need for landowners and municipalities to unite and form larger regions for effective management.

The Directorate for Nature Management issues management regulations under which the local and regional management consisting of the municipalities, the county governor and, in some areas, the moose regions operate.

Changes in Management Policy

Growing concerns for uncontrolled growth in the moose and red deer populations

led the Directorate for Nature Management in 1994 to invite participation of representatives from both governmental and non-governmental agencies (NGOs) in developing new strategies for management of cervids. Participants included municipalities, the county governors, management boards for public land in southern Norway, The State Forests, which is an organization that acts as landowner on public land in Norway, The Forest Owner Association, The Farmers Union, and The Norwegian Association of Hunters and Anglers. The report from this group was entitled "Action plan for management of cervids in Norway towards year 2000". The report proposed a number of new objectives and goals for cervid management. While not all the new objectives have yet been realized, all organizations that participated in the work have adopted them.

The general objective for management of the Norwegian moose population up to 1994/95 was: "To maintain moose populations with optimal productivity and annual yield, taking into account the quality and carrying capacity of the habitats and the damage caused to agriculture and forestry".

After 1995, the general objectives were broadened and changed to:

- moose, red deer, and wild reindeer populations should be stabilized at a sustainable level regarding the viability of the populations and other interests, such as forestry and traffic safety;
- cervid populations should have an acceptable sex and age ratio and maintain their genetic variability;
- cervid populations should not threaten biodiversity through too heavy browsing and grazing pressure;
- cervid populations should yield a harvest that is as stable as possible;
- land management should ensure long term survival of viable cervid populations;

- management should ensure healthy cervid populations; and,
- management should facilitate a harvest with both recreational and economic benefits.

Changing to Local Moose Management Plans

In 1996, the local fisheries and wildlife management initiative was started to address some of the challenges such as growing numbers of road and railroad kills of moose (Fig. 3). The objective was to promote community based management in the form of local management plans for each hunting area and for regional management of cervids where such inter-municipal regions are established. Both governmental agencies and NGOs support this direction to meet the present and future management challenges.

In order to promote good community based management, changes have been made in the Wildlife Act where the license fees for moose and red deer will now remain in the municipality. The municipality will also take full responsibility for moose, red deer, roe deer, and wild reindeer killed out of season, mainly by traffic and train collisions. Crop damage by cervids will now be the sole responsibility of the municipality. Compensation for crop damage will

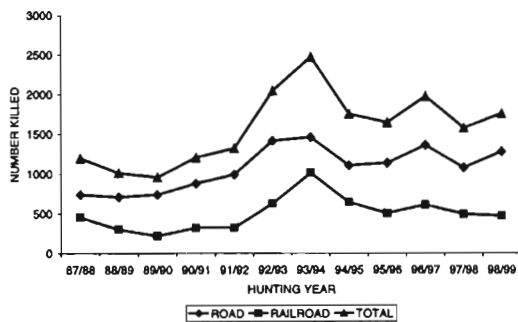


Fig 3. Moose killed by trains and cars from 87/88 to 98/99. The hunting year runs from April 1st to March 31st. (Source: Statistics Norway, Oslo, Norway).

most probably be discontinued.

To promote better community based management there are plans to establish a positive feedback system for landowners that take responsibility for cervid management plans. It is proposed that landowners accepting this responsibility be given access to longer hunting seasons, full responsibility for sex and age ratio of their harvest, and good financial support for regional management through landowners’ organizations.

In addition, there are plans to improve the flow of information about management issues by educating people involved with municipal politics and administration. There is also an urgent need to educate people locally in the NGO’s, particularly in the landowners’ organizations. The Directorate is also heightening general awareness and knowledge about moose management by use of the internet.

Advantages and Risks of Local Management Plans

The expected advantages are:

- a generally higher awareness of wildlife in the local community creating a local political basis for more sustainable land and wildlife management;
- local management will provide more precise management of moose populations according to the specific properties and goals for that population;
- local regionalized management should lead to a form of management with fewer conflicts and lower administrative costs;
- local ownership of management decisions will lead to less cheating, further contributing to better precision in management; and,
- local awareness of moose habitat requirements should lead to better land use regarding moose and production of moose browse.

There are some risks in these proposed changes:

- critics claim that they could lead to sudden and uncontrolled changes in moose density in certain areas and that local goals might not be sustainable;
- there is a risk that local managers might manage in a way that will leave populations with strongly skewed age and sex ratios; and,
- municipalities might be reluctant to allocate power and money to landowners' organizations and to regional management bodies because the license fees might become important in their economy.

The concerns about risks are valid. However, experience from areas where local management has occurred according to plans developed and implemented by landowners for some time does not strongly support this. In most areas the local management has been at least as good, if not better, than what could be done by governmental or municipal authorities. Hopefully, the monitoring program for cervids conducted by the Directorate will reveal if further changes are needed.

Research and its Applications

The research project "Moose forest and society" (Saether et al. 1992) provided the original basis for management of moose incorporating ecological and economic constraints. It provided knowledge about the effect of different management strategies on moose demography and the effects of different forest management strategies on production of moose browse.

Ongoing projects like "Optimal harvest of moose" couple the dynamics of moose populations to variation in vegetation, harvesting, and predation, and evaluate the use of hunter observations as a management tool. Results suggest that moose demography is influenced by a balance between the quantity of winter food and quality of summer food, where regional variation exists in the response of the winter food to a given

browsing pressure. The project will examine the effects on the population dynamics of biased sex ratio and altered age-structure due to selective hunting. Data will be used in a plant-herbivore model to explore how changes in trophic interactions, either through altered forestry practices or increased numbers of large predators, will influence the moose harvest. The project will identify aspects of population dynamics that are best predicted from data of hunter observations. Data from hunter observations will be used in different management units to assess variation in acceptance of different management strategies between locations and contexts.

Hunter selectivity can change the age and sex ratio (Solberg et al. 2000) which in turn may promote increased variation in the timing of calving within populations. In addition, hunter selectivity, through changes in the moose population, may lead to changes in the genetic composition of the population.

Present and Future Challenges

Secondary succession is occurring rapidly in clearcuts made from 1960 to 1990. Concurrently, forestry activities have been curtailed in many areas due to reduced availability of old growth mature stands and lower revenues. Thus, succession and reduced logging have resulted in less available browse. High moose densities have in some areas led to decreased browse quality which has led to moose having lower body weights and reduced fecundity.

Research on radio-collared moose has shown that a large proportion of our moose populations are migratory, and hence there can often be a mismatch between administrative borders and borders for effective biological management. Saether et al. (1992) proposed regional management units for moose where several municipalities combine to form a larger area based on knowledge about the movement patterns of par-

ticular moose populations. Parts of a municipality may appropriately belong to different moose management regions to address variation in migratory patterns of moose populations.

The recovery of brown bear (*Ursus arctos*) and wolf (*Canis lupus*) populations has created a need to estimate the local impact of predation on moose populations. The resurgence of large mobile predators raises another issue. The impact of predation, particularly by wolves, tends to occur at a larger spatial scale than an average municipality. This calls for larger management units, or at least, close cooperation between 2 or more municipalities.

Implications for Management

Results from research and monitoring, in addition to changing ecological circumstances, illustrate a need for further adjustments in management. The current "Wildlife Act" and "Cervid Regulations" do not provide the public part of the management system with precise tools for addressing these new challenges. The only option is to reduce adult harvest quotas, particularly males, in order to maintain a less skewed age and sex ratio. However, this does not fully counteract the tendency for hunters to harvest larger than average animals of any sex and age. Harvest selection can only be effective through management plans imposing measures that encourage hunters to harvest animals that are small for their age and sex group.

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