

MOOSE HUNTING, FORESTRY, AND WOLVES IN SWEDEN

Margareta Bergman¹ and Sofia Åkerberg²

¹Department of Historical Studies, S-901 87, Umeå University, Umeå, Sweden, e-mail: Margareta.Bergman@formas.se; ²Department of Animal Ecology, Swedish University of Agricultural Sciences, S – 901 83, Umeå, Sweden, e-mail: Sofia.Akerberg@gmail.com

ABSTRACT: We have reviewed Swedish forestry and hunting literature in order to investigate how the management of moose (*Alces alces*) in Sweden has changed during the 20th century, especially after the re-establishment of the wolf (*Canis lupus*) in the 1980s. The focus is on the perspective of moose hunters and of the forest industry since these are the two main factors in control of the size of the Swedish moose population. At about the same time as the Swedish moose population was reaching its all time high, there were reports that wolves were being spotted again in the country. Up to the first half of the 19th century, wolves were relatively abundant in Sweden. However, intense hunting led to their drastic decrease, so that in the beginning of the last century only a small number remained. As a result of being virtually extinct, the wolf was thus declared protected in 1965. Currently, the Scandinavian (i.e., the Swedish and Norwegian) wolf population has grown to a size of about 100 individuals. This might not sound like much in a relatively large country like Sweden but in areas where hunters already have had their culling ratio for moose decreased by the forest companies to minimize forest damage, the establishment of a single wolf pack has proven to be ‘the final straw’. Thus, there are instances where hunters have gone on ‘strike’; i.e., refusing to search for animals injured in traffic, as protest to this state of affairs. There are few instances (to our knowledge) where the forest companies have shown any increased interest in the ‘wolf issue’, which might be understandable from a commercial point of view but disastrous when it comes to their relationship with the hunters. We suggest that moose management in areas with wolves should be controlled by special regulations, taking both local and national interests into account and where ownership of the hunting ground should not be the sole consideration.

ALCES VOL. 42: 13-23 (2006)

Key words: *Alces alces*, *Canis lupus*, forestry, hunting, management, moose, Sweden, wolf

The present distribution of gray wolves (*Canis lupus*) in Europe is tiny compared to their historical distribution. Originally they were widespread and common throughout the whole of the northern hemisphere (Mech 1995, Wabakken et al. 2001). Because the distribution of wolves followed the distribution of large herbivores, conflict with humans arose early, presumably about the same time in history as wild ungulates were domesticated (Mech 1995). One such obvious conflict is between moose hunters and wolves as they in many instances compete for the same prey. In addition, because hunting dogs have been injured or killed in wolf territories in Sweden, on 43

occasions between 1997 and 2003 (Karlsson and Jaxgård 2004), some hunters are hesitant to use their dogs for moose hunting in areas with wolf territories. Forest companies have a strong voice in the setting of the moose hunting quotas because moose hunting in Sweden is tied to the ownership of land and roughly half of the forests in Sweden are owned by forest companies. The Swedish management of moose in general, and in areas with wolves in particular, results in a delicate problem among not only hunters and forest companies and people who live in close proximity to the wolf, but also the state, especially the Swedish Environmental Protection Agency (SEPA)

and environmentalists who want to protect the Swedish wolf.

Current research has shown that the attitudes toward wolves may be affected in areas experiencing increasing populations of wolves and where hunting quotas should be reduced to avoid a decline in prey populations (Nilsen et al. 2005). The objective of this study was to investigate the nature of the conflict between the Swedish hunters and the forest companies concerning the wolf issue. More specifically, by reviewing three hunting magazines and a forestry magazine we wanted to capture the current attitudes of the hunting and forestry sectors to the re-establishment of wolves in Sweden.

In scientific articles we get the unbiased, at least as far as is possible, picture of the ecological, biological, and social predictions and consequences of the re-establishment of wolves, whereas in hunting and forestry magazines a somewhat more biased picture emerges, which often can be more directly attributed to the authors' interests; i.e., whether or not the person owns land, and/or owns livestock, and/or is a hunter. To study the conflict between local moose hunters and a large forest company, we focused on one small village of Sweden within an area having one of the densest populations of wolves in the country. We also give a historical background about forestry and hunting in Sweden because these are the two key players concerning the management of the moose population.

METHODS

We reviewed articles dealing with moose, wolves, and forestry in the three largest hunting magazines in Sweden, 'Svensk Jakt' ('Swedish Hunting') published by the Swedish Association for Hunting and Wildlife Management, 'Jakt och Jägare' ('Hunting and Hunters') published by The National Swedish Association of Huntsmen, and 'Jaktjournalen' ('The Hunting Journal') which is independently published. Also, we reviewed the forestry

magazine 'Skogen' ('The Forest') published by The Swedish Forestry Association. We focused on the years between 2000 and 2004 because it was in 2000 that the debate really started concerning wolves in connection with moose hunting; i.e., in particular, the discussion concerning moose hunting quotas in areas with wolves. Further, we used the area 'Åmot' in the Southeast of Sweden (60°96'N, 16°45'E) as a case study to review the arguments in a conflict between local hunters and a forest company concerning the wolf, as the hunters in this area have been very vocal concerning altered hunting quotas as a result of the establishment of wolves in the area in 2001.

A BRIEF HISTORY OF SWEDISH FORESTRY

The forest industry has long been of vital importance to Sweden's economy. Of all the exported goods from Sweden in 2003, 13% were wood products (Karlsson 2004). The situation has historically been very different; in the beginning of the last century forest resources were alarmingly low, this mainly due to rapid human population growth demanding more land for grazing livestock and small hold leases (Ekelund and Hamilton 2001), and also by the expansion of the timber harvesting areas, which by the late 19th century affected pine ecosystems throughout all of Sweden (Axelsson and Östlund 2001). However, the country's first forestry legislation, the National Forestry Act of 1903, stipulated that logged forests should be cultivated and replanted. This action helped turn the forest industry into the single most important industrial sector in Sweden for decades. Selective felling was the most common forestry technique up to the end of the 1940s. However, the second National Forestry Act in 1948 prohibited selective felling of mature trees and opened up the forests for clear felling, a technique which was widely used during the 1960s and 1970s. As a result, large areas were cleared of trees.

This large scale forestry opened up the forest to extensive regeneration of trees and shrubs, and contributed to the increase of the moose population (Cederlund and Markgren 1987, Cederlund and Bergström 1996). Today, large areas of the Swedish boreal landscape are characterised by young, even-aged stands of pine trees (Axelsson and Östlund 2001).

MOOSE HUNTING AND OWNERSHIP OF LAND

The majority of forested land in Sweden (51%) is owned privately and 42% of the forest is owned by forest companies (including those owned by the state as well as by shareholding companies) (Karlsson 2004). Anyone who owns land, no matter its size, has the right to hunt on it under the condition that they fulfil the national regulations concerning hunting. The forest owners may also lease out the right to others to hunt on their property and this is a very common practice concerning moose hunting in Sweden.

The right to hunt on ones' own property has a long tradition in Sweden, dating back to 1789, when King Gustav III allowed all land owners in the country to hunt on their own property (Haglund 1980). However, the resulting intense hunting meant that an already declining moose population came close to extinction and in the beginning of the 19th century there were very few moose left in the country (Björklöf 1994). Prompted by this situation, the Swedish Association for Hunting and Wildlife Management (SAHW) was founded in 1830. One of its aims was to make hunting more ethical and to see that data were gathered in order to favour and publicize knowledge to the 'pleasure and education' of hunters (Haglund 1980). In 1938, the Swedish government adopted a new law, which placed the SAHW in control of the hunting and management of the Swedish moose population. With the aim to increase the size of the moose population, a series of hunting restrictions suggested by the SAHW

were adopted by the Swedish government. One of the ways to increase the moose population was by making it illegal to cull moose calves, but as the moose population started growing again this restriction was abandoned. During the 1960s hunting for calves was encouraged. This practice later proved to increase the moose population further, rather than reducing it (Åkerberg 2005). At the same time as the harvesting of calves was encouraged, the harvest of adult female moose was restricted, which meant that the hunt during the late 1960s was focused on the least productive segments of the moose population (Ericsson 1999).

Hunting restrictions in combination with modern forestry techniques were two important factors in the increase of the moose population. The harvest of moose increased from 11,318 to 32,680 between the years 1945-1960, and between 1960-1980 the harvest increased a further four times (The Swedish Association for Hunting and Wildlife Management 2005a).

As the moose population increased, damage to trees began to be seen as a problem by the forest owners, particularly to the forest companies who had seen many decades with virtually no browsing damage to their forests. As a result, discussions and efforts were intensified concerning how to manage the moose population more actively. In 1967, completely regulated moose hunting (i.e., under licence only) was introduced in a few counties (von Essen 2005) and in 1977 all of Swedish hunting was completely regulated (Åkerberg 2005). In 1982, the moose population peaked and 174,741 moose were culled. Currently, about 300,000 hunters participate in the moose hunt each year and about 100,000 moose are harvested annually (The Swedish Association for Hunting and Wildlife Management 2005a). Despite the hunting regulations, the moose population increased to a level almost beyond control and the high harvesting quota was mainly a result of pressures from forest companies who feared that the level of tree

damage would be too high. The attitude from many of the hunters at the time was that the excitement of moose hunting was almost gone as there were ‘too many moose’ (Andersson 1980).

THE ORGANIZATION OF SWEDISH MOOSE HUNTING

The county administrative boards assign moose hunting licence quotas according to the estimated moose density for each management unit and the unit’s quota is further broken down to correspond to each hunting team’s land coverage (Ericsson 1999). The number of moose to be shot each year is generally based on the culling the year before, by the hunters’ observations of moose during the first 7 days of the hunt, aerial surveys, moose pellet counts, and by inventories of the browsing pressure (The Swedish Association for Hunting and Wildlife Management 2005a). The method ‘ÄBIN’ is currently used to measure the browsing pressure by moose on pines and birches 1-4 m high. An index of browsing pressure is based on fresh browsing on top shoots, stem breakage, or bark stripping. The inventory is mainly performed on areas of 20-100,000 ha (The National Board of Forestry 2004a).

The current moose hunting system in Sweden can be described as a patchwork, with many types of hunting areas. ‘A-areas’ are where the size and characteristics of the area have to be such that a minimum of one adult moose can be culled per year and the hunting season is 70 days; ‘B-areas’ are where the demands for A-areas are not fulfilled; hunting may be permitted in these areas for one adult moose or one calf per year, the size of the area has to be a minimum of 5 ha, and the hunting time is a maximum of 5 days; ‘E-areas’, here one calf may be culled, the size of the area has to be a minimum of 20 ha and the hunting time is 70 days; ‘Ä-areas’, provide an area that is large enough and has the characteristics to allow management of its own moose population, here moose hunting

without licence is allowed, the hunting season is 70 days, the size of the area is usually at least 5,000 ha, the moose population within this area has to be able to sustain a culling of 25 moose per year. Finally there are ‘calf areas’ where, during a maximum 5 day season, an unrestricted number of calves can be culled (The County Board Administration Västra Götalands Municipality 2005).

WOLVES, MOOSE HUNTING, AND FORESTRY

On average, 500 wolves per year were harvested in Sweden during 1827-1839. Harvest of wolves and presumably numbers in the population decreased such that by 30 years later, fewer than 100 wolves per year were harvested (Aronson and Sand 2004). Wolf hunting continued and bounties were paid out for killed wolves as late as during the mid-1960s (Wabakken et al. 2001). When wolves became protected in 1966 there were 10 or fewer wolves remaining in Sweden (Aronson and Sand 2004). The first known litter since 1964 was born in northern Sweden in 1978, and in 1983 at least 6 wolves were born in south-western Sweden (Björvall 1988). However, it was not until the early 1990s that the Scandinavian wolf population started to exceed 10 individuals. Between 1991 and 1998 the average growth rate of the wolf population was 29% (Wabakken et al. 2001) and by 2005 there were about 110 wolves in Norway and Sweden of which about 85 were in Sweden and the rest in Norway (SEPA 2005; <http://www.naturvardsverket.se>).

The problem with the Swedish wolf population is not the fact that they are numerous per se, the problem is rather that the wolves are concentrated in relatively small areas of Sweden (Fig. 1) giving rise to conflicts with the locals. A rough calculation performed by Karlsson et al. (2004) estimates that Sweden has a prey population that could sustain a wolf population of about 5,000 individuals. However, at those densities of wolves, there would

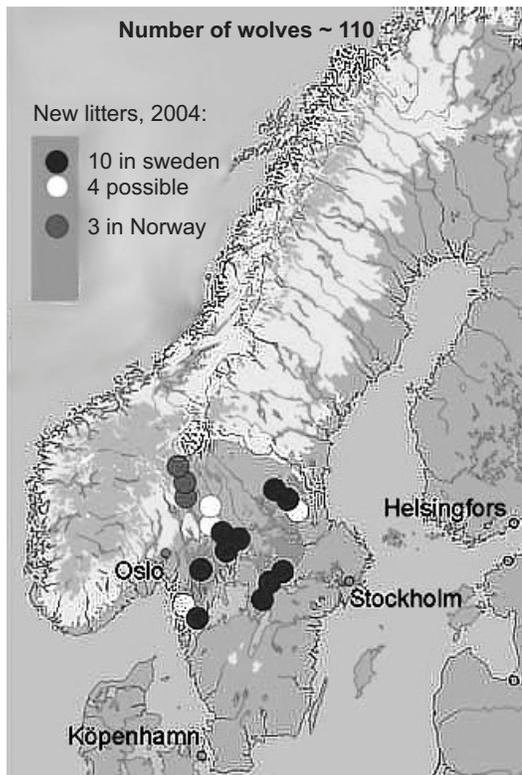


Figure 1. Map of Scandinavia showing the location of new wolf litters in 2004. Translated from Swedish. Source: SEPA Home Page, <http://www.naturvardsverket.se>.

be limited room for hunting of ungulates.

Since the Swedish wolf was nearly extinct for decades, there are few Swedish studies that have investigated the hunters' attitudes toward wolves. One exception is a study by Ericsson and Heberlein (2003) which showed that while Swedish hunters were the strongest supporters of wolves in the 1970s, their attitudes changed after the restoration of wolves in the country, and that by 2001 the hunters were actually less supportive of wolves than was the general public.

Because the forest companies in Sweden are one of the major leasers of moose hunting licences to the Swedish moose hunters, the companies greatly influence the number of moose to be harvested by the hunters in a particular area. Officially, the quotas are set by the county administrative boards, but it is

stated in the Swedish hunting legislation that at least one member of this board (consisting of 11 members plus one representative from the Sami community in some northern counties) should be appointed by the national board of forestry and a further 3 should represent owners of agrarian and forest land (SFS 1987:905). In 2000, forest owners were expressly encouraged by the magazine 'The Forest' to take a greater role in the areas where they could influence moose management (Johansson 2000). Moreover, the forest companies have other ways to put pressure on the leasing hunters. For example, there have been demands for the hunters to pay the company harvesting fees in advance, based on a 100% fulfilment of that year's quota. There might also be different harvesting fees depending on the gender of the shot moose (cows are usually cheaper because the companies prefer that the hunters harvest cows instead of bulls) and, if the leasing hunters cannot harvest the full quota, other hunters (Swedish and/or foreign) might be brought in on the basis of external hunting tourism (A. Kjellsson, The Swedish Association for Hunting and Wildlife Management, personal communication).

The demand of paying the harvesting fees in advance can put a great financial strain on the hunting teams. Annual leasing fees per ha are generally quite cheap in the northern parts of Sweden [2-15 SEK] while they increase radically as one moves further south. Higher fees in the south are mainly due to more hunters or hunting teams competing for hunting opportunities. In extreme cases, the cost may be as high as 300 SEK per ha but the leased areas in the south are, on the other hand, usually not as large as the areas in the north. Most landowners within a certain area usually charge similar leasing fees because it is regarded as bad form to overcharge. However, in general, forest companies frequently place themselves a few percent above the regular fee (A. Kjellsson, The Swedish Association for Hunting and Wildlife Management, personal

communication). In addition to the leasing fee, hunting teams must pay a governmental harvesting fee of 300 SEK per killed adult moose (calves are free) and the landowner seeks an additional harvest fee. One forest company charged about 3,500 SEK per killed adult moose and 800 SEK per killed calf (B. Eriksson, Stora Enso, personal communication). Considering that hunting teams rarely consist of more than 15 people (usually 5 - 15 people), but that they can easily shoot more than 15 moose in some areas of the country, these extra harvesting fees, especially if they have to be paid in advance, can represent a considerable part of the annual expense for the hunting teams. However, it must be noted that there may be an extremely large difference between areas. It all depends on how big the competition is between the hunters in the areas in question (i.e., how much the land owner can charge for the leasing fee and how large the hunting areas are), how abundant the game is, and who the landowner is. Different forest companies have different policies and the only thing consistent is that even though the various fees can represent quite a lot of money (not least for the hunting teams) overall, it is usually not a large part of the companies' annual revenue – rarely more than 0.5 - 1%.

The re-establishment of wolves in Sweden presents another issue in the relationship between the hunters and the forest companies, at least in the areas with wolf territories. Conflicts arise as to whether the forest companies or the hunters should have the largest influence over the moose hunting quota. According to Swedish legislation, both groups should have a similar influence, but there is a conflict of interest because the forestry industry is to grow commercially important trees in the most efficient manner, therefore a minimum amount of damage to trees by moose is desirable whereas the moose hunters wish to have a sufficiently large moose population in order to have a meaningful hunt. A forest owner in the magazine 'The Forest' says: 'It

is the land owner who owns the moose hunting and the hunting ground and also pays for the moose damage' (Ek 2003). Whereas a moose hunter in 'The Hunting Journal' says: 'There should be a better way to manage the moose population than to shoot it to pieces, one should not forget that the land owners get a large income from a well managed moose population' (Nilsson 2004a).

The moose population should be in balance with the available food supply in a specific area and a current goal set by the Swedish forest companies is that the level of fresh moose damage on young forests should not exceed 2% per year, corresponding to 1,000-1,800 undamaged trees (the main trunk) per ha. By 2005, the goal is that the level of fresh moose damage should be less than 2% within a minimum of 80% of the surveyed areas (Steffansson 2002). However, the level of moose damage in a specific area is hard to predict as there are other factors than the moose density per se, such as stand density (Lyly and Saksa 1992, Ball and Dahlgren 2002) and tree species composition (Danell et al. 1991) that influence damage levels caused by moose browsing. The SAHW do not agree with this goal as they think it will be difficult to maintain a balance between the moose harvesting levels and the goal of maximum 2% moose damage in areas with wolves, and suggest in order to maintain moose hunting quotas that the forest owners will have to accept a higher level of moose damage in areas where there are wolves (Lundvik 2002).

In the three Swedish hunting magazines there were hardly any articles between 2000-2004 in which the forest companies generally expressed a negative attitude against the presence of wolves, and the hunting manager of the forest company in Åmot says in the magazine 'Hunting and Hunters' that 'it is not the forest companies mission to grow food for wolves at the expense of the forest company, and at the same time, we do not say no to wolves in our forests' (Törnström 2001). From the moose

hunters' perspective, there are many articles in all the three hunting magazines that express a clear resentment to how the forest companies handle the wolf issue. For example, one hunter in Åmot says: 'Is there any reason at all for the moose hunters to cooperate with the land owners (i.e., a forest company) if the thank you we'll get is that we no longer can hunt for moose' (Törnström 2002). Another hunter interviewed for the magazine 'The Hunting Journal' says that 'the forest companies are only interested in trading with wood and do not care about us hunters' (Larsson 2003).

THE CONFLICT IN ÅMOT

The conflict between hunters, forest companies, and the wolf is evident when looking at the situation in 'Åmot', a small village located in south-eastern Sweden. Almost all land (161,000 ha) within the Åmot moose preservation district is owned by a single forest company which distributes the quota to the hunters who, in turn, lease the right to hunt there. The hunters in the area claim that they have been 'hunting under threat' from the forest company for many years; the threat being that the forest company would bring in their own hunters if the local hunters refused to harvest the large number of moose that the forest company is required to harvest in order to reduce the moose population and browsing damage (Olsson 2003a). In 2001, the high hunting quotas came to an abrupt end when a pair of wolves established in the area had 8 pups the same year. The situation changed drastically for the hunters. Instead of harvesting 22 moose as in 2,000, the following year only 3 moose were shot, and from 2002 to 2004 one adult moose (and one calf in 2004) was shot per year out of the total 3 moose identified on the licence to be harvested each year between 2001-2004 (The County Board Administration Gävleborg Municipality 2005). The hunters decided to refrain from shooting calves as they feared that would decrease the moose population to an unacceptably low level. This can be

viewed as an example where the local hunters feel powerless with respect to decisions about the hunt in their area and use the limited means they have to express their discontent, in this case, refusing to harvest calves (3 of the 4 hunting districts in Åmot are B-areas, in which the hunters can choose whether to shoot one adult moose or one calf).

Before the establishment of wolves in the area, moose density was 5.9 moose per 1,000 ha and a year after, in 2001, when the wolves had established in the area, the moose density was down to 0.8 moose per 1,000 ha (Olsson 2003a). The hunters in Åmot have suggested to the forest company that in order to have a meaningful hunt, the moose densities should be 8.45 moose per 1,000 ha, a suggestion which, according to the hunters, the forest company did not agree with. By 2003, many hunters in the area had ceased hunting as they did not think it worthwhile to hunt for only one moose (Olsson 2003a). The representative of the forest company responsible for hunting issues agreed that the situation in Åmot is problematic. In an interview in 'Svensk Jakt' in 2003, he claims that the moose population cannot be increased as the moose then would cause too much damage on young pine plantations. Further, the same representative thinks that the hunters will breach the hunting agreement if they decide not to harvest moose calves. As he expresses it 'a hunting lease is a business agreement and anyone who leases the right to hunt must try to harvest the amount of moose stated on the licence' (Olsson 2003b).

CONTROLLED HUNTING OF WOLVES

As a result of the increase in the wolf population, conflicts arose with farmers, hunters, and locals in the areas having wolf territories and voices were raised demanding a hunt for wolves. However, controlled hunting of wolves in Sweden is very restrictive. Between 1992 and 2005, SEPA has permitted controlled hunting for wolves in

four instances, for a maximum of 5 wolves (of which 4 were harvested; 1 in 1992, 2 in 2003, and 1 in 2005) (Swedish Environmental Protection Agency 2005). Between the years of 2002 and 2005, 18 petitions were handled by the SEPA, two of which came from The Swedish Association for Hunting and Wildlife Management in cooperation with the Federation of Swedish Farmers. The two petitions applied for controlled hunting of wolves in 8 wolf territories. The rationale for the petitions was to protect the hunters' interests, protect domesticated animals (including hunting dogs), and to 'lessen the anxiety' in areas with wolf territories. The SEPA rejected both petitions with the main argument that the Swedish wolf population had not reached the first level of the goal for the size of the wolf population stated by the Swedish Government in 2000, which is 20 rejuvenations per year, corresponding to roughly 200 animals. Before this first goal is reached only limited use of controlled hunting should be allowed. Also, according to the SEPA interpretation of the petition, the purpose was preventive; i.e., to limit the wolves' rate of population growth and decrease the actual number of wolves in areas having the highest concentrations of wolves rather than aiming the controlled hunting toward specific damage-causing individuals in the wolf population. Moose hunters in areas with wolf territories have been on strike; i.e., refusing to search for moose injured in traffic accidents, as a protest to this state of affairs. They claim that since they have to use their dogs to search for the injured animals, they do not want to risk their dogs being attacked by wolves (Nilsson 2004b).

DISCUSSION

During the 1900s, Swedish moose management has been characterized by numerous rules and regulations. In hindsight it is clear that the attempts to control the moose population have failed very often. It does not seem so simple that the more facts and knowledge

we have about the moose population, the more control we have over it. When reading through the four magazines it becomes clear that there still is a gap between scientific results and their implementation in moose management. Now that the wolves have entered the scene, things are further complicated by emotional arguments and any attempts to manage the moose population in wolf territories will have to take not only ecological, biological, and political factors into account but also listen to the local hunters because, in many instances, they feel like they have been neglected. If there is not better communication between local moose hunters and representatives of the forest companies concerning the wolf issue, we may be at risk of having more situations like the one in Åmot.

The issue concerning ownership of land is also a complicated one. Should moose hunting only be tied to ownership of land or are there other options? The responsibility for management of moose hunting lies at the local and regional levels, and the goal for the management is, in general, to maintain a stable moose population; i.e., in terms of their number and age, their reproduction, and also to strive to minimize their damage to forests (The Swedish Association for Hunting and Wildlife Management 2005a). Moose management under the current 2% damage goal may prove to be difficult in many areas and if the wolf population continues to increase many hunters may have to accept a lower moose hunting quota unless land owners are willing to accept more browsing damage in areas with wolves. The ÄBIN inventories performed between the years of 2000-2004 show that the majority of the areas surveyed for moose browsing injury are over the 2% limit set by the forest companies (The National Board of Forestry 2004b).

There is currently a suggestion for a new moose management system for Sweden that has been worked out by The Swedish Association for Hunting and Wildlife Management,

The National Swedish Association of Huntsmen, the Federation of Swedish Farmers, and the forest industries. The suggestion is that the County Administrative Board divides the country into moose management areas in cooperation with hunting and landowner organizations. These areas should be, at a minimum, 50,000 ha and have a set hunting season (The Swedish Association for Hunting and Wildlife Management 2005b).

The idea behind the suggestion is that the administration of the hunt should be less complicated and better coordinated and that the moose hunting quota should be set to a higher degree than today for a better balance between the local moose hunters' interests and the forest industries' wish to keep damage levels caused by moose low. For example, a hunting area which has high densities of predators should have a moose hunting quota which is based on the moose population in the whole moose management area rather than the situation today where neighbouring areas may have a large reduction in the moose hunting quota, leading to feelings of injustice for the local moose hunters.

ACKNOWLEDGEMENTS

We thank J. P. Ball and E. M. Addison for constructive comments that greatly improved this manuscript. This work was funded by the Kempe Foundation via a grant to the Swedish Council for Sustainable Development.

REFERENCES

- ÅKERBERG, S., editor. 2005. Viltvård, älgar och jaktturism: Tvärvetenskapliga perspektiv på jakt och vilt i Sverige 1830-2000. Nyheternas tryckeri, Umeå, Sweden. (In Swedish).
- ANDERSSON, S. 1980. Visst var älgjakten roligare förr? Svensk Jakt 118:912-915. (In Swedish).
- ARONSON, Å., and H. SAND. 2004. Om vargens utveckling i Skandinavien de senaste 30 åren. Skogsvilt III: 47-53. (In Swedish).
- AXELSSON, A. -L., and L. ÖSTLUND. 2001. Retrospective gap analysis in a Swedish boreal forest landscape using historical data. Forest Ecology and Management 147:109-122.
- BALL, J. P., and J. DAHLGREN. 2002. Browsing damage on pine (*Pinus sylvestris* and *P. contorta*) by a migrating moose (*Alces alces*) population in winter: relation to habitat composition and road barriers. Scandinavian Journal of Forest Research 17:427-435.
- BJÄRVALL, A. 1988. Lär känna vargen. The Swedish Association for Hunting and Wildlife Management, Stockholm, Sweden. (In Swedish).
- BJÖRKLÖF, S. 1994. Älgen i vår historia och vardag. Milano Stampa, Milano. (In Swedish).
- CEDERLUND, G., and R. BERGSTRÖM. 1996. Trends in the moose-forest system in Fennoscandia, with special reference to Sweden. Pages 265-281 in R. M. DeGraaf and R. I. Miller, editors. Conservation of Faunal Diversity in Forested Landscapes. Chapman & Hall, London, U.K.
- _____, and G. MARKGREN. 1987. The development of the Swedish moose population, 1970-1983. Swedish Wildlife Research Supplement 1:55-61.
- DANELL, K., L. EDENIUS, and P. LUNDBERG. 1991. Herbivory and tree stand composition: moose patch use in winter. Ecology 72:1350-1357.
- EK, B. 2003. Gröna guldet blir bara massa. Skogen 9:27. (In Swedish).
- EKELUND, H., and G. HAMILTON. 2001. Skogspolitisk historia. Skogsstyrelsen, Jönköping, Rep. 8A. (In Swedish).
- ERICSSON, G. 1999. Demographic and life History Consequences of Harvest in a Swedish Moose Population. Ph. D. Thesis, University of Agricultural Sciences, Umeå, Sweden.
- _____, and T. A. HEBERLEIN. 2003. Attitudes

- of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation* 111:149-159.
- HAGLUND, B., editor. 1980. *Jägaren och vildnaden*. Svenska Jägareförbundet, Stockholm, Sweden. (In Swedish).
- JOHANSSON, S. 2000. Mindre makt åt jägarna när skogsbruket tartar i samråden. *Skogen* 11:32-35. (In Swedish).
- KARLSSON, S. 2004. Estate and ownership structure. Pages 31-43 in J. O. Loman, editor. *Swedish Statistical Yearbook of Forestry 2004. Volume 54. AB Danagårds Grafiska, Jönköping, Sweden*.
- _____, H. ANDRÉN, and H. SAND. 2004. Vad bestämmer antalet vargar och deras utbredning i framtiden? Pages 54-57 in G. Jansson, C. Seiler, and H. Andrén, editors. *Skogsvilt III: vilt och landskap i förändring*. Grimsö Research Station, Swedish University of Agricultural Sciences, Sweden. (In Swedish).
- _____, and P. JAXGÅRD. 2004. Vargangrepp på hundar. Pages 243-247 in G. Jansson, C. Seiler, and H. Andrén, editors. *Skogsvilt III: vilt och landskap i förändring*. Grimsö Research Station, Swedish University of Agricultural Science, Sweden. (In Swedish).
- LARSSON, J. 2003. *Jaktjournalen* 1:48-49. (In Swedish).
- LUNDAVIK, B. 2002. Vargdebatt fyllde sporthall, *Svensk Jakt* 7:22. (In Swedish).
- LYLY, O., and T. SAKSA. 1992. The effect of stand density on moose damage in young *Pinus sylvestris* stands. *Scandinavian Journal of Forest Research* 7:393-403.
- MECH, L. D. 1995. The challenge and opportunity of recovering wolf populations. *Conservation Biology* 9:270-278.
- NILSEN, E. B., T. PETTERSEN, H. GUNDERSEN, J. M. MILNER, E. J. SOLBERG, H. P. ANDREASSEN, and N. C. STENSETH. 2005. Moose harvesting strategies in the presence of wolves. *Journal of Applied Ecology* 42:389-399.
- NILSSON, H. 2004a. Fred i älgskogen? *Jaktjournalen* 9:3. (In Swedish).
- _____. 2004b. Jägarstrejk i protest mot vargpolitiken. *Jaktjournalen* 1:3.
- OLSSON, O. 2003a. I Åmot jagar man av sociala skäl. *Svensk Jakt* 2/3: 60-62. (In Swedish).
- _____. 2003b. Förmycket älg i Åmot. *Svensk Jakt* 2/3:63. (In Swedish).
- STEFFANSSON, J. 2002. Ungskogar med bra kvalité och med rätt trädslag! *Balans* 1:4-5. (In Swedish).
- (SFS) SWEDISH CODE OF STATUTES. 1987. *Jaktförordningen*. Swedish Board of Agriculture, Stockholm, Sweden.
- SWEDISH ENVIRONMENTAL PROTECTION AGENCY. 2005. Skyddsjakt på varg. <http://www.naturvardsverket.se/>. (accessed 20 Dec 2005).
- THE COUNTY BOARD ADMINISTRATION, GÄVLEBORG MUNICIPALITY. 2005. Älgjaktsinformation. <http://www.x.lst.se/>. (accessed 20 Dec 2005).
- THE COUNTY BOARD ADMINISTRATION, VÄSTRA GÖTALANDS MUNICIPALITY. 2005. Älgjakt. <http://www.o.lst.se/o/amnen/Jakt/Algjakt.htm>. (accessed 20 Dec 2005).
- THE NATIONAL BOARD OF FORESTRY, SWEDEN. 2004a. Älgbetningsinventering – ÄBIN <http://www.svo.se/minskog/templates/Page.asp?id=12188>. (accessed 20 Dec 2005).
- _____. 2004b. Enkel älgbetningsinventering, 'ÄBIN', resultat. <http://www.svo.se/minskog/Templates/EPFileListing.asp?id=10193>. (accessed 20 Dec 2005).
- THE SWEDISH ASSOCIATION FOR HUNTING AND WILDLIFE MANAGEMENT. 2005a. <http://www.jagareforbundet.se/viltvetande/artpresentation/algforvaltningo.asp>. (accessed 20 Dec 2005).
- _____. 2005b. Förslag till nytt älgförvaltningssystem. <http://www.jagareforbundet.se/forslagtillnyttalgforvaltningssystem.asp>. (accessed 20 Dec 2005).
- TÖRNSTRÖM, D. 2001. Även skogsbolagen ho-

- tar älgstammen. *Jakt och jägare* 12:2-3.
- _____. 2002. Skogsbolagen största hotet mot älgjakten. *Jakt och Jägare* 3:55.
- VON ESSEN, H. 2005. Från allmogejakt till avverkningsjakt. Pages 15-23 *in* S. Åkerberg, editor. *Viltvård, älgar och jaktturism*. Nyheternas tryckeri, Umeå, Sweden. (In Swedish).
- WABAKKEN, P., O. LIBERG, and A. BJÄRVALL. 2001. The recovery, distribution, and population dynamics of wolves on the Scandinavian peninsula, 1978-1998. *Canadian Journal of Zoology* 79:710-725.