Management Plan for the Wild Forest Reindeer Population in Finland

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Summary

In Finland, the wild forest reindeer is a game animal, and responsibility for the management and conservation of the wild forest reindeer population belongs to the Ministry of Agriculture and Forestry. At the province level, game management is the responsibility of the game management districts, which are local administrative units of the Finnish game management system and also of the statutory hunting organization.

Over the past few years, the growth of the wild forest reindeer population in Suomenselkä, its decline in Kainuu, the spread of wild forest reindeers to new areas and ways of ensuring genetic purity have highlighted the major challenges in managing the wild forest reindeer population in Finland. Even though attitudes to the wild forest reindeer are for the most part positive, there are conflicting aims in managing the wild forest reindeer population, both at the national and the regional level.

The management plan for the wild forest reindeer population in Finland was prepared in order to fulfil international obligations. During the preparation of the plan, the opinions of regional and national players were taken into consideration.

The management plan for the wild forest reindeer population in Finland is made up of two parts. Part 1 sets the background for the Ministry of Agriculture and Forestry's policy vis-à-vis the wild forest reindeer population. It describes the biology and the status of the wild forest reindeer population based on up-to-date Finnish research. Part 1 also deals with topics such as the economic and social significance of the wild forest reindeer in modern society, national legislation, international obligations, research, previous aims of population management and measures recently carried out.

Part 2 presents guidelines based on the one hand on the biology of the wild forest reindeer but on the other hand on socio-economic facts that are considered important in this context, all of which the Ministry of Agriculture and Forestry will apply in its continued systematic management of the wild forest reindeer population to ensure that the species remains a permanent part of biodiversity in Finland. This aim will be implemented through the combined effects of different measures. Measures are proposed for aspects such as regional population management; the prevention of damage and costs; compensation for damage; hunting; monitoring of the wild forest reindeer population; research and how to develop it; the provision of training, advisory services and information; supervision of hunting; cooperation among the various parties involved; and the allocation of responsibility for population management. The measures to be taken will take into account economic and social demands and regional and local special features. Implementation of the plan will be monitored, and the plan will be updated as necessary.

Contents

1 Introduction

1.1 Background

There are many aims associated with game management. The favourable development of populations and the conservation of these species must be safeguarded, and it must also be possible to reconcile the perspectives and demands of various stakeholders when it comes to game management. The perspectives of local people in particular must not be ignored.

Species-specific management plans are one tool for fulfilling the special requirements of population management. Management plans for managing the protection and sustainable use of animal species are becoming more widespread internationally too.

The wild forest reindeer (Rangifer tarandus fennicus Lönnb.) disappeared entirely from Finland around the turn of the 20th century. The species has been re-introduced into Finland through natural dispersal and active population management measures. The wild forest reindeer population is currently undergoing an interesting phase of development. Management of the Suomenselkä subpopulation initially focused on conservation, but its favourable development has meant that management methods can now be increasingly based on the principles of sustainable use. To begin with, the status of the Kainuu subpopulation was also developing in the same direction as the Suomenselkä subpopulation, but this has now changed. The number of wild forest reindeer in Kainuu had been increasing up until 2001, but the population has declined significantly since then, and hunting has not been permitted since the 2002–2003 hunting year.

For decades, the Ruunaa subpopulation in North Karelia had comprised only 20 individuals, but the most recent data show that this subpopulation has now died out. Introductions made by Ähtäri Zoo has resulted in the development of a new subpopulation in the area of Suomenselkä, near Ähtäri. However, current data show that this subpopulation is also in decline.

The growth of the wild forest reindeer population in Suomenselkä, its decline in Kainuu and the increase in the size of habitats have highlighted local and regional differences in the interaction between people and wild forest reindeer. On the one hand, sustainable use of the growing numbers of wild forest reindeer is possible and even called for in order to limit numbers and prevent damage caused by the animals. On the other hand, demands are being made that the wild forest reindeer should be protected and hunting banned. The problems associated with preservation of the genetic purity of the species also continue to exist and will require further action.

Limited hunting of wild forest reindeer has been possible with a hunting licence since 1996, for the purpose of preserving the genetic purity of the species and preventing traffic accidents and damage to agricultural land. From the perspective of population management, however, it is necessary to investigate further issues in more detail. Do we want to safeguard the natural structure of the population or develop the population in accordance with other criteria? How can we actually develop the wild forest reindeer subpopulations, and what are the target figures for the different areas? In addition to all this, the most important question is associated with the animal itself: Is the wild forest reindeer's future as part of Finland's natural biodiversity secure?

1.2 Preparation of the management plan

During the initial phase of the management plan process, the Institute of Rural Research and Training at the University of Helsinki (in Seinäjoki; currently the Ruralia Institute) carried out a project for the Ministry of Agriculture and Forestry based on interviews with wild forest reindeer experts and with local people in order to collect background information for the management plan. The research project published in 2003 provided comprehensive background information on the socio-economic perspectives associated with the wild forest reindeer. During the next phase, the actual draft of the management plan was compiled. The draft was submitted to the Ministry of Ag-

riculture and Forestry on 8 December 2003. After that, civil servants prepared a version based on this draft dated 22 January 2004, and this proposed management plan was widely circulated for comment as of that date.

A total of 35 comments were received. All respondents considered it important that the drafting of a management plan be based on international obligations, national characteristics and taking the perspectives of local, regional and national stakeholders into account. Those commenting on the plan generally felt that the Part 1 of the draft plan was an excellent information package, and very few concerns were raised. The attitude to Part 2 of the draft plan was also positive on the whole, though far more concrete and precise measures for the development of the wild forest reindeer population were proposed in some of the statements.

On the basis of the comments received, civil servants at the Ministry of Agriculture and Forestry prepared a final version of the management plan. It was possible to put much more detail into the management plan using the remarks, suggestions and specifications made in the comments. A significant amount of valid research data and material that was published after the draft was circulated for comment was also included. This has made it possible to clarify the background to the management plan, the targets in the aims section (Part 2) and thus the implementation measures and bring them up to date.

1.3 Aims and measures in the management plan

The background section of the management plan sets out in detail the population management measures that have been carried out to benefit of the wild forest reindeer population (e.g. translocation and measures to safeguard the genetic purity of the species), and provides a comprehensive description of other contributory factors (e.g. the biology of the wild forest reindeer, the status of wild forest reindeer subpopulations, research, legislation, damage caused by wild forest reindeer and the wild forest reindeer as a game animal). In the measures section, an overall view of how the management and development of the wild forest reindeer population in Finland must be continued is shaped on the basis of the background research, taking into account the perspectives of various players.

The aim is to continue the systematic development and management of the wild forest reindeer population using strategies defined using up-to-date information in order to ensure that the wild forest reindeer remains a fundamental member of Finland's fauna and a valued and viable game animal species. This aim will be implemented through the combined effects of different measures. Measures are proposed for aspects such as safeguarding the genetic purity of the species, reversing the decline of the Kainuu subpopulation, monitoring the wild forest reindeer population, damage prevention, reforming hunting practices, research, supervision of hunting, training provided by the statutory hunters' organization, advisory services and information, and cooperation among the various parties involved.

Implementation of the plan will be monitored, and the plan will be updated as necessary.

Helsinki, 12 July 2007

Sirkka-Liisa Anttila
Minister of Agriculture and Forestry

Christian Krogell
Acting Director, Department of Fisheries and Game

PART 1. BACKGROUND TO THE MANAGEMENT AND CONSERVATION OF THE WILD FOREST REINDEER POPULATION IN FINLAND

2 The wild forest reindeer is a subspecies of the reindeer (Sauli Härkönen and Jukka Bisi, University of Helsinki)

The first scientific description of the wild forest reindeer was written in 1909, by which time the species had already in practice died out Finland. After examining a stuffed wild reindeer, two skulls and the carcasses of wild reindeer that had been shot, the Swedish zoologist Einar Lönnberg came to the conclusion, based on the size of these animals, that the wild reindeer in Finland were a species which had adapted to a forest habitat and which significantly differed from the mountain/wild reindeer (see Montonen 1974). Lönnberg suggested calling this species Rangifer tarandus fennicus — the Finnish forest reindeer. Some studies classify the wild forest reindeer as a species in its own right, but nowadays the wild forest reindeer is unambiguously classified as a subspecies of reindeer (Nieminen 1982a).

In addition to the wild forest reindeer, European subspecies include the mountain/wild reindeer (R. t. tarandus), adapted primarily to mountain conditions, and the Svalbard reindeer (R. t. platyrhynchus), adapted to Arctic conditions. Genetically, the wild forest reindeer found in Siberia differs from the types found in Europe, and it is sometimes classified as a subspecies in its own right (R. t. valentinae) (Gruzdev & Davydov 2001). Four more subspecies of reindeer can be found outside of Europe: the Peary caribou (R. t. pearyi), Grant's caribou (R. t. grantii), the barren-ground caribou (R. t. groenlandicus) and the woodland caribou (R. t. caribou). The Arctic reindeer (R. t. eogroenlandicus) became extinct at the beginning of the 20th century. The domesticated reindeer of Lapland are a form of mountain/wild reindeer bred for the needs of humans (Helle 1982; Nieminen 2000). As many as 22 subspecies of the Rangifer genus used to be identified (see Nieminen 1986).

According to current thinking, the reindeer/caribou in the Rangifer genus are divided into three major ecological groups (woodland, tundra/mountain and Arctic islands), although this is insufficient to account for the differences in their DNA (Flagstad & Røed 2003). This points to the fact that the variations in the morphology of the reindeer subspecies are likely to have developed relatively late, as a way of adapting to the climatic changes since the Ice Age.

The findings of Flagstad and Røed (2003) support the classic theory, based on morphological and historical data (Banfield 1961), that the tundra reindeer (groenlandicus, grantii and tarandus) originated in the Ice Age region of Beringia, and possibly the Central European refuge to the north of the Alps. On the other hand, their findings suggest that the Eurasian wild forest reindeer (fennicus), which according to the classic theory (Banfield 1961) originated in a separate temperate refuge, in fact has the same diphyletic origin as the mountain/wild reindeer (tarandus) and has only recently, after the Ice Age, adapted to forest conditions (Flagstad & Røed 2003).

The mountain/wild reindeer and the wild forest reindeer entered Fennoscandia after the Ice Age. It has been possible to identify the periods when reindeer came to Finland and their distribution through various archaeological finds of reindeer bones (see e.g. Ukkonen 1993; Rankama & Ukkonen 2001; Ukkonen et al. 2006). According to Ukkonen (1993), the wild forest reindeer arrived in south-eastern Finland during the Atlantic period (6000 to 3000 years ago), which is earlier than the timing suggested by Lepiksaar (1986), for example.

According to Siivonen (1972), the wild forest reindeer spread to Finland from the east after the Ice Age (see also Rankama & Ukkonen 2001). Their re-introduction into the fauna of Finland also came from the east. The first wild forest reindeer to come over from Russia in the 1940s were observed in Kuhmo (Vanninen 1972).

The genetic purity of the wild forest reindeer and other reindeer subspecies has been investigated. The history of the wild forest reindeer shows that the wild forest reindeer and the reindeer have existed side by side in Finland (see Montonen 1974) and Russian Karelia (Danilov & Markovsky 1983; Danilov 1989) at various stages and that there has been interbreeding. The latest example is from Kainuu at the beginning of the 1970s when, as their population grew, wild forest

reindeer strayed onto the reindeer pastures of the Halla reindeer herding cooperative and into the herd of farmed reindeer. Reindeer and wild forest reindeer are believed to have lived in the same areas in the forested areas of Lapland even as recently as the 19th century (e.g. Nieminen 1982a; Heikura et al. 1985; Pulliainen & Leinonen 1990).

According to Väinölä et al. (2001), the wild forest reindeer of Kainuu and Russian Karelia form a genetically coherent group which differs clearly from the reindeer and the wild forest reindeer population of the more eastern region of Arkhangelsk; it can be regarded as an intermediate form of these subspecies. Väinölä et al. (2001) also believe that the wild forest reindeer is found in its purest genetic form in Russian Karelia's most southern and western ranges. For example, the wild forest reindeer in Louhi and Kemi show signs of the reindeer experiments carried out in Russia.

The results of the DNA study carried out by Väinölä et al. (2001) dovetail with skull and carcass measurements carried out at the University of Oulu (Hakala et al. 1996); they support the contention that the wild forest reindeer can be classified as a separate subspecies.

The Suomenselkä subpopulation clearly differs from the other subpopulations studied. According to Väinölä et al. (2001), the history of the subpopulation's development provides the explanation for this, as the genetic basis of the subpopulation is formed from the genetic material of wild forest reindeer translocated from Kainuu. The Suomenselkä subpopulation is a genetic sample of the Kainuu subpopulation, but it is more inbred. The favourable development of the population does, however, prove (Anon. 2003; Kojola et al. 2007) that inbreeding has not slowed the growth of the population.

The wild forest reindeer is of undisputed significance in Finnish cultural history, as it has long been a part of Finnish wildlife and the settlement of Finland (Montonen 1974; Heikura et al. 1998). The wild forest reindeer was in the past found practically all over Finland, and there is evidence of this in the large numbers of place names beginning with the element peura, the Finnish word for wild forest reindeer (Montonen 1974; Nieminen 1982b).

There has been some discussion regarding the genetic purity of the wild forest reindeer and whether or not it constitutes a subspecies (Nieminen 2000). The classification of the different species of caribou is also open to interpretation in the same way, and perspectives vary (see e.g. Thomas & Gray 2002; COSEWIG 2004). These differences of opinion in part due to the fact that terms such as species, subspecies, metapopulation, population, subpopulation, local population, herd, deme, cline and intergrade are used loosely and without clear definitions.

The national and current perspective both consider the wild forest reindeer as a subspecies of reindeer in its own right, even though its genome does contain characteristics of the genetic material of reindeer. Certain EU regulations, international agreements and Finnish national legislation also acknowledge and define the existence of wild forest reindeer.

3 Biology of the wild forest reindeer (Sauli Härkönen and Jukka Bisi, University of Helsinki)

3.1 Reproduction

Unlike the moose, the white-tailed deer and the roe deer, female wild forest reindeer mainly give birth to one calf at a time. Wild forest reindeer females have their first calf when they are two to three years old. Twin calves are rare. Females tend to give birth to their calves on peatland and the surrounding thick forest. Female reindeers return to the same calving grounds from one year to the next. The woodland caribou has been observed to have similar behaviour (e.g. Seip 1992).

The reproduction rate of the wild forest reindeer is significantly lower than that of cervids which produce two or more calves at a time. With the current gender and age structure regulated by hunting practices, the annual increase in the adult moose population can be as high as 50–60%, while the natural increase in the wild forest reindeer population remains at 20% to 25% (Kojola 1996).

During the rutting season, which lasts from September to October, wild forest reindeer form rutting herds of 10–40 reindeer. These rutting herds usually contain only one dominant male, the 'alpha male', who mates with some of the females in the rutting herd. As the rutting season progresses and the alpha male starts to tire out, the subordinate males in the rutting herd get the opportunity to mate with the females (K. Kilpeläinen, verbal communication 2003). This observation confirms the data on mountain/wild reindeer in Norway, according to which more males than previously assumed produce calves (Røed et al. 2005).

No detailed information exists on the mortality of wild forest reindeer calves, or of different adult age groups. Approximately 30% to 50% of woodland caribou calves survive their first year (Thomas & Gray 2002). The typical calf yield of the woodland caribou is maintained to be 70–74 calves per 100 adult females. The mortality of adult (> 1 yr.) caribou females has been observed to vary between 5% and 15% (Bergerud & Elliott 1998). It is estimated that the woodland caribou population should remain stable when 30 calves for every 100 adult females survive until the autumn (Anon. 1996).

3.2 Use of feeding grounds

It is typical for wild forest reindeer to have separate winter and summer feeding grounds and to migrate between them in the spring and autumn. Woodland caribou also exhibit similar behaviour (Thomas & Gray 2002). In the summer, wild forest reindeer eat fresh green vegetation, and in the winter, their diet consists of lichen; this explains why they migrate in the autumn. In the summer, when there is plenty of fresh green vegetation, wild forest reindeer migrate to lush peatlands and the surrounding areas. During the summer months, they mainly graze on grasses, sedges and hay. In the autumn, when the vegetation has withered away, wild forest reindeer migrate to dry heath forests in search of lichen. Wild forest reindeer also feed on grass and winter grain cultivations. Grazing on cultivated fields mainly happens during the early winter and late spring (Heikura et al. 1985; Kojola 1996, Heikura 1997).

The lichen that makes up the main part of the winter diet grows on ridges or in heath forests with nutrient-poor soil. Lichen has a slow growth rate, which means that it does not take long for feeding grounds to be stripped of lichen (Heikura 1998a). This forces the wild forest reindeer to find new feeding grounds, and during the winter they will travel further and further away from their calving grounds. It is, however, typical for wild forest reindeer to move on to a new feeding ground before all the lichen has been stripped from the previous one.

Wild forest reindeer are gregarious. Females spend the early summer alone hidden away with their calf, but at the end of the summer they join herds again. During the rutting season, which lasts from September until October, the animals form rutting herds. Once the rut and mating have taken place, the herds migrate towards their winter feeding grounds along their traditional migration routes, and they even use the exact same paths (Pulliainen et al. 1986).

Wild forest reindeer usually migrate in separate small groups ranging from a few up to a couple of dozen individuals (e.g. Helle 1979; Heikura et al. 1983). However, when they start to congregate in the same areas, the size of the herd increases considerably. Hundreds may congregate in one place on the cultivated ground near the winter feeding grounds in particular (Bisi et al. 2006).

When the snow cover is at its deepest from February until March, wild forest reindeer gather on the same

Wild forest reindeer on their winter feeding ground.

feeding grounds along their own network of paths (Heikura et al. 1989). This is most likely a method of protection against the threat of large predators and a way of conserving energy. The wild forest reindeer usually congregate on ridges covered in lichen or on very sparsely vegetated heathland. The entire subpopulation may spend a period of many weeks gathered together on this winter feeding ground made up of only a few thousand hectares.

At the beginning of April, the wild forest reindeer begin to make their way – usually over the frozen crust of the snow and along frozen waterways – towards their calving grounds. For some, this means travelling a distance of dozens of kilometres, and some may even travel 200 km to reach their calving grounds, as observed in Kainuu and Suomenselkä. The oldest females lead the migration along the traditional routes (Pulliainen et al. 1986).

We know that wild forest reindeer migrated further in the past. For example, based on literature, Nieminen and Pietilä (1999) describe the spring migration habits of wild forest reindeer in the 1760s through Paltamo to Kuopio and the parishes of Leppävirta and Rantasalmi and further towards Lake Saimaa.

3.3 Wild forest reindeer and large predators

It was assessed at the end of 2006 that there were 800–850 brown bears, 250–270 wolves, 140–150 wolverines and 1,200–1,250 lynxes in Finland (www.rktl.fi). Wolf and lynx populations were up from 2005, while wolverine and brown bear populations remained the same. The bear population was concentrated in North Karelia, which had about 25% of Finland's entire bear population. Wolves were found mainly in North Karelia and Kainuu, which had 55% of Finland's wolf population.

The wolf population is 2.6 times greater than it was in 1999 when it was estimated that there was a minimum of 95 wolves (www.rktl.fi). In 2006, 25 wolf litters were born, five more than in 2005. Eight of the litters were born in the Kainuu game management district. Five were born in Kuhmo, which is where most of Kainuu's wild forest reindeer population can be found.

Lynxes have also increased significantly on previous years. In 2006, 14 lynx litters were born in the Kainuu game management district (www.rktl.fi).

The brown bear population has remained stable in recent years. In 2006, 13 brown bear litters were born in the Kainuu game management district (www.rktl.fi).

Wild forest reindeer predators include all of the large predators in Finland. For example, 36.4% of all the wild forest reindeer that were found dead over the period from 1979 to 1988 had been killed by a large predator (Heikura 1997). Of these, 41% had been killed by a lynx, 35% by a bear, 15% by a wolverine and 9% by a wolf.

Large predators previously had little effect on the development of the wild forest reindeer population. However, the increase in large predator populations means that predation has a greater impact now. For example, in Kainuu the percentage of dead wild forest reindeer that had been killed by a wolf increased from 19% to 50% when the number of wolves in the area increased from 0.004 wolves per wild forest reindeer in 1998 to 0.02 wolves per wild forest reindeer in 2000 (Kojola et al. 2004).

According to Kojola et al. (2004), the growth of the wild forest reindeer population is severely restricted by wolf predation. During mid to late winter and early spring while the snow cover is thick, wild forest reindeer are relatively safe from wolf predation. Wolf predation is greatest during the summer, autumn and early winter (Kojola et al. 2004; Kojola 2007).

The sudden decline in Kainuu's wild forest reindeer population seems to be a result of the greater number of calves killed by the growing numbers of wolves (Kojola 2007; Kojola et al. 2007). Observations of woodland caribou also highlight the significant role of the wolf in calf mortality in the summer (e.g. Wittmer et al. 2005; Gustine et al. 2006) and a factor restricting population size (Fuller & Keith 1981; Seip 1992; Bergerud & Elliot 1998).

Other large predators may also have an impact on the development of the wild forest reindeer population, but closer research would be required to separate the impact of other predators from that of wolf predation. For example, Wittmer et al. (2007) have observed that large predators have a significant impact on the survival of adult woodland caribou females and consequently on the development of the woodland caribou population. Preliminary research results from Kainuu show that wild forest reindeer calves form part of the diet of the brown bear in early summer (I. Kojola, verbal communication 2006). Predation by wolverine and lynx has also been observed (e.g. Pulliainen & Leinonen 1990).

Herd of wild forest reindeer

Reindeer.

3.4 Differences between wild forest reindeer and reindeer

Wild forest reindeer and reindeer belong to the same species. They interbreed, and their offspring are capable of reproducing.

Wild forest reindeer and reindeer look very similar, but closer inspection reveals clear differences in their anatomy (Nieminen & Helle 1980) and behaviour. Wild forest reindeer are taller (by approx. 15 cm) and have longer legs than reindeer, so they are better adapted to moving about in deep snow and more able to escape predators. Wild forest reindeer are also much more timid than reindeer.

Wild forest reindeer have a longer and narrower skull, and their antlers are larger and more solid. The angle of the antlers is also different. Reindeer antlers grow out towards the side, while wild forest reindeer antlers are more upright. Wild forest reindeer antlers are flatter, while reindeer antlers are more rounded (Siivonen 1977; Helle 1981b, Nieminen 1982a, 1986). Both female and male wild forest reindeer have antlers (Nieminen 1984), and their antlers are thought to have become adapted to forest conditions (Nieminen 1982a).

4 The wild forest reindeer in legislation and other background factors (Sauli Härkönen, University of Helsinki)

4.1 Bern convention

4.1.1 Aims

The Convention on the Conservation of European Wildlife and Natural Habitats, often called the Bern Convention, was adopted at Bern on 19 September 1979. The Convention entered into force in Finland on 1 April 1986.

The aim of article 1 of the Convention is the conservation of wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the cooperation of several States, and to promote such cooperation. The Bern Convention gives particular emphasis to endangered and vulnerable species, including endangered and vulnerable migratory species.

Under article 2 of the Bern Convention, the Contracting parties shall take requisite measures to maintain the population of wild flora and fauna at, or adapt it to, a level which corresponds in particular to ecological, scientific and cultural requirements. In doing this, the Contracting Parties shall take account of economic and recreational requirements and the needs of subspecies, varieties or forms at risk locally.

Each Contracting Party shall take steps to promote national policies for the conservation of wild flora, wild fauna and natural habitats, with particular attention to endangered and vulnerable species, especially endemic ones, and endangered habitats, in accordance with the provisions of article 3 of the Convention. Each Contracting Party undertakes, in its planning and development policies and in its measures against pollution, to have regard to the conservation of wild flora and fauna. Each Contracting Party shall promote education and disseminate general information on the need to conserve species of wild flora and fauna and their habitats.

4.1.2 Status of the wild forest reindeer in the Bern Convention

The wild forest reindeer comes under Appendix III (Protected fauna species) of the Bern Convention. According to article 4, the Contracting Parties undertake to give special attention to the protection of areas that are of importance for the migratory species specified in Appendices II (Strictly protected fauna species) and III and which are appropriately suited in relation to migration routes, as wintering, staging, feeding, breeding or moulting areas.

According to article 7 of the Bern Convention, the Contracting Parties shall take appropriate and necessary legislative and administrative measures to ensure the protection of wild fauna species specified in Appendix III. Any exploitation of wild fauna specified in Appendix III shall be regulated in order to keep the populations out of danger, taking into account the requirements of Article 2. Measures to be taken shall include:

a) closed seasons and/or other procedures regulating the exploitation;
b) the temporary or local prohibition of exploitation, as appropriate, in order to restore satisfactory population levels;
c) the regulation as appropriate of sale, keeping for sale, transport for sale or offering for sale of live and dead wild animals.

In accordance with article 8 in respect of the capture or killing of wild fauna species specified in Appendix III, Contracting Parties shall prohibit the use of all indiscriminate means of capture and killing and the use of all means capable of causing local disapearance of, or serious disturbance to, populations of a species, and in particular, the means specified in Appendix IV.

The measures prescribed by articles 7 and 8 of the Bern Convention have been enforced in our hunting legislation.

4.2 Convention on Biological Diversity

The Convention on Biological Diversity was drawn up in Rio de Janeiro on 5 June 1992. The Convention entered into force in Finland on 25 October 1994.

The aim of the Convention on Biological Diversity is the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Sustainable use is defined in the Convention as meaning the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

The Convention has been implemented in Finland through national legislation, national action strategies, plans and programmes. The aim is that the Convention's basic principles of preservation and sustainable development will become integrated into the internal and indirect plans, programmes and policies of the various administrative sectors.

Conservation of biological diversity in Finland has been furthered by implementation of the National Action Plan for Biodiversity in Finland (Anon. 1997). The Action Plan had 124 measures to promote the preservation, management and sustainable use of biodiversity. The Action Plan also included a general overview of the status of biodiversity in Finland, the threats to biodiversity, methods of safeguarding and exploiting biodiversity and the options within these areas. The Action Plan complemented the Government Programme on Sustainable Development that was approved in 1998 for the protection, management and sustainable use of biodiversity. The Action Plan covered the years 1997–2005, and its implementation was overseen by a monitoring group comprising representatives of various administrative sectors and other stakeholder organizations. National progress reports of the results of the monitoring were presented to the Secretariat of the Convention on Biological Diversity.

A new National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity up to 2016 was drawn up on the basis of the results of the National Action Plan for Biodiversity in Finland and the challenges identified. The aim of this strategy that was approved by the Government on 21 December 2006 is to halt the depletion on biodiversity in Finland by 2010. The aim is to also stabilize the favourable development of nature in the long term. The strategy is based on the concept that it is not possible to maintain the functioning of nature merely by protecting organic species or habitats but that new ideas for creative and comprehensive methods of land use that will curb the damage caused by society and the economy while at the same time safeguarding the income of the people who make their living from nature and natural resources.

The objectives of the Convention and the measures implemented according to the Convention also affect the management of the wild forest reindeer population. Responsibility for these measures is held by the appropriate authorities.

4.3 Habitats Directive

4.3.1 Aims

Council Directive (92/43/EEC) on the conservation of natural habitats and of wild flora and fauna (The Habitats Directive) entered into force in Finland at the beginning of 1995 along with accession to the EU. The aim of this Directive is to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies. Measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest. Measures taken pursuant to this Directive shall take account of economic, social and cultural requirements and regional and local characteristics.

The obligations of the Habitats Directive can be classified into conservation of species and conservation of natural habitats and habitats of species. Species and habitats and species whose habitat requires conservation are listed in the annexes of the Habitats Directive. The conservation status of species depends on the annex it comes under in the Directive. The obligations are implemented under national legislation.

4.3.2 The wild forest reindeer in the Habitats Directive

The wild forest reindeer is listed in annex II on the Habitats Directive regarding conservation of natural habitats. Animal and plant species of Community interest whose conservation requires the designation of special areas of conservation. In the Habitats Directive "species of Community interest" means species which, within the territory referred to in article 2, are:

- endangered, except those species whose natural range is marginal in that territory and which are not endangered or vulnerable in the western palearctic region; or vulnerable, i.e. believed likely

to move into the endangered category in the near future if the causal factors continue operating, or
- rare, i.e with small populations that are not at present endangered or vulnerable, but are at risk. The species are located within restricted geographical areas or are thinly scattered over a more extensive range, or
- endemic and requiring particular attention by reason of the specific nature of their habitat and/or the potential impact of their exploitation on their habitat and/or the potential impact of their exploitation on their conservation status.

Such species may or may not be listed in Annex IV or V. The wild forest reindeer has not been listed in Annexes IV or V for animal species in need of protection. Correspondingly, "special area of conservation" means a site of Community importance designated by the Member States through statutory, administrative and/or contractual act, where the necessary conservation measures are applied for the maintenance or restororation, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated.

Insofar as the future responsibilities prescribed for the Member States in the Habitats Directive are concerned, a favourable conservation status will be essential. A favourable conservation status is defined in the Directive for species and habitats. Firstly "conservation status of a natural habitat" means the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species within the European territory of the Member States to which the Treaty applies. The "conservation status" of a natural habitat will be taken as "favourable" when:

- its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to exist for the forseeable future, and
- the conservation status of its typical species is favourable.

Correspondingly "conservation status of a species" means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the European territory of the Member States to which the Treaty applies. The "conservation status" of a species will be taken as "favourable" when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the forseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Annex II of the Habitats Directive in practice means that the Natura 2000 network may also include sites that enable the natural habitat of the wild forest reindeer to be maintained or, where appropriate restored at a favourable conservation status in their natural range. According to Niinivirta (written communication, 2006) the wild forest reindeer was one of the selection criteria for 33 of the Natura areas in Finland. The total surface area of the areas is approximately 102,000 hectares.

4.4 Hunting legislation

The wild forest reindeer is a game animal. Issues associated with its hunting and management are covered in the Hunting Act (615/1993), the Hunting Decree (666/1993), the Act on Game Management Fee and Hunting Licence Fee (616/1993) and the Government Decree on Game Management Fee and Hunting Licence Fee (823/2001). Compensation for damage caused by cervids is prescribed in the Government Decree on compensation for damage caused by cervids (1162/2000).

The Ministry of Agriculture and Forestry is in charge of hunting and game management and responsible for its monitoring. In addition to the state officials responsible for hunting and game management issues, the independence of hunters is ensured by the Hunters' Central Organization, game management districts and game management associations as prescribed in the Hunting Act. Hunting and game management issues are also taken care of by hunting associations and national hunting organizations based on voluntary membership.

The Ministry of Agriculture and Forestry has legislation, regulations and performance targets that regulate the Hunters' Central Organization, the 15 game management districts, the 298 game management associations and the Finnish Game and Fisheries Research Institute,

including ensuring the management, administration and monitoring of wild forest reindeer populations, within its administrative branch.

According to the Hunting Act, the tasks of the Hunters' Central Organization are to: 1) develop hunting and game management and and to carry out game management experiments, 2) promote training and advisory services concerning hunting and game management, 3) direct and supervise the activities of game management districts, 4) carry out tasks as ordered by the Ministry of Agriculture and Forestry; and 5) deal with other matters for which it has responsibility under this Act.

According to the Hunting Act , the tasks of a game management district are to: 1) provide training and advisory services concerning hunting and game management, 2) promote and assist in game management, 3) direct and supervise the activities of game management associations, 4) perform tasks as ordered by the Ministry of Agriculture and Forestry and the Hunters' Central Organization, and 5) perform other tasks as provided for it.

According to the Hunting Act , the tasks of a game management association are to: 1) provide training and advisory services concerning hunting and game management, 2) promote game management, 3) supervise hunting; and 4) perform other tasks laid down for it or ordered by the Ministry of Agriculture and Forestry or the game management district.

The general requirement of the Hunting Act is that hunting must be carried out according to the principles of sustainable development and so as not to endanger game animal populations. Appropriate game management must also be employed to safeguard continued reproduction of the game animal population.

Game management means activity in accordance with the Hunting Act intended to increase, preserve or improve a game animal population and the balance between different animal populations by regulating the size of game populations, preserving or improving game habitats, or by some other means.

4.5 Nature conservation legislation

Even though the wild forest reindeer is a game animal and the issues affecting it are mainly prescribed in hunting legislation, nature conservation legislation does contain certain obligations that affect the wild forest reindeer. The Natura 2000 network, prescribed in the Habitats Directive, includes areas where conservation of the wild forest reindeer's habitat is being carried out. This conservation may be carried out in accordance with the Nature Conservation Act (1096/1996).

A nature reserve known as Friendship Par was established in Kuhmo and Suomussalmi in 1990 under the Friendship Park Act (488/1990) and Friendship Park Decree (489/1990). One of the reasons for establishing the park was to conserve the habitats of the wild forest reindeer. The park is made up of five sub-areas: the Ulvinsalo nature reseve, the Juortanasalo-Lapinsuo mire conservation area, and the Elimyssalo, Lentua and Iso-Palonen-Maariansärkki nature reserves. The park is managed by the Forest and Park Service.

4.6 Endangered status

The continued existence of animal populations in specific geographical areas, requires that the sum of reproduction and immigraion is bigger or at least as big as the sum of mortality and emigration. In estimating a viable minimum, it is fundamentally a question of estimating the risk of extinction for a specific period in the future. Key starting points include the minimum number of individuals required for preservation of the population and the minimum area required (Shaffer 1987; Soule 1987). The World Conservation Union (IUCN) Red List of Threatened Animals states that a population is threatened if it does not contain at least 1,000 individuals capable of reproduction according to criterion D referring only to number of individuals (IUCN 2001). Linnell et al. (2007) also presented a thorough analysis of species viability while investigating the development needs of EU-level management of large predators.

In the latest Red List on Finnish Species report published in 2001, the wild forest reindeer is classified as Near Threatened (NT) (Rassi et al. 2001). Near Thereatened species are not endangered. According to the classification, Near Threatened species do, however, require monitoring on the basis of population development or size.

According to the report, the forest industry may be responsible for reducing the wild forest reindeer's territory. The report also states that in Kainuu cross-breeding with reindeer threatens the genetic purity of the species and that traffic poses a growing threat.

According to the report, the new endangered status is not a proposal for action in the same way as a previ-

ously assigned endangered status. Furthermore, the probability of biological extinction does not always tell us enough about a species' need for protection or the ways in which it can be protected.

The endangered status of species is currently being re-evaluated at the national level. The Ministry for the Environment is in charge of this re-evaluation, and the results will be ready in 2010. During 2007, a report that is in line with article 17 of the Habitats Directive will be produced regarding application of the the provisions of the report. At the same time, the species in the Directive such as the wild forest reindeer will be assessed regarding their favourable conservation status.

4.7 Natural resources strategy of the Ministry of Agriculture and Forestry

The natural resources strategy of the Ministry of Agriculture and Forestry defines the aims for sustainable use of renewable natural resources and shared aims for all administrative sectors together with guidelines for each sector until 2010 (Anon. 2001). Practical implementation of the natural resources strategy is carried out primarily by each individual sector with the help of various strategies and programmes. The strategy is also implemented through the operations and financial planning of the Ministry of Agriculture and Forestry and through performance management of the administration of the Ministry of Agriculture and Forestry.

The management plan for the wild forest reindeer population is one part of the implementation of the natural resources strategy carried out by the game management unit.

4.8 EU strategies

The European Union is committed to the protection of biodiversity in its strategies. The Community Biodiversity Strategy was approved in 1998. The strategy called for biodiversity action plans with concrete measures for different policy areas to be drawn up. These biodiversity action plans were approved in 2001. It was agreed at the EU level in the same year that the loss of biodiversity in the EU must be halted by 2010 and that ecosystems must be protected and restored.

The EU approved the European Sustainable Development Strategy at the EU summit in Gothenburg in 2001. This Strategy is based on the principle that investigation of the economic, social and environmental effects of all policies should be coordinated and the effects taken into account in decision making. The Sustainable Development Strategy has four priorities: climate change, transport, public health and natural resources.

The Sixth Environmant Action Programme of the European Community is an important part of the Sustainable Development Strategy's environmental dimension. The programme defines the EU's most important priorities and objectives for a ten-year period (2002–2012). The Programme sets objectives for climate change, nature conservation, biodiversity, the environment, health and quality of life, and natural resources and waste.

The Commission published a Communication in spring 2006 in which the actions taken by the EU so far were investigated in terms of their adequacy (Anon. 2006a). The Communication identified the most important areas for action and the associated objectives, and support was provided for the measures to help achieve the 2010 targets and bring about restoration of biodiversity. The Communication included an annex (EU Action Plan to 2010 and beyond) which described in detail the planned objectives and measures. Conclusions based on these objectives and measures for halting the loss of biodiversity were approved by the EU Environment Council on December 18, 2006. The Environment Council Conclusions provide particular support for the Communication's general approach for incorporating biodiversity and ecosystem services into other policy areas; in particular benefiting from the possibilities provided by agricultural, rural area development, forestry and fishing policies in order to conserve biodiversity.

5 Status of the wild forest reindeer population (Jukka Bisi and Sauli Härkönen, University of Helsinki)

5.1 Overall situation of the subspecies

In the past, wild forest reindeer were very widespread across various parts of Europe, and were found in Poland, for example, as late as the 16th century (Banfield 1961). Since then numbers have dwindled, and the distribution range has receded rapidly northwards (e.g. Heikura et al. 1985) because of excessive hunting. The last herds of wild forest reindeer were observed in Suomenselkä at the end of the 19th century (see Nieminen 1980b) and in Kuhmo in the 1910s (Vanninen 1972). Wild forest reindeer were protected by law in Finland in 1913, by which time the species had for all intents and purposes died out.

Today, the wild forest reindeer population is formed of subpopulations; some of these remain separate for most of the year, and some for the entire year. The Kainuu subpopulation was the largest with 1,700 wild forest reindeer in 2001, but numbers have declined since then. There is another sizeable and independent subpopulation in Suomenselkä (1,000 animals in 2003).

For decades, an occurrence of about twenty wild forest reindeer could be found in Ruunaa, in Lieksa, North Karelia, right on the Finnish-Russian border. However, there have been no verified sightings of these animals since early winter 2005. However, as a result of introductions made by Ähtäri Zoo, a new subpopulation has been developing in Suomenselkä, near Ähtäri.

There are large subpopulations of wild forest reindeer in Russian Karelia; the number of individuals has been estimated at about 3,000 (Anon. 2002). However, there are factors of uncertainty involved in this estimation because numbers appear to have fallen over previous years, and because the overall situation of the subpopulations is unclear.

5.2 Russian subpopulations

An aerial count carried out by Russian Karelian authorities in winter 2002 found that there were about 3,000 wild forest reindeer in the Russian Karelian subpopulations (Anon. 2002). However, it is important to note that the method used in Russia differs from the helicopter count method used in Finland. In Russia, the figure is not based on individuals observed, but rather on an assessment of population size over a larger area calculated on the basis of specific flight lines. At the beginning of the 1980s, the four subpopulations in Russian Karelia were believed to number 3,500–3,700 wild forest reindeer (Danilov & Markovsky 1983). According to Danilov (2003), there were about 6,500 wild forest reindeer in Russian Karelia up to the 1970s, but since then the figure has fallen below 3,000.

In the late winter of 2003, Russia and Finland combined forces to carry out a count of the wild forest reindeer in Russian Karelia using the Finnish helicopter count method. About 600 wild forest reindeer were tallied, mainly around Kalevala and Louhi (Heikura 2003). Poor flying conditions, however, meant that it was not possible to complete the census. For this reason, the size of the wild forest reindeer population in Russian Karelia cannot be estimated reliably on the basis of this count. The figures and available data do, however, indicate that the population is in decline and that mortality is high.

The helicopter count carried out during late winter 2003 provided information suggesting the age and gender structure of the Russian Karelian subpopulation. Heikura (2003), by interpreting photographs of the wild forest reindeer, found that the percentage of calves out of the whole population and the ratio of males and females in the adult population was the same as in the Kainuu subpopulation.

The wild forest reindeer populations of Finland and Russian Karelia are partly linked in Kainuu and around Ruunaa in North Karelia. Some of the wild forest reindeer of Kainuu spend part of the year on the Russian side of the border, and wild forest reindeer from Ruunaa have been known to wander over to Russia and roam around Tuulijärvi.

5.3 Kainuu subpopulation

5.3.1 Population development

The wild forest reindeer population in Kainuu started to recover during the 1940s and 1950s. The first few wild forest reindeer came to Kuhmo from the Pieninkä woodlands of what was then the Soviet Union, most likely in the 1940s (Vanninen 1972; Montonen 1974). More and more observations were made, and once calving had

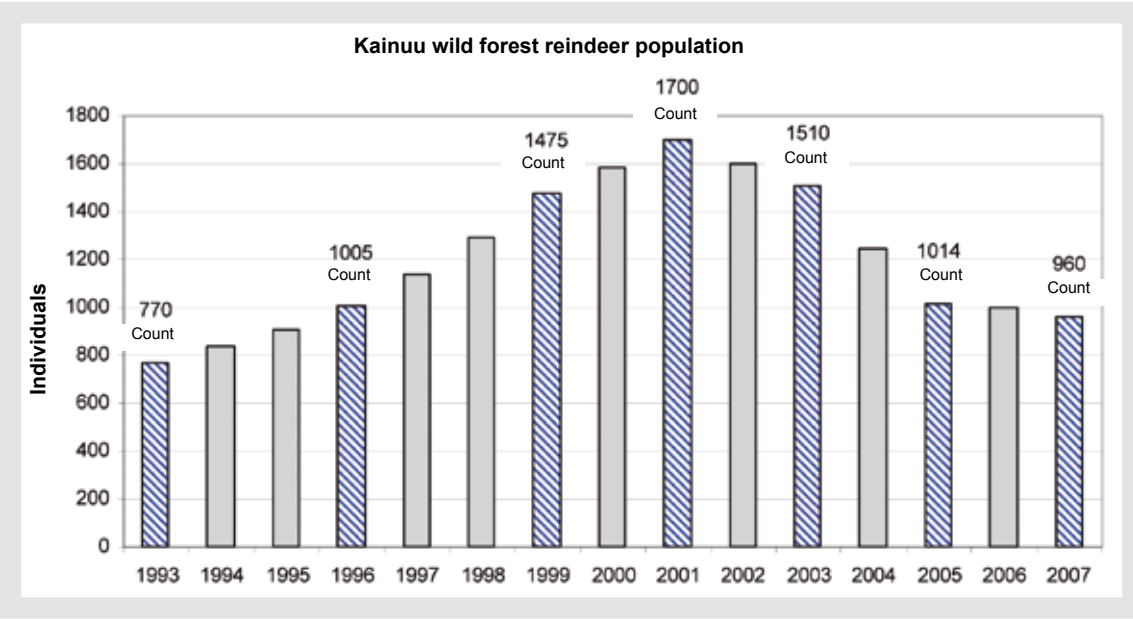

Figure 1. Development of the Kainuu wild forest reindeer population over the period 1993–2007. Population size has been estimated for the years when the helicopter count was not carried out

been observed in 1958 and the 1960s, the wild forest reindeer was considered a part of the fauna of Finland again (Montonen 1974).

Wild forest reindeer came to Elimyssalo in Kuhmo at first, and from there they moved slowly westward as their population grew. In the 1970s, numbers were in the hundreds, and the Lentuanjärvi region was the principal range (Helle 1982; Heikura et al. 1985; Pulliainen & Leinonen 1990; Heikura 1998b; Heikura & Kojola 2002).

The wild forest reindeer population stabilized during the 1970s and began to grow more rapidly at the turn of the 1970s and 1980s (see Heikura et al. 1985); the population was estimated at 540 in April 1981, for example. Back then, wild forest reindeer had untouched pastures of lichen to graze on on the shores and islands of Lentuanjärvi.

There was an unexpected dip in the number of wild forest reindeer when the population fell by a third in one year in 1983 (Heikura et al. 1985). The most likely reason for this was that repairs were made to the border fence on the Russian side, which would have prevented some wild forest reindeer from returning to Finland. However, this meant that some Russian wild forest reindeer were also trapped on the Finnish side.

The population on the Finnish side then grew rapidly for three years, but this growth halted and the population remained at almost the same level until 1993. The population was estimated at over 600 in 1985, but by 1993 the population had only increased to around 800 individuals (Heikura 1998b; Heikura & Kojola 2002).

During the 1980s, the feeding grounds gradually shifted away from Lentuanjärvi towards the west. The wild forest reindeer still grazed on the ridges dividing Lentuanjärvi, but at the turn of the 1990s the feeding grounds had shifted about 30–40 km west-northwest to the area around Vuosanka and also around Kellojärvi, the 'blue pathway ridges' (Heikura 1997, 1998b; Heikura & Kojola 2002).

A fence was constructed on the southern edge of the reindeer herding area over the years 1993–1996 in order to keep reindeer separate from wild forest reindeer. After construction of this fence started, the growth of the wild forest reindeer population increased significantly, and the annual increase exceeded 10%. According to Kojola et al. (2007), the annual increase of the wild forest reindeer population ( ) over the period 1992–2001 was on average 10.5%.

The wild forest reindeer population continued to grow more or less steadily until 2001, when 1,700 wild forest reindeer were tallied in a helicopter count in Kainuu (figure 1). The number of individuals has clearly fallen since then, as 1,510 were tallied two years later in spring 2003 (Anon. 2003). Only 1,014 were tallied in the spring 2005 count (Heikura 2005). In November 2007, 960 were tallied in the helicopter count (Kojola 2007). The decline has continued, albeit slightly more slowly than before.

According to Kojola (2007), the annual decrease of the wild forest reindeer population over the period 2001–2007 was on average 9%. There are many reasons for this: the increase in predation by large predators, particularly wolves (Kojola 2007; Kojola et al. 2004, 2007); an increase in mortality as a result of traffic accidents and measures to maintain genetic purity; and the loss of individuals migrating across the border to Russia.

Feeding grounds have gradually moved from Kuhmo to Ristijärvi, Sotkamo and Paltamo. During the winter of 2002–2003, most of the wild forest reindeer congregated in the Kontiomäki region of Paltamo (Appendix 1). In comparison, the summer feeding grounds cover a very wide area: a significant part of Kainuu, some of the northern parts of North Karelia and Northern Savo, and also Russian Karelia.

During the winter of 2003–2004, the main wintering area of the wild forest reindeer shifted northwest from Kontiomäki in Paltamo to Iijärvi and Valkeisjärvi in the north of Paltamo. About 150 wild forest reindeer spent the winter in Sumsalla in Sotkamo, about 100 in Hietaperä in Kuhmo and a couple of dozen in Sapsoperä in Sotkamo.

During the winter of 2004–2005, only about 400 wild forest reindeer came to the area bordering Paltamo and Ristijärvi. The rest of the population spent the winter near the town of Kuhmo and in Sotkamo.

During the winter of 2005–2006, about 400 wild forest reindeer wintered around Iso-Pyhännänjärvi, and Laahtanen in Ristijärvi. The majority of wild forest reindeer wintered in the area between Hietaperä in Kuhmo and the eastern side of Lammasjärvi. Herds of adult wild forest reindeer males were also seen in Sumsa and Huhtikangas in Sotkamo.

In the winter of 2006–2007, the main concentrations of wild forest reindeer were further east than they had been in previous years, on the south side of the town of Kuhmo, the eastern parts of Sotkamo and the southeast corner of Ristijärvi. In the November 2007 helicopter count, wild forest reindeer were also found in new areas; over 100 wild forest reindeer spent the winter in the south of Kuhmo, on the border with Nurmes.

5.3.2 Age and gender structure of the population

On the basis of helicopter counts carried out in 2001, 2002, 2003 and 2005, 23% to 36% of the adult population were male and 64% to 77% were female (Heikura 2005). According to Kojola et al. (2007), the ratio of calves (calves per 100 females) during late winter had fallen from 45–50 to 20–25 over the period 1996–2005.

5.4 Ruunaa subpopulation

Ruunaa in Lieksa, North Karelia has its own separate subpopulation, which roams on both sides of the national border (Heikura 1998b). Russian data shows that this occurrence is part of the so-called Lieksajärvi subpopulation, which at its peak had over 1,000 individuals. The Lieksajärvi subpopulation has consequently significantly decreased in size, and the Ruunaa occurrence is an independent remnant of this subpopulation.

At its peak in the 1970s, the Ruunaa wild forest reindeer population was made up of 170 individuals (Figure 2), but the population has declined, and only 20– 30 individuals have been observed each year since then. In the helicopter count carried out at the beginning of April 2003, only wild forest reindeer tracks were observed, no actual animals. In December 2003, 23 wild forest reindeer were seen in the area. The most recent tracks of wild forest reindeer were found in the Ruunaa Nature Reserve at the end of 2005. Since then there have been no observations at all.

The Ruunaa occurrence has displayed characteristic population development, with its numbers remaining almost static. The reasons for this have not been investigated separately, but hunting in Russian Karelia and predation by large predators are likely candidates. Only one or two calves have been born annually over recent years.
FIGURE/

Kalevi Heikura from the University of Oulu Zoological Museum monitored the development of the Ruunaa subpopulation with the Border Guard. At the end of

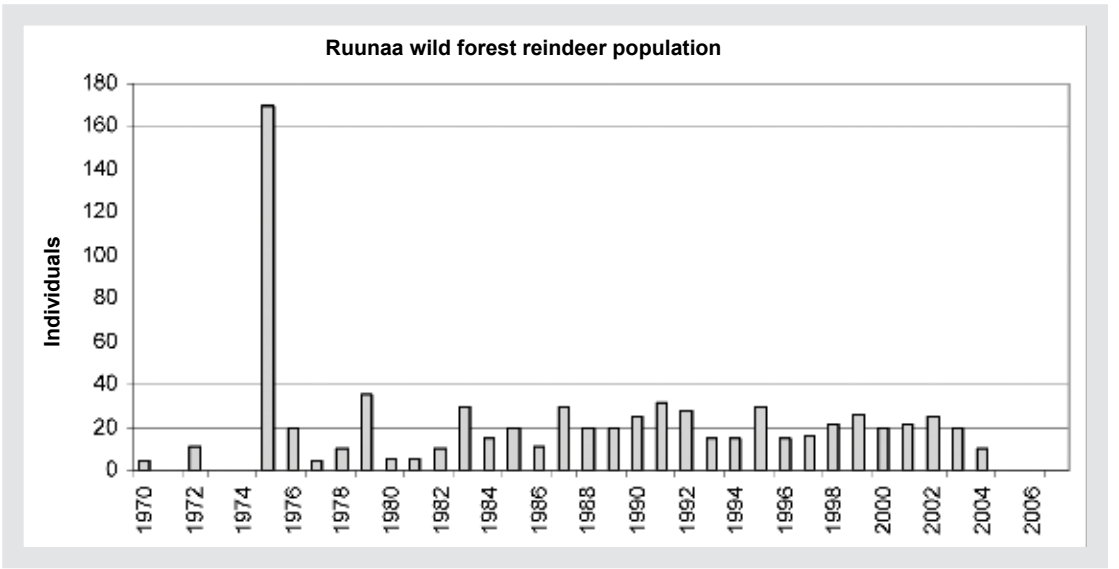

Figure 2. Development of the Ruunaa wild forest reindeer population over the period 1970–2003 (Source: University of Oulu, Zoological Museum / K. Heikura) and 2004–2007 (Source: North Karelia game management district).

2003, the North Karelia game management district and the Lieksa Border Guard Area of the North Karelia Border Guard District agreed to cooperate in the monitoring of population numbers. The aim is for all observations of wild forest reindeer by border guards to be recorded in the Border Guard Area database and for the game management district to receive yearly reports. At the moment, these observations, together with observations made by moose hunting clubs, form the basis for the monitoring of the population.

Lieksa, Ilomantsi and Nurmes have geophysical conditions that make them an ideal habitat for even a significantly large population of wild forest reindeer. There is not much arable farming, and the sparse population means that there is not much traffic.

5.5 Suomenselkä subpopulation

5.5.1 Population development

The wild forest reindeer population was reintroduced to Suomenselkä from Kuhmo by translocating two females in 1979 and two males and six females in 1980 (Nieminen & Laitinen 1983). The individuals were kept in captivity at the Salamanperä Strict Nature Reserve on the area bordering Kivijärvi and Perho.

The female that was translocated in April 1979 produced a calf that spring, and five of the females that were moved in April 1980 produced calves in May 1980 (Nieminen & Laitinen 1983). Three females and one male were released back into the wild in December 1981 (Nieminen & Laitinen 1983; Kojola & Helminen 1984; Kojola 1993). These individuals were all born in captivity. A few individuals also escaped from captivity (see Kojola 1982; Nieminen & Laitinen 1983).

Wild forest reindeer were kept in captivity until 1984. Over these five years, 26 calves were produced and 21 survived (Kojola & Helminen 1984). During this period, the wild forest reindeer that were born in Suomenselkä also produced 13–14 calves in the wild. The first calves were born in the wild in spring 1982 (Kojola & Helminen 1984).

The wild forest reindeer that were released into the wild or had escaped from captivity spent their first years in the vicinity of the wild forest reindeer station and spent most of their winters in the Salamajärvi National Park until the end of the 1980s (Kojola 1993). When the population grew, the wild forest reindeer started moving west to spend the winter in the municipalities of Perho and Halsua. During summer at the beginning of the 1990s, wild forest reindeer were observed in at least 12 municipalities in Central Ostrobothnia and Central Finland.

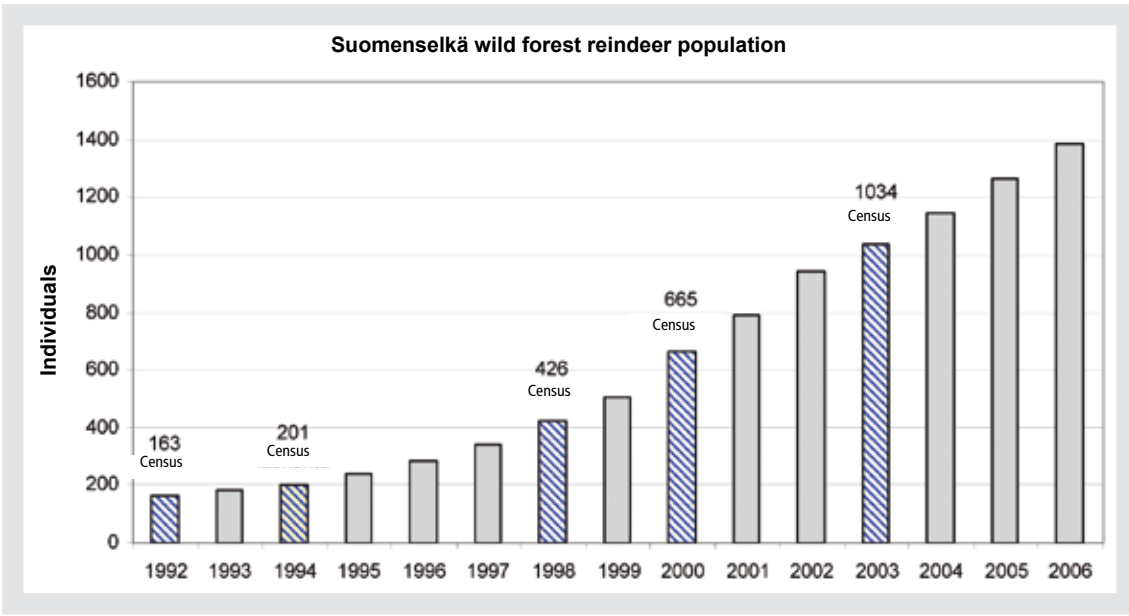

Figure 3. Development of the Suomenselkä wild forest reindeer population over the period 1992–2006. Population size has been estimated for the years when the helicopter count was not carried out

A census carried out in late spring 1994 showed that wild forest reindeer wintered mainly on the areas between Halsua, Ylikylä and Patananjärvi in Perho (Kojola 1994). After this the main winter feeding ground began to shift southwest. The 1998 census found that the tracks covering the winter feeding grounds went all the way from Oksakoski and Poras in Perho to Alajärvi and Lappajärvi, the area near Pyhävuori.

In 2001 and 2002, the winter feeding grounds shifted unexpectedly, and the wild forest reindeer spent the winter in the vicinity of Halsua, Ylikylä and the village of Kanala. This was a shift of about 30 km northwest from the central point of the original feeding ground. In the March 2003 census, 905 wild forest reindeer were observed over an area of over 2,000 hectares (Appendix 2), and it was estimated that the Suomenselkä subpopulation was made up of just over 1,000 individuals (Anon. 2003) (Figure 3).

The summer feeding grounds cover an extensive area in Suomenselkä (Appendix 2). They cover almost the entire area of Central Ostrobothnia, far into Central Finland and also into North Ostrobothnia. Wild forest reindeer can often be seen in Kalajokilaakso in the summer. Some regularly migrate as far as the Pyhäntä region.

Year	
1989	1 adult male, 3 adult females (1 male was later returned to the zoo)
1990	1 adult male, 2 adult females
1991	2 adult females
1992	2 adult females, 2 calves (male and female)
1993	2 adult females
Total	14 individuals

Table 1. Wild forest reindeer relesed into the wild in Maaherransalo in Ähtäri by Ähtäri Zoo (J. Lahtinen, verbal communication 2003).

The annual growth rate of the Suomenselkä wild forest reindeer population was on average 23.2% over the period 1980–1992 (Kojola 1993). Similarly, according to Kojola et al. (2007), the annual growth rate (λ) was 19.2% on average over the period 1992–2000 and 15.9% on average over the period 2000–2003.

5.5.2 Age and gender structure of the population

The censuses have shown that in Suomenselkä, males make up 35% to 40% of the adults (Kojola 1993), while calves make up 20% to 24% of the subpopulation.

Up to now, 68% of the wild forest reindeer killed by hunters have been adult males (see Table 3), which is probably why there is a higher ratio of females in the subpopulation. Since 1998, 294 adult males have been killed by hunters.

5.6 Ähtäri subpopulation

As a result of introductions made by Ähtäri Zoo at the beginning of the1990s, a separate subpopulation has been developing near the Suomenselkä subpopulation (Table 1). The wild forest reindeer introduced by Ähtäri Zoo are the offspring of the adult male translocated from Suomussalmi in 1979 and of the adult female translocated from Kuhmo to Kivijärvi in 1984 and its female calf, and the offspring of their offspring.

At the beginning of the 1990s, the wild forest reindeer of Ähtäri roamed a long way across the provincial border into Satakunta and to Parkano, Kankaanpää, Honkajoki and all the way to Ikaalinen. Since then, the majority of the wild forest reindeer have returned to the Ähtäri region.

Maaherransalo is still an important calving ground, and a herd of about 15 wild forest reindeer were seen in this area in the autumn. The winter feeding grounds of this group centre in the areas bordering Karstula and Soini.

According to local information, the Ähtäri subpopulation has earlier been estimated to contain 30–40 individuals. However, only 8 individuals were tallied in the helicopter count of 2003. The tracks covering the wintering area did, however, indicate more than 8 individuals.

According to the most recent information, the Ähtäri subpopulation is in decline, as no calves were observed in autumn 2005 (J. Nurmi, verbal communication 2006). Predation by bears is the most likely reason for the lack of calves (J. Lahtinen, verbal communication 2006). No detailed information exists on the current age and gender structure of the population.

The population has grown very slowly. If the population had increased in size at the same speed as the subpopulation that was translocated to Suomenselkä with the interim period of captivity in Kivijärvi, then the subpopulation should have reached over 200 individuals by 2005. It is estimated that the subpopulation is currently made up of 10–15 individuals (J. Lahtinen, verbal communication 2006).

6 Research on the wild forest reindeer (Sauli Härkönen and Jukka Bisi, University of Helsinki)

6.1 Population monitoring

6.1.1 Airborne counts

The wild forest reindeer population has been monitored in Suomenselkä and Kainuu at regular intervals using a helicopter. Until 1997, the WWF wild forest reindeer working group was responsible for the practical implementation of these helicopter counts; after this it was the responsibility of the game management districts, and the most recent successful complete count (Kainuu and Suomenselkä) was carried out in 2003 by the Finnish Game and Fisheries Research Institute.

The census uses what is known as the total count method. The aim is to get visual observations of every wild forest reindeer and to photograph each individual, in order to ascertain the structure of the population. A preliminary investigation into the incidence of the subpopulation is carried out before the census with the help of local hunters. The flight plan is based on this preliminary investigation.

In the 1970s, wild forest reindeer were counted using an aeroplane and the line transect method (see Heikura et al. 1985). This method was abandoned in favour of the helicopter count method, which produces more exact results.

6.1.2 Other monitoring

The Finnish Game and Fisheries Research Institute has monitored the incidence and abundance of the wild forest reindeer using the moose observation card. The observation card system creates a good basis for the monitoring, as every year over 5,000 moose hunting parties return their cards.

Information on the structure of the population and calf production is assessed throughout the year using field observations. Kauko Kilpeläinen, Field Supervisor of the Kainuu game management district, has made most of these observations himself.

The Ruunaa subpopulation has been monitored since the end of 2003 on the basis of observations made by the North Karelia game management district, the Lieksa Border Guard Area of the North Karelia Border Guard District and local moose hunting clubs.

6.2 Other research

Research on the wild forest reindeer has focused mainly on monitoring the Kainuu subpopulation and its development. The University of Oulu Department of Zoology and Zoological Museum were previously chiefly responsible for this research. The wild forest reindeers' use of habitats and their movements at various times of the year have been studied in Kainuu with radiotelemetry. The feeding behaviour of wild forest reindeer, their use of feeding grounds and the condition of the feeding grounds have also been studied. Research has extended to the subpopulations of Russian Karelia too (e.g. Sulkava 1979; Sulkava et al. 1983; Helle 1979, 1981a, 1981b, 1982; Erkinaro et al. 1983; Heikura et al. 1983, 1985, 1989, 1998, 1999; Lindgren et al. 1983, 1989; Pulliainen et al. 1983, 1986; Hakala et al. 1996; Heikura 1997, 1998a, 1998b; Tuomivaara 2005).

The University of Oulu Zoology Department and Zoological Museum have collected data on the anatomy and skulls of wild forest reindeer from Kainuu and Suomenselkä. On the basis of these data, it has been possible to ascertain the typical anatomical properties of the subspecies (Hakala et al. 1996). The Finnish Game and Fisheries Research Institute has also studied the various anatomical characteristics of the reindeer, mountain/wild reindeer and wild forest reindeer (Nieminen & Helle 1980).

The University of Helsinki (Väinölä et al. 2001) and the Finnish Game and Fisheries Research Institute's reindeer research (M. Nieminen, verbal communication 2003) have carried out separate investigations on the genetic purity of the wild forest reindeer using DNA analysis. The Finnish Game and Fisheries Research Institute's reindeer research has also participated in international investigations into the DNA of the reindeer species.

The Radiation and Nuclear Safety Authority has monitored the caesium-137 levels of wild forest reindeer in Kainuu and Suomenselkä since 1987 (D. Solatie, written communication 2006). The results show that the wild forest reindeer in Kuhmo and Suomenselkä still exhibit elevated levels of caesium-137 as a result of the radio-

active fallout from the Chernobyl nuclear accident. For example, the caesium-137 levels of wild forest reindeer in 1987 after the Chernobyl accident were approximately 11,000 Bq/ kg. In the samples taken in 2004/2005, the caesium-137 levels were 320–4,800 Bq/kg in Kuhmo and Suomenselkä. Correspondingly, the average level of caesium-137 in reindeer meat was approximately 200 Bq/kg in 2005. The wild forest reindeer exhibit higher levels of caesium-137 compared with reindeer because the level of radioactive fallout was five times higher over the areas inhabited by wild forest reindeer than the areas inhabited by reindeer.

The Finnish Game and Fisheries Research Institute has interpreted satellite images to investigate the condition of the lichen pastures of the wild forest reindeer in Kainuu and Suomenselkä. The University of Oulu also carried out earlier investigations on the basis of so-called experimental plot methods (Heikura 1998a). Surveys of edible plants carried out in Kainuu by the Finnish Forest research institute (Metla) can also be used to assess the condition of the feeding grounds of the wild forest reindeer (Mattila 2004).

The Finnish Game and Fisheries Research Institute has developed an abundance index for game animals in order to assist the evaluation of the implementation of the aims of the natural resources strategy of the Ministry of Agriculture and Forestry (Anon. 2006b). The abundance of wild forest reindeer ascertained by the wildlife triangle method is included in the abundance index of 16 game animals (Lindén et al. 1999). The index shows the regional biodiversity and temporal fluctuations in abundance of game animals.

The Finnish Game and Fisheries Research Institute launched an extensive three-year research project in 2006 in cooperation with the Finnish Food Safety Authority (Evira), the University of Oulu and the Kainuu and Ostrobothnia game management districts to study the habitat of the Kainuu wild forest reindeer population, the role of the wild forest reindeer as food for large predators (Kojola 2007; Kojola et al. 2004, 2007), and diseases and parasites as factors affecting the vitality of the wild forest reindeer population (V. Ruusila, verbal communication 2006).

The Suomenselkä farming population was interviewed regarding their attitude to the wild forest reindeer and its damage to agriculture (Bisi et al. 2006). In addition to this, the University of Helsinki Institute of Rural Research and Training based in Seinäjoki (currently the Ruralia Institute) has conducted interviews to ascertain the interest, attitudes and expectations associated with the wild forest reindeer (Bisi & Kurki 2003). Studies have also been conducted in Suomenselkä on the damage caused by wild forest reindeer to agriculture (e.g. Korhonen 2000) and on wild forest reindeer hunting (Rautiainen 2003).

The Oulu Research Unit of the Finnish Food Safety Authority (Evira) has studied the Setaria tundra parasite that causes peritonitis epidemics in reindeer, in cooperation with the Reindeer Herders' Association, reindeer herding cooperatives and the Finnish Game and Fisheries Research Institute reindeer research. The incidence of this parasite in wild forest reindeer was also studied in the same project (Laaksonen 2006). Preliminary results indicate that the parasite is found at least in the wild forest reindeer in Kainuu.

The Finnish Food Safety Authority (Evira) has launched a TSE survey of cervids concentrating mainly on collecting samples from white-tailed deer. It will be possible to study samples from wild forest reindeer at the same time. The Oulu Research Unit of the Finnish Food Safety Authority (Evira) is responsible for collecting samples, and the Evira Virology Research Unit in Helsinki is carrying out prion research.

The origin of the Rangifer genus cervids has been studied on the basis of DNA analysis (Flagstad & Røed 2003), morphological factors (e.g. Banfield 1961; Siivonen 1975; Nieminen 1980a; Hakala et al. 1996) and bones from archaeological finds (e.g. Ukkonen 1993; Rankama & Ukkonen 2001; Ukkonen et al. 2006).

7 Wild forest reindeer management (Jukka Bisi and Sauli Härkönen, University of Helsinki)

7.1 Translocation

The translocation of wild forest reindeer from Kuhmo to Suomenselkä over the years 1979–1980 with an interim period of captivity was the first significant wild forest reindeer management measure. The World Wide Fund for Nature (WWF), the Hunters' Central Organization and the Forest and Park Service were responsible for the translocation in cooperation with people from Kuhmo interested in wild forest reindeer. Local hunting associations helped to provide food for the animals that were brought to Suomenselkä (Helminen 1982).

The purpose of translocation was to safeguard the development and genetic purity of the population and to speed up the reintroduction of the wild forest reindeer to Finland. Suomenselkä was chosen as the target area because wild forest reindeer were still found in the region during the second half of the 19th century (Montonen 1974). Further translocations, for example to North Ostrobothnia, have been planned but have not been implemented.

The wild forest reindeer population in Suomenselkä has developed from these translocated individuals. The process is described in more detail in section 5.5. 'Suomenselkä subpopulation'. The development of the population has been closely monitored. The WWF wild forest reindeer working group was responsible for the monitoring up to 1997. The working group obtained the funds for the airborne counts, for example, and was in charge of providing information on the wild forest reindeer. The working group relinquished its responsibilities at its meeting in Kuhmo on 28 January 1997. Game management districts have consequently taken over these responsibilities.

Ähtäri Zoo introduced 14 wild forest reindeer to Maaherransalo in Ähtäri over the period 1989–1993. This is explained in more detail in section 5.6. 'Ähtäri subpopulation'.

7.2 Maintaining the genetic purity of the wild forest reindeer subspecies

7.2.1 Wild forest reindeer fence

In Kainuu, the reindeer herding area and the range of the wild forest reindeer are adjacent. Wild forest reindeer and reindeer have formed mixed herds from time to time in the past. In order to eradicate this problem, the Forest and Park Service erected a fence on the southern border of the reindeer herding area over the period 1993–1996 to prevent wild forest reindeer from entering the area and to prevent reindeer from entering the habitat of the wild forest reindeer. After the fence was erected, the speed of growth of the wild forest reindeer population clearly increased (see e.g. Heikura & Kojola 2002).

The Forest and Park Service has invested in the maintenance of the wild forest reindeer fence and the required personnel and materials in accordance with a performance agreement settled with the Ministry of Agriculture and Forestry. The Forest and Park Service has also negotiated and drawn up the rental contracts with private land-owners, carried out fence inspections and repairs, winter maintenance on two cattle grids and provided new crossings for skidoo tracks and elsewhere in the terrain. The Forest and Park Service has spent a total of EUR 606,200 in subsidized employment appropriations allocated by the Ministry of Labour for the maintenance of the fence from 1999 to 2003. In all, EUR 976,200 has been spent on all of the measures carried out by the Forest and Park Service over this period.

Maintenance of the wild forest reindeer fence requires constant work. Damaged is caused by frost, subsidence, snow, fallen trees, moose and vandalism. Gates in the fence have also been left open. The larger gates on forest roads have also been repeatedly left open.

7.2.2 Wild Forest Reindeer Life Project

Soon after construction, it was noticed that the wild forest reindeer fence was not secure. Wild forest reindeer and reindeer were able to pass through from both sides. It was decided, however, that the measures to preserve the genetic purity of the wild forest reindeer should be continued, and the Wild Forest Reindeer Life Project, coordinated by the Hunters' Central organization, was launched.

The fence that separates wild forest reindeer from reindeer in Kainuu.

The aim of the project is to maintain the genetic purity of the wild forest reindeer and to keep reindeer and wild forest reindeer apart effectively. During the project airborne counts, measures to prevent damage to agriculture and a study of the wild forest reindeer genome were carried out, and a large amount of information was provided (Peltola 1998, 1999, 2000, 2001). The project spanned the period from 1 February 1998 to 30 June 2001, and the partners for the Hunters' Central Organization were the Ministry of Agriculture and Forestry, the Forest and Park Service, the University of Oulu, the Finnish Road Administration and the Kainuu game management district.

Extensive repairs were made to the 83-km-long fence from 1999 to 2000. The fence was also made higher and extended about 2 km westwards. The work carried out by the Forest and Park Service cost a total of some EUR 741,200; the Ministry of Labour provided EUR 499,200 in funding for this project.

In autumn 1999, the Finnish Road Administration built cattle grids to prevent the animals from using roads to pass through the fence. It was estimated that eight cattle grids would cost about EUR 235,000. Metal gates were also constructed for small forest roads.

The project's original budget total was about EUR 800,000. The total investment, however, come to about EUR 1,400,000, as the parties involved in the project were able to provide their own contributions to the financing during the project.

7.2.3 Cattle grids

When the fence was built, it cordoned off some of the calving grounds of some female wild forest reindeer which lay in the reindeer herding area. By instinct, these females naturally tried to get to the other side of the fence by any means necessary. It was found that faulty design in the cattle grids has enabled wild forest reindeer to cross them and thus get through the fence on occasion. Conversely, reindeer have been able to enter the territory of the wild forest reindeer. Wild forest reindeer were also seen using the Härmänkylä railway bridge in Kuhmo in autumn 2002. No reindeer or wild forest reindeer have been seen passing through the fence during summer 2005, or in 2006.

The Kainuu game management district and the Finnish Road Administration have been considering ways of redesigning the cattle grids, because they are not 100% effective. The cattle grid in Luisua has already been repaired using a redesigned cattle grid. It is not yet known how effective the redesigned cattle grids are, as there have been only a few wild forest reindeer and reindeer in that area. The road is covered in tarmac, so it will only be possible to see tracks clearly once there is snow cover. Three reindeer probably crossed the cattle grid during summer 2006. Motorists have preferred the new design, as it is nicer to drive over. These redesigned cattle grids are also easier to maintain.

Corrals, smells and other deterrents have also been tested in conjunction with the cattle grids.

7.2.4 Role of the Kainuu game management district

The Kainuu game management district has taken part in many projects as a local contributor to promote the genetic purity of the wild forest reindeer. Last year, the Kainuu game management district employed a member of staff to ensure that reindeer and wild forest reindeer are kept separate. One of the duties involved is to help return the reindeer that have crossed the fence into the territory of the wild forest reindeer to the reindeer herding area in cooperation with reindeer herders from the Halla reindeer herding cooperative. Other tasks include:

1) inspection and repair of the fence, and providing informatiom to the Forest and Park Service Natural Heritage Services,
2) fitting wild forest reindeer with radio collars and tracking their movements

3) monitoring activities associated with cattle grids. The annual cost of these activities has been about EUR 60,000 to 70,000.

The International Council for Game and Wildlife Conservation (CIC) awarded the Kainuu game management district the Edmond Blanc Prize in 2003 to recognize the work carried out to maintain the genetic purity of the wild forest reindeer. The prize was presented at the 50th General Assembly of the CIC in Helsinki. The prize is awarded for internationally significant work carried out to benefit game hunting and management.

7.2.5 Hunting

Wild forest reindeer in the Kainuu subpopulation are culled if they do not display features typical of their species. Hunting licences were granted from 1996 until 2003. Over these years, the hunting licences granted by the Kainuu game management district have been used to hunt a total of 129 wild forest reindeer (Kainuu game management district 2003).

Wild forest reindeer straying into the reindeer herding area have been culled by the Kainuu game management district using exceptional hunting licences by the Ministry of Agriculture and Forestry. From 2001 to 2005, a total of 97 wild forest reindeer, mainly females and calves, were removed from the reindeer herding area. The exceptional hunting licences issued by the Ministry of Agriculture and Forestry have also been used to cull reindeer / wild forest reindeer cross-breeds found outside the reindeer herding area.

7.3 Performance management by the Ministry of Agriculture and Forestry

7.3.1 Game management districts and the Hunters' Central Organization

The Ministry of Agriculture and Forestry initiated documented performance management of the game management districts and the Hunters' Central Organiza-

New cattle grid in Luisua.

tion in 1994. The focus areas of the performance management also take into account wild forest reindeer population management.

The first performance target letter stated: "Wild forest reindeer populations have spread and become well established in new areas. For the time being, hunting is only required to remove wild forest reindeer from the reindeer herding area, to prevent them from causing significant damage to agriculture and to preserve the genetic purity of the species."

The performance target was amended as follows in 1995: "The hunting of wild forest reindeer must be restricted to the removal of individual animals for the purposes of population management and the prevention of damage."

The growth of the wild forest reindeer population meant that it was necessary to change the performance target letter again in 1996, and until 1998 it read: "The hunting of wild forest reindeer must be restricted to the removal of individual animals for the purposes of population management and the prevention of damage, and also to a level required for allowing the population to continue to increase."

From 1999 to 2002, the performance target letter stated: "The game management districts of Kainuu, Oulu, Ostrobothnia, Central Finland and North Karelia will continue to carry out measures to stabilize their wild forest reindeer populations."

In 2003 and 2004, the target was outlined thus: "The wild forest reindeer population should be kept at a reasonable level from the perspective of population management and hunting and damage caused to agriculture in the Kainuu and Ostrobothnia game management districts. The game management districts of Central Finland, Oulu and North Karelia will continue to stabilize their wild forest reindeer populations."

And in 2005 thus: "The wild forest reindeer population should be kept at a reasonable level from the perspective of gender and age structure, population management and hunting and damage caused to agriculture in the Kainuu and Ostrobothnia game management districts. The game management districts of Central Finland, Oulu and North Karelia will continue to stabilize their wild forest reindeer populations."

In 2006, the target was amended as follows: "The wild forest reindeer population should be kept at a reasonable level from the perspective of gender and age structure, population management and hunting and damage caused to agriculture in the Kainuu and Ostrobothnia game management districts. The game management districts of Central Finland and Oulu will continue to stabilize their wild forest reindeer populations." The target remained unchanged for 2007.

The Hunters' Central Organization was given the following performance target in 2005: "A study of the factors affecting population management and the planning of the hunting of wild forest reindeer will be produced." The target in 2006 was: "The hunting models for the wild forest reindeer population will be compiled." The target remained unchanged for 2007.

7.3.2 Forest and Park Service

The Forest and Park Service was given a wild forest reindeer management performance target for the period 1999–2004 within the agreement on the implementation and funding of social activities between the Ministry of Agriculture and Forestry and the Forest and Park Service. The target for the period 1999–2001 was as follows: "Preparation and implementation of the tasks required to stabilize the wild forest reindeer population." Over the period 2002–2004, the target was as follows: "Tasks required to stabilize the wild forest reindeer population." A central government appropriation has been allocated for the implementation of these targets, being EUR 70,000 in 2004.

From 2005, wild forest reindeer issues have been settled according to an agreement between the Ministry of Agriculture and Forestry and the Forest and Park Service on the undertaking and funding of the public administration of issues within the Ministry of Agriculture and Forestry's administrative branch. Administrative tasks for the period 2005–2006 were as follows: "Game and hunting projects with the main focus on tasks to stabilize the wild forest reindeer population." The 2005 targets were implemented using EUR 63,000 of the money allocated by the Ministry of Agriculture and Forestry.

7.4 Success of management measures

The conservation and management measures carried out for the benefit of the wild forest reindeer have been successful. The most important achievement is that wild forest reindeer have been reintroduced to the wild in Finland. Solutions have also been found for the problems and risks associated with maintaining the genetic

purity of the wild forest reindeer. However, further measures are needed.

The existing wild forest reindeer population can be considered to be relatively stable, even though there are factors of uncertainty associated with the development of the subpopulations of Kainuu and Ähtäri. The loss of the Ruunaa subpopulation is a significant failure.

Finland has plenty of suitable habitats to offer the wild forest reindeer. The habitats are not subject to impacts that can be considered to be harmful to the development to the wild forest reindeer population.

On the basis of an interview carried out in 2003, the measures carried out for the wild forest reindeer can be considered to be on the whole successful and appropriate for local, regional and national stakeholders (Bisi & Kurki 2003).

A substantial amount of money has been needed for the conservation, management and monitoring of the wild forest reindeer population. The Ministry of Agriculture and Forestry has covered most of the costs. It has also been possible to find other channels of financial investment through cooperation between officials and organizations.

8 Human livelihood and wild forest reindeer damage (Jukka Bisi and Sauli Härkönen, University of Helsinki)

8.1 Agricultural damage

8.1.1 Types of damage

Wild forest reindeer tend to graze on cultivated land in spring and early summer, and in autumn from October onwards. They are interested principally in grass and autumn grain. So far, it has not been studied how important grasslands are as a food source for wild forest reindeer and how large a percentage of the population grazes on cultivated land.

Wild forest reindeer, as well as reindeer, cause agricultural damage by eating the crops, digging, trampling, and to a lesser extent defecation. Possible, though rarer, forms of damage include the breaking of plastic bales of animal feed and cattle fences, and digging and trampling of strawberry patches (puncturing the protective plastic sheets) (Ristioja 1998; Korhonen 2000; Bisi et al. 2006).

The grazing intensity of wild forest reindeer varies. Some herds may visit the same field on several consecutive days or even weeks. Their visits usually occur in the morning and afternoon. The size of such herds may vary from a few individuals to several dozen (Bisi et al. 2006). The largest coherent herds observed grazing on fields have consisted of more than 200 animals. It should be noted, however, that such large herds usually congregate only in mid-winter, when the snow cover is thickest, and when the wild forest reindeer begin to migrate to their winter feeding grounds. Once the snow cover is thick enough, the wild forest reindeer stop grazing on fields and move to forests to dig for lichen. In the autumn, field grazing usually occurs during the migration to the winter feeding grounds (October to January) and in the spring correspondingly during the migration to summer feeding grounds (April to June).

It is extremely difficult to predict damage in grass and autumn grain fields. Factors involved include the location of the field, the type of soil, the age of the field (i.e. the softness of its soil), the amount of frost and the thickness of snow. The fields most susceptible to damage are remote, recently cleared soft bog fields of autumn rye or young timothy that are free of frost and lie along the migration routes of wild forest reindeer.

Field grazing does not automatically result in damage; indeed, in some cases grazing can even improve the crop yield. Historically, sheep were allowed to graze in autumn rye fields to make the growth thicker. Farmers have noted that when herds of wild forest reindeer trample snow in fields, this may lead to the generation of ice scorch, but it may also prevent the occurrence of snow mould.

Wild forest reindeer faeces can be a problem during grazing in June, when the animals defecate on the growing hay. In such cases, the faeces may end up mixed with the harvested feed, making it taste bad. However, wild forest reindeer only occasionally graze in fields in the summer. Any faeces accumulating in fields during winter and early spring are leached into the soil in early summer, thus fertilizing the field.

8.1.2 Extent of damage

The extent of damage caused varies greatly by year and by region. So far, the year with the most severe damage was 2000, with a total of EUR 15,952 paid out as compensation for crop damages (EUR 7,212 in Kainuu and EUR 8,740 in Suomenselkä). Whether the damage in Suomenselkä had actually been caused by wild forest reindeer was a matter of public dispute. In 1998, the compensation paid was about EUR 9,334, of which EUR 8,746 went to the municipalities of Perho and Vimpeli alone (Peltola 2001).

In recent years, damage compensation paid in Suomenselkä has decreased. For example, in the municipality of Halsua, where the main body of the Suomenselkä subpopulation wintered in 2001-2002 and 2002-2003, the damage compensation paid totalled EUR 1,022 to three farms in 2002 and EUR 660 to two farms in 2003. This illustrates the moderating effect of a winter with much snow and frost: digging does not affect the surface structure of fields, and because the snow is so thick, the animals move on to lichen forests earlier. In 2005, the damage compensation paid in Halsua totalled EUR 962.

In Kainuu, agricultural damage compensation varied between EUR 566 and 7,546 in the years 2000 to 2005,

with compensation being paid to one to ten recipients in the municipalities of Kuhmo, Sotkamo and Ristijärvi.

Even if the number of animals in the subpopulations of Suomenselkä and Kainuu were to increase by a few hundred, it is not likely that the overall level of agricultural damage would change substantially from what it has been in recent years.

8.1.3 Research

In 2001 and 2002, a crop damage study was conducted by MTT Agrifood Research Finland (South Ostrobothnia research station) in Suomenselkä (Kangas, A., unpublished material). The study was conducted following the model of the study of crop damage by wild forest reindeer conducted in Kainuu in 1999 (Korhonen 2000). This study yielded long-awaited information on the impact of wild forest reindeer on crop levels, and its results were communicated to local farmers. The results showed that grazing by wild forest reindeer did not significantly lower crop yields. The findings in Kainuu were similar.

Implementation of the study showed just how difficult it is to anticipate the movements of wild forest reindeer. The animals never even showed in many of the fields chosen for the study on the basis of earlier experiences over several years, as the mid-winter feeding ground turned out to be in Halsua rather than in Perho that year. It is not known how snow and frost conditions affect agricultural damage.

8.1.4 Measures to prevent agricultural damage

Fencing has been used to protect some of the cultivated land against wild forest reindeer in the Kainuu game management district. The first such fence was built by the Lentua Society and the WWF in Kuhmo in the late 1980s. The Kainuu game management district itself has built fencing around fields on 16 different farms between 1996 and 2000, to a total of more than 20 km of fence. The construction work was implemented on subsidized employment appropriations. The materials and part of the workers' pay were paid for by the Ministry of Agriculture and Forestry. Material costs came to about EUR 36,300, or about EUR 1,680 per km. The agricultural damage caused by wild forest reindeer in Kainuu has been brought well under control by fencing off the locations that have been subject to the most damage.

Fencing to prevent damage to crops was discussed in Suomenselkä in 2000 and 2001, for example regarding the villages of Poranen and Oksakoski in Perho (Peltola 2001). The plans were abandoned, however, because the land areas which would have required fencing were notably large, and it was difficult to prioritize locations. In retrospect, the decision not to go ahead with the plans proved correct, because the shifting of the wild forest reindeer winter feeding grounds to Halsua has considerably reduced grazing by the animals in the aforementioned areas in Perho.

8.2 Forestry damage

Wild forest reindeer often rub their antlers against young trees particularly in rutting season, and to some extent in the winter too. The animals may also break or damage young saplings when they dig for lichen in the winter. This type of damage is very similar to that recorded for reindeer (e.g. Helle & Moilanen 1993).

There are mixed feelings about the damage caused by reindeer. On the one hand, damaged pine saplings may be exposed to consequential damage such as fungal diseases. On the other hand, heavy reindeer grazing has been considered to reduce the incidence of snow blight (Phasidium infestans) and to improve the growth of pine saplings (Helle & Moilanen 1993).

Wild forest reindeer have not caused significant losses to forest owners through damage. Because the forestry damage caused mainly amounts to damage to individual trees, there has been no point in introducing preventive measures. As far as we know, the government has not paid out any compensation for forestry damage caused by wild forest reindeer under the current compensation scheme.

8.3 Traffic damage

Collisions with wild forest reindeer have been relatively rare; but as the wild forest reindeer population grows and the migrations between summer and winter feeding grounds become longer, the animals increasingly cross roads and railway lines. In Kainuu in particular, collisions with wild forest reindeer have increased in the very recent past, and the number of collisions in Paltamo in 2003, for instance, reflects the risky congregating of wild forest reindeer in the proximity of road no. 5 and the railway line in Kontiomäki in the winter (Table 2).

YEAR	KUHM0	PALTAMO	SOTKAMO	RISTIJÄRVI	TOTAL	
		Road	Rail			
1999	19	0	0	0	0	19
2000	20	0	0	0	0	20
2001	37	0	0	0	0	37
2002	31	3	2	2	0	38
2003	14	13	7	5	2	41
2004	24	2	2	3	4	35
2005	30	3	0	5	1	39

Table 2. Recorded wild forest reindeer collisions in Kuhmo (Kuhmo game management association, reported 2006), Paltamo (Paltamo game management association, reported 2006), Sotkamo and Ristijärvi (Kajaani Police Department, reported 2006) between 1999 and 2005

In Suomenselkä, there have been notably fewer wild forest reindeer collisions, only a handful per year (2-5). Also, the bulk of the subpopulation has not been wintering close to heavily trafficked roads, nor have the animals been migrating across such roads. Publicity and road signs are used to warn motorists about wild forest reindeer.

8.4 Damage to decorative lichen

In recent years, Finland has exported EUR 1.24 to 1.56 million's worth of decorative lichen per annum (Metsätilastollinen vuosikirja 2004). About 50% of this consists of decorative lichen harvested in Uura in Paltamo; in Puokio in Puolanka; in Manamansalo, Neittävä and Säräisniemi in Vaala; and in Ahmas in Utajärvi. Income from this activity is divided between the landowners and the lichen pickers. A dozen local families earn a living from harvesting lichen together with about 100 summer pickers for whom lichen harvesting is a significant seasonal source of income (M. Sippola, verbal communication, 2003).

The best locations can yield EUR 80 per hectare of forest per year in income from decorative lichen (M. Sippola, verbal communication, 2003). Calculated over the period of growth and harvesting of the forest itself, lichen generates much more income than the wood from the trees.

The shifting of the winter feeding grounds towards Lake Oulujärvi constitutes a potential threat to the harvesting of decorative lichen around the lake. Wild forest reindeer mainly eat grey reindeer lichen. When the animals dig for this, the star-tipped reindeer lichen (or silver moss) which is used for decorative purposes is pulled out of the ground and trampled, and is no longer suitable for harvesting.

The anticipated trend in damages was foreshadowed when the bulk of the Kainuu wild forest reindeer subpopulation spent the mid-winter on the land owned by the UPM paper company in Puikkokoski in Paltamo in 2001-2002 and 2002-2003. The grazing and systematic digging of the animals destroyed the decorative lichen growths on the Puikkokoski ridges for a long time. No one has ever conducted an estimate of the financial loss. On the other hand, there has never been active harvesting of decorative lichen in this particular area.

Wild forest reindeer movements continued to shift towards the west-northwest in winter 2003-2004. The lichen harvesting locations of Manamansalo, Uura and Puokio are only a few dozen kilometres from Puikkokoski. During the winters 2004-2005 and 2005-2006, fewer wild forest reindeer than before entered the border zone between Paltamo and Ristijärvi.

So far, no measures have been taken to prevent damage to decorative lichen.

8.5 Scheme for compensating damage caused by cervids

The Government Decree on compensation for damage caused by cervids (1162/2000) provides for the basis for compensating damage caused by wild forest reindeer. The Decree specifies that agricultural damage, traffic

Field damage caused by wild forest reindeer.

damage and forestry damage qualify for compensation. Damage to decorative lichen and trampling, on the other hand, though candidates for compensation in the future, are not covered by the existing compensation scheme.

The purpose of setting up the compensation scheme was to create a basic safety net to prevent the suffering of unreasonable losses because of damage caused by these animals. However, farmers have also presented claims for compensation due to the extra work which they have had to carry out because of damage by wild forest reindeer (Bisi & Kurki 2003). On the other hand, the greatest problem probably lies in premature retilling of fields, the most typical form of damage caused by wild forest reindeer. Recently tilled grassland is sensitive to grazing and digging, and retilling such land as soon as two years after the previous tilling causes extra work and expenses.

The appropriations in central government funds for compensating damage by cervids are covered by cervid hunting licence fees. The fee is EUR 17 for an adult wild forest reindeer and EUR 8 for a calf.

The worst agricultural damage by wild forest reindeer to date was seen in 2000, with total compensation paid for crop damage being about EUR 16,000. The revenue from hunting licence fees for wild forest reindeer in the same year amounted to only about one tenth of this amount.

The hunting licence fees for wild forest reindeer will remain at the level of EUR 1,500 to 2,000 per year in the near future. If the annual damage compensation remains at its present level, the revenue from hunting licence fees will not be enough to cover the damage compensation to be paid.

8.6 Reindeer husbandry

8.6.1 Reindeer herding area

Wild forest reindeer disrupt reindeer husbandry and management when they enter the reindeer herding area. Male wild forest reindeer are stronger than male reindeer and impregnate female reindeer. Cross-bred offspring are more timid than reindeer, making it more

difficult to herd and gather reindeer herds. Keeping reindeer and wild forest reindeer apart is justified both for safeguarding the genetic purity of wild forest reindeer and for reindeer husbandry.

The wild forest reindeer fence has not been entirely successful in keeping wild forest reindeer and reindeer apart. Road crossings have been a particular problem. Observations by the Kainuu game management district indicate that there were at least 74 wild forest reindeer in the reindeer herding area in summer 2002, about 50 in summer 2004, about 30 to 35 in summer 2004, at least 8 in summer 2005 and at least 6 to 7 in summer 2006.

Wild forest reindeer have so far only posed a problem to the Halla reindeer herding cooperative along the southern edge of the reindeer herding area. The current wild forest reindeer fence separates most of the Halla reindeer herding cooperative from the territory of the wild forest reindeer. However, the fence ends in the Halla reindeer herding cooperative, which extends for some dozens of kilometres west of the terminus of the fence. The next reindeer herding cooperatives extending to the southern edge of the reindeer herding area are Näljänkä, Pintamo, Pudasjärvi and Kiiminki. According to reindeer herdsman Kauko Lantto (verbal communication, 2003), two female wild forest reindeer and their calves were observed in the Pintamo reindeer herding cooperative in summer 2001. Wild forest reindeer also used to be seen in the Näljänkä reindeer herding cooperative before the wild forest reindeer fence was built.

In winter 2003-2004, the principal wild forest reindeer winter feeding ground shifted to the northern reaches of Paltamo. If it shifts any further north, this will bring the wild forest reindeer even closer to the reindeer herding area and increase the risk of the bulk of the wild forest reindeer subpopulation wandering to the north of the wild forest reindeer fence when they begin their migration to their summer feeding ground, thus entering the reindeer herding area. In spring 2004, for instance, some wild forest reindeer took a short cut from the north side of Ristijärvi village directly towards their summer feeding ground in Kuhmo. This short cut almost took them to the north side of the fence, into the reindeer herding area.

8.6.2 Reindeer farming outside the reindeer herding area

Small-scale reindeer farming has been practiced in Parkano, Kihniö and Karvia some 100 km from the territory of the Ähtäri wild forest reindeer subpopulation since the mid-1990s. This farming is mostly related to farm holidays in the region.

There are five reindeer farms with a total of about 100 reindeer in the Parkano area. This farming can be considered a risk to the genetic purity of the Suomenselkä wild forest reindeer subpopulation, because reindeer can escape into the wild from the farms for a variety of reasons. Breakouts can have irreversible consequences, particularly during the rutting season.

According to information received from reindeer farmers, their enclosures are made of 2-metre-high wire netting, suspended between upright poles 4 metres apart. The instructions on how to build the fences were issued by the Satakunta game management district.

The reindeer farmers have set up an association (Suomen porofarmarit ry.) with a membership of five reindeer farmers. The farm in Eräjärvi in Parkano is not a member. The chairman of the association is Markku Koskenniemi.

According to Markku Koskenniemi (verbal communication, 2003), reindeer farming does not constitute a threat to the wild forest reindeer population, because the farms are small and constantly supervised by humans. The occasional runaway reindeer have always returned to the farm because of feeding habits and their gregarious behaviour. So far, not a single reindeer has remained on the loose in the wild. The reindeer farmers have also agreed among themselves that if a reindeer does escape into the wild, anyone may shoot it after one day has elapsed; the shooter and the owner will then share the meat from the animal between them (M. Koskenniemi, verbal communication, 2003).

Reindeer farming is practiced and individual reindeer are kept elsewhere outside the reindeer herding area too.

9 The wild forest reindeer as a game animal (Sauli Härkönen and Jukka Bisi, University of Helsinki)

9.1 Background

Up until the 17th and 18th centuries, the wild forest reindeer was the most important large game animal in many places in Finland (Montonen 1974). The population declined rapidly due to excessive hunting (Nieminen 1980b, 1990). No great attention was paid to this, however: the Decree on hunting and trapping animals in Finland issued in 1868 defined the hunting season for wild forest reindeer as 10 August to 14 March, and the Hunting decree issued in 1898 defined the season as lasting from the beginning of November to the beginning of February. The wild forest reindeer was not protected until 1913, by which time it had to all intents and purposes died out in Finland.

The wild forest reindeer has subsequently made a comeback to Finland's fauna and is now in the list of game animals in hunting legislation, meaning that it can be hunted under specific conditions. So far, the purpose of such hunting has been to promote genetic purity and to prevent agricultural damage. Hunting has been targeted at herds which graze in fields in Kainuu and in Suomenselkä.

Hunting of wild forest reindeer began in the Kainuu game management district in 1996, in the Ostrobothnia game management district in 1998, in the Central Finland game management district in 2001 and in the Oulu game management district in 2005. In Kainuu in particular, the purpose of hunting has been to remove atypical individuals and obvious cross-breeds from the population. Because of the decline in the Kainuu subpopulation, no hunting licences have been granted by the Kainuu game management district after the 2002–2003 hunting season.

The hunting of wild forest reindeer differs considerably from the hunting of other cervids in Finland. Although the hunting has to date mostly served the purposes of population management and research, certain special issues have already arisen. For example, the current hunting legislation does not address certain features of the biology of the wild forest reindeer. Also, there are certain features of hunting culture and hunting practice in the practical organizing of the hunting that must be taken into account. Also, being an exotic species with conspicuous antlers, the wild forest reindeer is of interest to hunting tourism.

9.2 Hunting by licence

Hunting licences for wild forest reindeer are issued by the relevant game management district (Table 3). In order to be issued with a licence, the applicant must have a suitable contiguous land area available for hunting, and the area used for the actual hunt must be at least 500 hectares. The Hunting Decree provides for the application procedure, the conditions to be entered on the licence, the dogs and equipment that may be used in the hunting of cervids, the duties of the hunting master, and the organizing of the hunt in general.

There are major differences in the regional allocation of hunting licences for wild forest reindeer compared with other cervids. At present, the game management districts issue the hunting licences in the summer, at which point it is difficult to estimate where the wild forest reindeer will move and appear in the autumn. When the hunting season opens at the turn of September-October, the animals are spread out over a wide area and are still partly occupying their summer feeding grounds. By the end of the hunting season in January, wild forest reindeer have congregated on their smaller winter feeding grounds.

The rutting season is still in progress when the hunting season opens, and wild forest reindeer are still in their rutting herds. The rutting areas may be the same year after year. After the rutting season, the animals begin to migrate to their winter feeding grounds and may travel a considerable distance in any one day. A migrating wild forest reindeer herd, which may consist of anything from a handful to several hundred animals, may stop en route for several weeks. A migrating spurt occurs when the snow thickness reaches 30 to 40 cm; at this point, the animals may travel dozens of kilometres per day.

Wild forest reindeer move through the areas of many different hunting right holders during the hunting season. They may cause damage in both their summer and winter feeding grounds. However, the animals are not necessarily found in those areas where they have caused damage in the previous year and where hunting licences have been issued on the basis of damage caused.

		Catch – Adults				Catch – Calves			Catch
GM district	**No. of hunting**	**Male**	**Female**	**Total**	**Male**	**Male**	**Female**	**Total**	**Total**
Kainuu	**animals**	**animals**	**animals**	**animals**	**%**	**animals**	**animals**	**animals**	**animals**
1996–1997	10	5	2	7	71	0	0	0	7
1997–1998	14	6	2	8	75	2	0	2	10
1998–1999	14	10	3	13	77	0	0	0	13
1999–2000	0	0	0	0	-	0	0	0	0
2000–2001	16	10	4	14	71	0	0	0	14
2001–2002	45	27	14	41	66	2	0	2	43
2002–2003	54	28	12	40	70	0	2	2	42
2003–2004	0	0	0	0	-	0	0	0	0
2004–2005	0	0	0	0	-	0	0	0	0
2005–2006	0	0	0	0	-	0	0	0	0
2006–2007	0	0	0	0	-	0	0	0	0
Total	153	86	37	123	70	4	2	6	129
Ostrobothnia									
1998–1999	6	5	1	6	83	0	0	0	6
1999–2000	15	8	5	13	62	0	2	2	15
2000–2001	38	28	9	37	76	0	0	0	37
2001–2002	53	42	6	48	88	0	1	1	49
2002–2003	66	39	12	51	76	0	1	1	52
2003–2004	83	40	16	56	71	8	8	16	72
2004–2005	110	39	22	61	64	9	12	21	82
2005–2006	100	44	31	75	59	14	14	28	103
2006–2007	117	49	34	83	59	22	20	42	125
Total	588	294	136	430	68	53	58	111	541
Central Finland									
2001–2002	3	2	0	2	100	0	0	0	2
2002–2003	7	3	1	4	75	1	0	1	5
2003–2004	14	3	0	3	100	0	0	0	3
2004–2005	18	4	1	5	80	0	0	0	5
2005–2006	22	6	4	10	60	0	1	1	11
2006–2007	21	7	6	13	54	0	0	0	13
Total	85	25	12	37	68	1	1	2	39
Oulu									
2005–2006	10	3	1	4	75	1	0	1	5
2006–2007	10	3	0	3	100	0	0	0	3
Total	20	6	1	7	86	1	0	1	8
GRAND TOTAL	846	411	186	597	69	59	61	120	717

Table 3. Hunting licences for wild forest reindeer issued by game management districts, and actual catches, from the 1996–1997 hunting season to the 2006–2007 hunting season.

If hunting licences are issued to the maximum number of hunting associations, they end up with one or two hunting licences apiece. On the one hand, issuing a low number of hunting licences does not necessarily help in preventing damage caused by wild forest reindeer; but on the other hand, issuing a large number of hunting licences 'just in case' for a specific location may lead to unused hunting licences or to excessive hunting. The sudden shifting of wild forest reindeer due to the availability of food or hunting may also affect the usage of hunting licences.

Section 26 of the Hunting Act states: "In granting hunting licences, it must be ensured that the cervid populations are not endangered by hunting and that damage caused by cervids is kept at a reasonable level. In order to take traffic safety aspects into account, the game management district must hear the regional authorities responsible for traffic safety on an annual basis." As regards damage, the mobility of wild forest reindeer may indeed cause situations which the game management district cannot in all respects anticipate when issuing hunting licences.

Also, in Kainuu the provision entered in the Hunting Act of equitable granting of hunting rights in the areas specified in section 8 poses a special requirement. Firstly, local people can apply for hunting licences on the basis of their free right to hunt. Also, anyone who has received a regional licence from the Forest and Park Service may apply for a hunting licence for State-owned lands in this area. The issuing of hunting licences focuses on allowing a level of hunting consistent with the principle of sustainable use.

9.3 Special features of hunting

The Hunting Decree prohibits the shooting of a female accompanied by a calf. In practice, when a hunt is in progress, it is sometimes not clear which female in a herd of wild forest reindeer is the mother of a particular calf. It is also difficult to tell a young adult from a calf. It is partly for these reasons that hunters have been reluctant to hunt females and calves. Also, both male and female wild forest reindeer have antlers, and thus even telling a young male and a young female apart during a hunt may be difficult.

The proximity of the reindeer herding area has a bearing on hunting in Kainuu, because there may be reindeer among wild forest reindeer even outside the reindeer herding area, and also cross-bred offspring. Some cross-bred reindeer and wild forest reindeer have had earmarks. It is also difficult to distinguish between species in the case of young animals.

In the early years of wild forest reindeer hunting, the Halla reindeer herding cooperative used to issue a blanket licence to hunting associations which hunted wild forest reindeer to shoot any reindeer which they encountered outside the reindeer herding area. In recent years, however, the Halla reindeer herding cooperative has not issued any such licences.

The legislation contains no provisions regarding cross-bred animals. It was therefore agreed during the early years of wild forest reindeer hunting in Kainuu that a cross-bred animal was considered a reindeer if it had an earmark and a wild forest reindeer if it did not.

Similarly, hunting within the reindeer herding area calls for careful planning.

The rutting period of wild forest reindeer in September-October also affects hunting. Currently, the hunting season begins on the last Saturday of September when the mature males are in heat. During the rutting season, the meat of male wild forest reindeer smells and tastes strongly due to hormonal changes. The rutting season ends by the middle of November, and it is not until then that the smell and taste of the meat of wild forest reindeer has changed so that hunted males can actually be used in household cooking. On the other hand, if a permit holder wishes to hunt a large male in order to gain an antler trophy, by November-December the largest males will already have shed their antlers.

PART 2. AIMS AND MEASURES IN WILD FOREST REINDEER POPULATION MANAGEMENT

10 Wild forest reindeer population management policies

10.1 Population management basics, principal aims and conditions

Attitudes towards wild forest reindeer are mainly positive (Bisi & Kurki 2003; Bisi et al. 2006), and their return to the Finnish national environment can be largely attributed to active management measures. The herding typical for the animals, migration between summer and winter feeding grounds, and grazing in fields have occasionally led to conflicts with agricultural entrepreneurs. The occurrence of winter feeding grounds next to heavily trafficked roads has also caused some problems. These have been addressed through advisory services and publicity, compensation for damages, prevention of damage and targeted hunting.

Wild forest reindeer and reindeer occupying the same territories and interbreeding have threatened the genetic purity of the wild forest reindeer subpopulation in Kainuu. Attempts to resolve this issue have been made for the past ten years. Some progress has been made, but targeted measures are still needed.

The most important basic factors for increasing the wild forest reindeer population are socioeconomic sustainability and hunting in accordance with the principles of sustainable use as defined in the Hunting Act. It must also be taken into account in guiding the development of the wild forest reindeer population that the Kainuu wild forest reindeer subpopulation has declined considerably and that the Russian Karelia wild forest reindeer subpopulation has also been showing a declining trend. Therefore the development of the Finnish wild forest reindeer population is of crucial importance to the overall situation for the subspecies. On the other hand, sustainable use of game animals can be achieved in different ways and with different goals.

The management plan describes and justifies the measures required for managing the wild forest reindeer population. Although the selection of measures is very detailed and covers a wide variety of types of interaction between man and wild forest reindeer, the aims of population management can be distilled to three main points:

1) The Finnish wild forest reindeer population must be kept viable and genetically pure,
2) The adverse impact on agriculture and traffic of a viable wild forest reindeer population must be minimized, taking cost equivalence into account, and
3) Awareness of wild forest reindeer among citizens must be increased.

These aims can be achieved through planned population management measures. A brief justification is given for each of the planned measures.

10.2 Harmonizing protection and sustainable use

Finland is a party to several international nature protection treaties and is committed to their obligations. Being an EU Member State, Finland is also bound by the aims and obligations of the EU Habitats Directive. The wild forest reindeer is named both in the Habitats Directive and in the Bern Convention. The biodiversity agreement must also be taken into account in the management of the wild forest reindeer population.

The aim of the Convention on the Conservation of European Wildlife and Natural Habitats, which is often called the Bern Convention, is the conservation of wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the cooperation of several States, and to promote such cooperation. The Contracting Parties shall take requisite measures to maintain the population of wild flora and fauna at, or adapt it to, a level which corresponds in particular to ecological, scientific and cultural requirements. In doing this, the Contracting Parties shall take account of economic and recreational requirements and the needs of subspecies, varieties or forms at risk locally. According to the Bern Convention, the Contracting Parties shall take appropriate and necessary legislative and administrative measures to ensure the protection of wild fauna species specified in appendix III, to which the wild forest reindeer also belongs. According to the Bern Convention any exploitation of the wild forest reindeer (= hunting) must be regulated in order to keep the populations out of danger. Contracting Parties shall prohibit the use of all indiscriminate means of capture and killing and the use of all means capable of

causing local disappearance of, or serious disturbance to, populations of a species, and in particular, the means specified in Appendix IV (Prohibited means and methods of killing, capture and other forms of exploitation). The measures prescribed by the articles of the Bern Convention prescribing regulation of hunting have been implemented in Finnish hunting legislation.

The main aim of the Council Directive (92/43/EEC) on the conservation of natural habitats and of wild flora and fauna, i.e. the Habitats Directive, is to promote the conservation of biodiversity taking into account the economic, social and cultural requirements and regional and local characteristics. The conservation of species and the conservation of areas have been classified in the Habitats Directive. Regarding conservation of habitats, the wild forest reindeer is listed in annex II of the Habitats Directive (animal and plant species of Community interest whose conservation requires the designation of special areas of conservation). Known as the Natura 2000 network, this may also include sites that enable the natural habitat of the wild forest reindeer to be maintained, or, where appropriate, restored at a favourable conservation status in their natural range. The wild forest reindeer has proved reasonably flexible with regard to its habitats, and the recent decline in its population has nothing to do with the disappearance, fragmentation or declining quality of its habitats. Indeed, the wild forest reindeer occupies a number of different habitats in Finland today in the course of its annual cycle. The loss or changing of habitats does not directly threaten the wild forest reindeer in Finland. When the development of the wild forest reindeer population and its behaviour observed in varied habitats is taken into account, it is clear that the diverse wilderness in Finland is such that the natural habitat for even a significantly large population of wild forest reindeer can be ensured at a favourable conservation status without the need for specific new conservation areas.

The aim of the Convention on Biological Diversity is the conservation of biological diversity. Sustainable use is defined in the Convention as meaning the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity. The aims of the Convention and the measures implemented in accordance with it also affect wild forest reindeer population management. Population management of the wild forest reindeer is part of the measures to meet the aims of the Convention within the administrative sector of the Ministry of Agriculture and Forestry.

The sustainable use of the wild forest reindeer population will only be possible when the wild forest reindeer are found in significant numbers in suitable habitats outside the reindeer herding area. There is good potential for this as there are plenty of habitats and food available for the wild forest reindeer outside the current distribution range. In practice this means a distribution range that is more extensive than it currently is, when the wild forest reindeer have gradually spread to new habitats after this has been made possible with population management measures. This is also a direct continuation from the wild forest reindeer population management measures that have been carried out over recent years.

The breeding potential of the Finnish wild forest reindeer population is sufficient to ensure the spreading of the population to a wider area. Favourable subpopulation development in Suomenselkä in particular in recent years and the systematic development of population management show that the wild forest reindeer population in Finland is viable. Our wild forest reindeer population is also linked to that of Russian Karelia.

Limited hunting has not had detracted from the development of the wild forest reindeer population. On the contrary, hunting has had a positive effect on keeping the population genetically pure and on preventing agricultural damage.

Aim:
The principal aim in the protection, management and control of the Finnish wild forest reindeer population is and continues to be to maintain the wild forest reindeer as part of Finland's fauna and as a valued and viable game species.

The following will be taken into account in the measures to be implemented:

a) the economic, social and cultural requirements and regional and local characteristics, as outlined in the Habitats Directive,
b) the requirement in the Bern Convention in which the wild forest reindeer population must be maintained at a level which corresponds in particular to ecological, scientific and cultural requirements, also taking into account economic and recreational requirements, and
c) the conservation of biological diversity and the sustainable use of its components as outlined in the Convention on Biological Diversity.

Measures:
The aim will be achieved through the combined effect of the different measures described below.

10.3 Regional wild forest reindeer population management

10.3.1 Population management areas

The most significant factor for human activities in both Kainuu and Suomenselkä is that wild forest reindeer have been wintering in a small, concise cluster. More than 1,000 animals may congregate in an area of only a few thousand hectares in February-March. According to earlier estimates of the biology of the wild forest reindeer, a population begins to diverge into new subpopulations when its size exceeds 600 animals (Pulliainen & Leinonen 1990). So far, no new subpopulations have been formed, even though the declining Kainuu wild forest reindeer subpopulation has increasingly been spreading to more than one core area in winter.

The local population density in a group of more than 1,000 animals is notable, and migrations are highly conspicuous events which obviously have an impact on human activities. Interviews conducted in Kainuu and Suomenselkä indicate that there is no local tolerance for significantly increasing the size of the wild forest reindeer population from its 2002-2003 level (Bisi & Kurki 2003). Instead, it is hoped that wild forest reindeer will spread or be spread to new areas. In some areas in central Finland, for example, the growth and spread of the wild forest reindeer population is desired (Bisi & Kurki 2003). Spreading is justifiable at the national level too.

The wild forest reindeer population in Finland must be maintained at a level where it does not cause unreasonable damage or disruption to human livelihood and other human activities. Management of the wild forest reindeer population should aim at the continued existence of separate subpopulations in Finland, each with their own grazing rotation and separate winter feeding grounds. The existence of several viable subpopulations will reduce the risk of diseases in particular.

The distribution of wild forest reindeer must be kept separate from the reindeer herding area, the natural migration routes and feeding grounds of the wild forest reindeer tending to follow eskers, rugged moorland and large bogs. This aim can be justified by the fact that there are plenty of suitable for habitats for wild forest reindeer in such areas, and they are not subject to factors that would have an adverse impact on the development of the wild forest reindeer population.

The Finnish wild forest reindeer population can be divided into four subpopulations and population management areas; in each of these, the present situation is different and the potential for developing the subpopulation is different too. However, this division does not exclude the implementation of population management measures in even smaller areas.

The wild forest reindeer subpopulation management areas are: 1) Kainuu, 2) Suomenselkä, 3) Ähtäri and 4) Ruunaa (Figure 4). Kainuu and Suomenselkä may be regarded as focus areas, and Ähtäri and Ruunaa as development areas. The functioning of this division into subpopulation management areas will be evaluated, like that of other components of this management plan, when the plan is updated.

Measure:
The wild forest reindeer population in Finland will be managed regionally, by subpopulation, outside of the reindeer herding area.

10.3.2 Regional population goals

While peremptory demands for setting regional upper limits for regional population goals emerged particularly in the hearings regarding the preparation of population management plans for large predators, no similar strong views were expressed with regard to regional population goals for wild forest reindeer. Logically, then, there is currently no need to set upper limits to subpopulation goals; the goals will be determined over time as the subpopulations spread out, in relation to trends in agricultural and traffic damage, and especially in relation to the views of local people. On the other hand, this does not preclude the setting of intermediate subpopulation goals if there are justified reasons for doing so.

The sufficiency of lichen pastures is not precisely known, but it has been estimated that the Suomenselkä area, for instance, could support a wild forest reindeer population of up to 5,000 animals (Kojola 1993; 1996). On the other hand, there are risks involved in testing the limits of ecological bearing capacity to destruction.

It is considered a particular condition for augmenting the subpopulations of wild forest reindeer that the animals must not cause unreasonable disruption to local people or their livelihoods. The regional game management organization assesses the situation with local stakeholders.

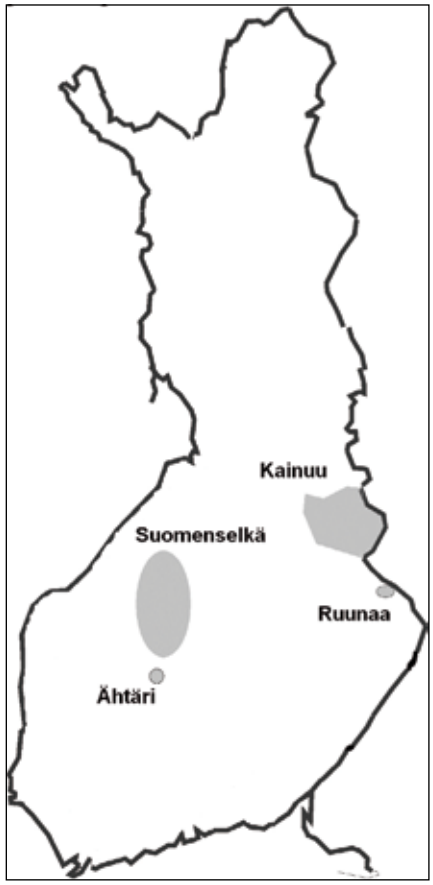

Figure 4. Finland's wild forest reindeer population management areas.

Measure:
The development and impact of wild forest reindeer subpopulations will be monitored, and the need for setting regional upper limits for subpopulation goals will be investigated as necessary.

10.3.3 Regional population management goals and measures

Kainuu subpopulation

The Kainuu subpopulation grew relatively steadily until 2001 (annual subpopulation growth averaging 10.5% between 1992 and 2001), at which point 1,700 animals were tallied in a helicopter count. The subpopulation then went into a steady decline, with 1,510 animals tallied in spring 2003 and only 1,014 in spring 2005, representing an average annual decrease of 12.4% between 2001 and 2005 (Kojola et al. 2007). In the helicopter count conducted in March 2007, 960 animals were tallied (Kojola 2007). The latest count indicates that the average annual decrease in the wild forest reindeer population was 9% between 2001 and 2007 (Kojola 2007).

There are several probable causes for the decline in the Kainuu subpopulation, including increased preying by large predators, particularly wolves (Kojola 2007; Kojola et al. 2004, 2007), increased mortality due to traffic accidents and culling for genetic purity, and migration to Russian Karelia. In similar drastic decreases in caribou populations on the Arctic islands of Canada, the causes cited include snow conditions in winter, interspecies and intra-species competition, wolves, hunting, parasites and diseases, and migration out of the area (COSEWIG 2004; Gunn et al. 2006). Man-made changes to habitats may also play a part (Schaefer 2003). Declines in subpopulations of Canadian caribou have also been explained by preying by large predators (Wittmer et al. 2007), particularly wolves (e.g. Thomas & Gray 2002; Wittmer et al. 2005; Gustine et al. 2006).

Wild forest reindeer were hunted in the Kainuu game management district between the hunting seasons of 1996–1997 and 2002–2003, inclusive (Table 3). Since it was noted that the subpopulation had gone into decline, hunting has been limited to culling individual animals on exception licences granted by the Ministry of Agriculture and Forestry.

Halting the decline in the Kainuu subpopulation requires active measures and the enabling of measures to augment the Kainuu subpopulation, which in turn requires rapid decisions. Because the principal cause of the decline appears to be preying by an increased number of wolves (Kojola 2007; Kojola et al. 2004, 2007) and possibly other large predators, as was observed in the case of the woodland caribou (Wittmer et al. 2007), it may prove necessary to control the large predator populations (see Gunn et al. 2006; Wittmer et al. 2007) within the bounds of hunting legislation, even though preying by large predators can to some extent be considered a natural mortality factor. However, its impact can be highlighted by the fact that the wolf population in the area has grown because of an abundance of food (moose) to a level (Bergerud & Elliot 1986; Seip 1992; Larter & Nagy 2003) where the animals are being driven to prey on the wild forest reindeer population too. The increase in the moose population is largely due to human activities, and therefore the decline in the wild forest reindeer population can ultimately be con-

sidered to be due to human activities too. Forestry has created plenty of young forests in Kainuu, which are a suitable habitat for moose. This and the present moose hunting plan has enabled the moose population to grow to a level which in turn has enabled the wolf population — almost completely protected against hunting — to increase its numbers so as to have a greater impact than before on the wild forest reindeer population too (Härkönen 2007).

Little attention has previously been paid in Finland to the interaction between the large predators and cervids described above. However, the situation with the Kainuu wild forest reindeer subpopulation shows that the management of large predator populations and cervid populations must be considered jointly and not as separate entities (Härkönen 2007; Härkönen & Hiedanpää 2007). Reindeer husbandry is also an essential factor in the present situation in Kainuu. Large predators, particularly wolves, have caused considerable financial losses to reindeer husbandry for the Halla reindeer herding cooperative and northwards along the eastern border, all the way to the Kuusamo reindeer herding cooperative (Nieminen 2007; Norberg & Nieminen 2007). The high incidence of wolf damage is partly due to the fact that wolves have multiplied substantially outside the reindeer herding area (i.e. in the territory of wild forest reindeer) (Kojola et al. 2006; www.rktl.fi). As a result, wolves seeking new territories are constantly migrating to the reindeer herding area. Reindeer herdsmen have proposed setting up a 'buffer zone' outside the reindeer herding area (e.g. Viik 2007) and reducing the number of wolves in the buffer zone, which by all accounts would reduce wolf damage in the reindeer herding area. A decrease in the number of wolves would have a significant positive impact on the development of the wild forest reindeer population.

In the areas where the wild forest reindeer occurs in Finland, the wolf, the bear and the lynx are species protected under Annex IV of the Habitats Directive; this protection can only be derogated from under certain specific circumstances itemized in the Directive. Linnell et al. (2007) have noted that the status of the Kainuu wild forest reindeer subpopulation could be construed as a circumstance which under Article 16(1) of the Habitats Directive justifies derogating from the protected status of large predators. The aim here would be to remove predating pressure by culling individual large predators and thereby to protect a game animal species whose numbers are low. Because this option is entered in Finnish national hunting legislation too, it can be invoked quickly if enabled administratively. There is also better scope for restricting the wolf population in Kainuu than before, because the wolf population in Finland in general has increased substantially, and this has been taken into account in the new judgement of the Court of Justice of the European Communities (Judgement C-342/05, 14 June 2007; http://www.curia.europa.eu/fi/index.htm) concerning the issuing of exception licences for wolf hunting in Finland. If the wolf population in Kainuu were subjected to active controls, it would be only appropriate to update the goals presented in the Finnish wolf population management plan too. This would ensure that there are no conflicting aims in the management of the wolf population on the one hand and the wild forest reindeer population on the other.

There are quantified research findings concerning the impact of reducing the wolf population. In North America, controlling the wolf population has brought about considerable results. In a study conducted in Yukon, it was found that the one-year survival rate of caribou calves increased by 113% and adult caribou mortality decreased by 60% when the wolf population was depleted by 80% (Farnell & McDonald 1986). Another study shows that the one-year survival rate of caribou calves increased from 5.5% to 16.7% when the number of wolves was reduced by 60% to 90% over three winters (Bergerud & Elliott 1998). Similarly, a wolf population control effort undertaken in Alaska over seven years increased the caribou population from 2,200 animals to 10,690 over 14 years (Boertje et al. 1996). The theoretical estimate is that 2, 4 or 8 wolves per an area of 1,000 km^2 require a caribou population of 387, 773 or 1,547 animals, respectively, assuming that the caribou are the only source of food for the wolves and that the wolves are the only mortality factor for the caribou (Thomas & Gray 2002).

Reindeer husbandry is an important livelihood in the reindeer herding area in Kainuu, and the wild forest reindeer population may continue to disrupt it. Conversely, reindeer may continue to cause problems regarding the genetic purity of the wild forest reindeer population. Wild forest reindeer have also caused agricultural and traffic damage in the region, and they have destroyed decorative lichen harvesting areas in western Kainuu. Damage trends and the views of local people must be monitored in the near future to determine detailed goals for subpopulation development.

Measures:
The decline of the Kainuu subpopulation will be halted using any means necessary. Currently, the most effective means seem to be active controlling of the wolf population so as to reduce its numbers. The goal after this is to augment the Kainuu subpopulation outside of the reindeer herding area so as to reach at least the 2001 level (1,700 animals) as an intermediate goal. Livelihoods in the region will be taken into account in wild forest reindeer population development.

Cooperation and exchange of information with reindeer husbandry parties will be continued.

Continued monitoring of the Kainuu subpopulation, harmonizing the population management of cervids and large predators, increasing publicity updates and preventing damage are important measures in wild forest reindeer population management in this region.

Suomenselkä subpopulation

The Suomenselkä subpopulation has been growing by about 16% per year in recent years (Kojola et al. 2007). Just over 1,000 animals were tallied in the most recent helicopter count, conducted in March 2003 (Anon. 2003; Kojola et al. 2007).

Wild forest reindeer have been hunted in the Ostrobothnia game management district since 1998, in the Central Finland game management district since 2001 and in the Oulu game management district since 2005 (Table 3). Hunting has mainly been targeted at herds which graze on fields and in their immediate vicinity.

Large predators are gradually spreading to western Finland (Kojola et al. 2006; www.rktl.fi), and thus the harmonization of the management of cervid populations on the one hand and large predator populations on the other requires closer attention (cf. Härkönen 2007; Härkönen & Hiedanpää 2007) in the territory of the Suomenselkä wild forest reindeer subpopulation too. Developments in Kainuu enable an estimation of future developments and measures required in Suomenselkä.

Wild forest reindeer have caused some agricultural and traffic damage in the area. Projected future damage and changes in the attitudes of local people need to be monitored to determine more specific aims for wild forest reindeer population development in the future.

Measures:
The Suomenselkä subpopulation will be augmented to an intermediate goal level of at least 1,700 animals. The livelihood of local people will be taken into account in wild forest reindeer population development.

Enhanced monitoring of the Suomenselkä subpopulation, harmonization of the management of cervid populations on the one hand and large predator populations on the other, increased publicity updates and preventing damage are important measures in wild forest reindeer population management in this area.

Ähtäri subpopulation

There is a separate subpopulation evolving in the area of Ähtäri, Soini and Karstula in Suomenselkä, originating in the translocations performed by Ähtäri Zoo in the early 1990s. Although several dozens of wild forest reindeer have been tallied in the area, recent information indicates that the subpopulation is declining. Large predators are cited as a cause. Developments in Kainuu enable an estimation of future developments and measures required in Ähtäri.

The subpopulation consists of the descendants of only two individual animals, making it highly inbred.

Measures:
The reasons for the decline of the Ähtäri subpopulation will be investigated and the decline halted with the necessary measures. The subpopulation will then be augmented to an intermediate goal level of at least 100 animals.

Expanding the genetic base of the Ähtäri subpopulation should be investigated together with the relevant stakeholders.

Enhancing the monitoring of the Ähtäri subpopulation, increased publicity updates and preventing damage as the subpopulation grows are important measures in wild forest reindeer population management in this area.

Ruunaa subpopulation

The number of wild forest reindeer in the Ruunaa area peaked at 170 in the 1970s. Since then, the subpopulation has declined, and for decades there were no more

than 20 to 30 animals in the area. The last observations of tracks from individual animals in the Ruunaa nature reserve are from 2005, after which no wild forest reindeer have been observed in the area at all.

Current information suggests that the Ruunaa subpopulation is extinct. The reasons for this have not been studied, but hunting in Russian Karelia and the activities of large predators are probable explanations (cf. the situation in Kainuu).

The North Karelia game management district wishes to restore the wild forest reindeer permanently to the fauna of the area, and achieving this would be justifiable in the national context too.

Measure:
The conditions for repopulating the Ruunaa subpopulation will be investigated together with the relevant stakeholders, the ultimate aim being to repopulate the Ruunaa subpopulation.

10.4 Ensuring genetic purity

10.4.1 General

Active measures have been undertaken in Kainuu to ensure the genetic purity of the wild forest reindeer subpopulation. A fence, known as the 'wild forest reindeer fence' has been erected to separate wild forest reindeer from reindeer. However, this fence has not fully prevented the animals from crossing over into each other's territories.

With the fence having been built at a considerable investment cost, it would only be fair to expect that it would actually keep the wild forest reindeer apart from the reindeer. This will require the monitoring of the movements of wild forest reindeer and of the condition of the fence, and repairing the fence as necessary.

Females attempting to access the reindeer herding area have been removed from the population to reduce movement in that direction. Atypical individuals and obvious cross-breeds have also been removed.

So far, monitoring the Kainuu wild forest reindeer subpopulation and culling for genetic purity have required one person-year of work, at an annual cost of EUR 60,000 to 70,000.

There has been no need for similar measures to ensure genetic purity in Suomenselkä. However, reindeer farming in the area constitutes a growing risk.

Measures:
Measures to ensure the genetic purity of the Kainuu wild forest reindeer subpopulation must be continued. Similar measures must be prepared for in Suomenselkä.

10.4.2 Wild forest reindeer fence maintenance responsibility

The wild forest reindeer fence is currently just over 80 km long. Responsibility for its maintenance currently rests with the Forest and Park Service, according to which the practice is feasible and can continue. Wild forest reindeer fence maintenance measures have cost a total of EUR 195,000 per year on average between 1999 and 2003.

The existence of the wild forest reindeer fence benefits reindeer husbandry too, and accordingly the Reindeer Herders' Association could be the appropriate party for maintaining the fence where it runs along the edge of the reindeer herding area. This alternative should be investigated separately.

Measure:
The Forest and Park Service will continue to maintain the wild forest reindeer fence for the time being.

Transferring maintenance responsibility for the wild forest reindeer fence to the Reindeer Herders' Association where the fence runs along the edge of the reindeer herding area will be investigated.

10.4.3 Repair of cattle grids, and responsibility for their maintenance

The wild forest reindeer cattle grids have not been completely secure; due to weaknesses in their deck structure, both reindeer and wild forest reindeer have been able to cross over into each other's territories. The cattle grids have been in need of repair for some time. Some measures have already been undertaken; a cattle grid with a new deck structure has been built in Luisua. Motorists describe the new structure as much easier to drive across than the old one. The new structure should

also be tested on Purnuntie and Rytisuontie. Replacing the deck structures will probably cost about EUR 10,000 to 12,000 per cattle grid.

The Finnish Road Administration has agreed with the Kainuu game management district that it will continue to maintain the existing wild forest reindeer cattle grids and that it is willing to undertake new experiments consistent with normal road maintenance and improvement. On the other hand, if financial input not related to normal road maintenance and improvement is needed, outside funding must be sourced.

Measure:
The wild forest reindeer cattle grids will be repaired so as to prevent wild forest reindeer and reindeer from crossing them.

10.4.4 Extending the wild forest reindeer fence

The winter migration cycle of wild forest reindeer may turn increasingly towards the northwest along the esker route via Ristijärvi through the northern part of Paltamo. If the herds attempt to move northward from this esker route, their spring migration may take them into the reindeer herding area, past the western edge of the current wild forest reindeer fence. They would then have no open route to their summer feeding grounds in Kuhmo. This is a clear and concrete risk which requires anticipatory action and the continuous and close monitoring of wild forest reindeer.

Scenarios for extending the wild forest reindeer fence have been investigated (Porsanger 2006). Basically, a landowner is free to build such a fence on his land, and by extension another party can build such a fence with the landowner's consent. Such matters have been agreed by written agreement with landowners. However, recent discussions and negotiations have shown that the existing wild forest reindeer fence cannot be extended even as far as the no. 5 road through privately owned lands.

At the moment, the most feasible alternative is to extend the wild forest reindeer fence as a game fence from Ristijärvi along the Kostamus railway line all the way to Kontiomäki (Porsanger 2006). This would make the new section of fence much longer. Its cost can be roughly estimated at EUR 9,500 to 11,000 per km (Appendix 3).

Measures:
Potential for obtaining funding for extending the wild forest reindeer fence will be investigated. The ultimate goal is to extend the fence along the Kostamus railway line at least as far as Kontiomäki.

10.4.5 Reindeer farming

Reindeer farming practiced in the Parkano area constitutes a potential risk for the genetic purity of the Suomenselkä and Ähtäri wild forest reindeer subpopulations. Reindeer farming and reindeer husbandry involving individual animals is practiced elsewhere outside the reindeer herding area too.

Reindeer can escape from enclosures through fences broken by vandalism, falling trees or moose damage. Practical experiences in farming other animals have shown that animals can escape into the wild for a variety of reasons.

The flight risk must be taken into account in reindeer farming. Reindeer escaping into the wild would be easier to identify among wild forest reindeer if they were marked with a red ear mark, for example.

Measures:
Reindeer farming and other reindeer husbandry outside the reindeer herding area must be monitored. Outside the reindeer herding area, reindeer must be marked so that they can easily be identified among wild forest reindeer in the wild.

Guidelines for the structure and maintenance of reindeer farms, and the management of trees growing around the structures, will be drawn up in order to prevent farmed reindeer from escaping into the wild and to prevent vandalism of the farm structures.

10.4.6 Culling for genetic purity

For years now, atypical animals and obvious crossbreeds have been removed from the Kainuu wild forest reindeer subpopulation. Wild forest reindeer that have moved into the reindeer herding area through acquired migrating behaviour have also been removed, and reindeer straying into the territory of wild forest reindeer have been returned alive to the reindeer herding area.

These measures have been undertaken by the Kainuu game management district.

Measure:
The Kainuu game management district will continue to organize culling for genetic purity as necessary.

10.5 Translocations

Translocations of large predators (a few individual bears, lynxes and wolverines) have prompted strong criticism, and rumours associated with them have maintained the popular beliefs that large predators are translocated and freed from captivity all the time. No similar debate has been associated with the translocation of wild forest reindeer or the release into the wild of farm-raised wild forest reindeer; on the contrary, these measures have been commended and considered successful. Public opinion could thus be favourable to further translocations of wild forest reindeer.

Internationally, success in translocations of subspecies of the genus Rangifer has been variable (Kojola 1993; Thomas & Gray 2002). However, we should note that with regard to the overall situation of the wild forest reindeer population in Finland, there is no real need for new translocations. Additionally, before even considering something like repopulating the Ruunaa subpopulation through translocation, the projected success of such a measure must be investigated thoroughly. If it can be assumed that the wild forest reindeer would migrate to the Russian side of the border and stay there, or that large predators would exact too great a toll on the subpopulation, the potential for failure is too great to warrant launching the project. There are also issues of animal protection involved in the capturing and transportation of adult animals (see Nieminen & Laitinen 1983).

If, after investigating, a decision is made to repopulate the Ruunaa subpopulation through translocation, the costs of this project will depend on the method chosen. The most expensive, but most reliable, method is to translocate wild forest reindeer to a fenced farm and then release them. This would be a repeat of the project that was carried out in Suomenselkä between 1979 and 1984. The total costs of the translocation would probably be between EUR 100,000 and EUR 200,000. It would be considerably more affordable to use the method employed by Ähtäri Zoo, which led to a permanent population being established in the Ähtäri area. With this, the costs would only be a few thousand euros. The animals to be translocated could be young animals from the Kainuu subpopulation. The Ähtäri subpopulation could be strengthened by the same means, or an entirely new subpopulation created in a suitable area in inland Finland, for example.

Measure:
The potential for new translocations will be investigated together with local stakeholders and in consultation with local people.

10.6 Organizing the monitoring of the wild forest reindeer population

There have been five counts of the wild forest reindeer population from the 1990s to the present day in Suomenselkä (1992, 1994, 1998, 2000, 2003) and seven in Kainuu (1993, 1996, 1999, 2001, 2003, 2005, 2007). These were helicopter counts based on preliminary surveys and conducted during late February and early March. Practical experience has shown that it is difficult to ascertain the number of wild forest reindeer reliably with any other method or at any other time of the year.

The purpose of the helicopter counts was to observe and tally all individual animals and also to photograph them in order to determine the structure of the population. The counts have yielded up-to-date and reliable information on the development of the wild forest reindeer population in Finland and changes in winter feeding grounds. The Finnish Game and Fisheries Research Institute has also made use of the moose observation card system in monitoring the occurrence and numbers of wild forest reindeer. The Suomenselkä subpopulation would seem to be developing as expected, whereas there are uncertainty factors in the development of the Kainuu subpopulation. In order to confirm the overall situation, helicopter counts should be conducted of the wild forest reindeer subpopulations in both Suomenselkä and Kainuu in early spring 2008, and concurrently with counts performed by the appropriate parties in Russian Karelia. Information from this would help determine when the next count should be conducted.

Cost of helicopter counts in Suomenselkä and Kainuu in early spring 2008
The number of flight hours required for counts in both areas is about 60 (45 hours for Kainuu and 15 hours for Suomenselkä). The cost of a flight hour is about EUR 600 at 2005 prices.
The overall cost, including the fees of tallying personnel, is about EUR 40,000.

Monitoring of the Ruunaa subpopulation was earlier undertaken by Kalevi Heikura, Curator of the Zoological Museum at the University of Oulu, together with the North Karelia Border Guard District. In late 2003, the North Karelia game management district and the Lieksa Border Guard Area of the North Karelia Border Guard District agreed to cooperate in monitoring the wild forest reindeer population. There must continue to be a provision for monitoring the Ruunaa subpopulation, even though current information suggests that there are no longer any wild forest reindeer in the area. The obvious party to carry out the monitoring would be the North Karelia game management district together with the Lieksa Border Guard Area and the Finnish Game and Fisheries Research Institute.

The wild forest reindeer population monitoring system should be developed with future needs in mind. It would be particularly important for the monitoring data for the different subpopulations to be compatible. The observation card system used for monitoring the structure of the subpopulation in Kainuu should be introduced in Suomenselkä too. The aim might be set of training hunting licence recipients to identify animals by their gender in herds grazing in fields, and possibly by age too, and to enter the information on observation cards. These cards would be collated by the relevant game management district, and their analysis would dovetail with the cervid research being undertaken at the Finnish Game and Fisheries Research Institute. The age structure of the adult wild forest reindeer population could further be monitored through jaw sample collections from hunting catches at appropriate intervals. The monitoring of the structure of the population can be managed between the game management districts and the Finnish Game and Fisheries Research Institute without substantial additional costs.

Measure:
Helicopter counts will be conducted in Suomenselkä and Kainuu in early spring 2008, and as needed thereafter.

The possibility of conducting a helicopter count in Russian Karelia will be investigated.

Methods other than helicopter counts will be developed for wild forest reindeer population monitoring, and a permanent wild forest reindeer population structure monitoring system will be set up.

10.7 Improving damage prevention

10.7.1 Damage to agriculture and forestry

Current monitoring methods are sufficient for monitoring agricultural damage caused by wild forest reindeer. Cooperation between the statutory hunters' organization and the agriculture authorities is smooth, and there are operational models in place.

At the national level, agricultural damage by cervids is not analysed by species. This should be improved so that damage reports include not only geographical information but also unambiguously which species of cervid has caused the damage.

The damage caused by wild forest reindeer to agriculture and forestry has been slight, and the wild forest reindeer is not expected to become a significant source of such damage. There are proven solutions for preventing agricultural damage by wild forest reindeer. Fencing in particular is effective in preventing agricultural damage. As the wild forest reindeer population grows and spreads out, some farmers may be obliged to make further investments because of the increased risk of damage. The Ministry of Agriculture and Forestry is prepared to support preventive measures as resources allow. Fencing materials are available for priority locations.

The development of measures to prevent damage by wild forest reindeer and the providing of advisory services and training related thereto has so far been largely the responsibility of the Hunters' Central Organization and the game management districts. In recent years, preventive materials have been acquired in larger batches and warehoused centrally by the Hunters' Central Organization, while the game management districts have organized advisory services and training related to the use of those materials. This practice works well.

An important and justified principle in the prevention of damage by game animals is cost equivalence, which means that it is not feasible to support preventive measures out of public funds in locations where the material costs clearly exceed the potential damage protected against. Alternative protective measures need to be developed.

A new rural development policy period began in the European Union in 2007. Related to this, the Government approved a new Rural Development Strategy for Fin-

land on 3 August 2006 and the proposal for a Rural Development Programme for Continental Finland 2007–2013 based on it. The EU Rural Development Committee approved the Programme, after several amendments, in June 2007. The Programme aims at preserving a viable and functional countryside, improving the state of the environment and ensuring the sustainable use of natural resources. The Programme is divided into four schemes, each with a range of measures for rural development. The support systems related to this Programme may have a favourable impact on wild forest reindeer population management.

Measures:
Statistics on agricultural damage by cervids will be developed so as to identify the species causing the damage and to record geographical information for the location of the damage.

Game management districts will continue to coordinate the protecting of locations of potential damage with fencing.

The prevention of damage by wild forest reindeer follows the cost equivalence principle. If the value of a protected location in the long term is less than the support that would need to be allocated to its protection, it is not justifiable to spend public funds on this.

Publicity regarding the availability of material used in preventing damage by wild forest reindeer will be enhanced.

With regard to preventing agricultural damage, the usability of agricultural support systems related to the new rural development policy period will be investigated in cases where field areas at risk could be managed not as cultivated land but as resting and feeding grounds for wild forest reindeer.

10.7.2 Traffic accidents

Unless the wild forest reindeer winter feeding grounds shift decisively, no significant increase in the number of collisions in the Suomenselkä area is expected. The most heavily trafficked roads in the area are roads no. 16 (Lapua–Kyyjärvi, 1,500 to 3,000 vehicles per day), no. 28 (Kokkola–Kajaani, 500 to 1,500 vehicles per day) and no. 4 in Central Finland (3,400 to 6,000 vehicles per day) (Tiehallinto 2006). The feeding grounds most used to date lie between these roads, and only a small number of wild forest reindeer cross the roads during their grazing migration; accordingly, collisions have occurred only occasionally. On local roads in Perho, Halsua and Lestijärvi, for example, traffic volumes only amount to a few hundred vehicles per day, so the risk of collision is small.

In Kainuu, it may be anticipated that wild forest reindeer will continue to cross road no. 5 in Kontiomäki and the railway line running alongside it, and that collisions are therefore to be expected. Traffic is the heaviest on the section of road no. 5 between Kajaani and the turnoff to road no. 22 towards Oulu, with about 5,600 vehicles per day (Tiehallinto 2006). After the turnoff, the traffic towards Ristijärvi is only about half of this. If wild forest reindeer cross road no. 5 towards Saviniemi or Paltaniemi on their way to the shores of Lake Oulujärvi, for example, the collision risk will probably increase from its present level. The collision risk is also relatively high on secondary roads in the Kuhmo area despite their low traffic volume, because the annual migration routes of wild forest reindeer follow the esker formations in the area and traverse the north-south oriented roads.

The means available for preventing collisions here are the same as are used for preventing collisions with cervids. Local and regional publicity can influence the attitudes, traffic behaviour and awareness of motorists. Traffic signs, warning lights and the clearing of roadside shrubberies are useful additional measures. Game management districts and game management associations must also cooperate closely with the traffic safety authorities.

The Finnish Road Administration has provided game management districts with information on the occurrence of collisions with cervids for use in the planning of hunting. The collision sites have been entered in geographical information systems (GIS) and can thus be used more comprehensively in the planning of hunting in order to prevent accidents.

At the moment, traffic accident statistics only distinguish between moose collisions and deer collisions. The latter should be further specified by species (wild forest reindeer, white-tailed deer, fallow deer and roe deer).

Measures:
Close cooperation with traffic safety authorities and the use of tried and tested methods will be continued in order to reduce traffic accidents.

Statistics on collisions with cervids will be improved so as to classify collisions by species and to record the location of each collision in a geographical information system.

10.7.3 Damage to decorative lichen

Finland exports decorative lichen worth EUR 1.24 to 1.56 million per year (Metsätilastollinen vuosikirja 2004). More significant than the export angle is the fact that the harvesting of decorative lichen is a significant source of additional income for local people.

Wild forest reindeer can disrupt the harvesting of decorative lichen. This is a problem particularly around Lake Oulujärvi, where there are several valuable locations for harvesting decorative lichen. There are no economically feasible ways of protecting such locations. Fencing is too expensive, because the areas that would have to be fenced are extensive. Moreover, it is not enough just to fence the best lichen areas; lichen areas at various stages of growth would also have to be fenced. In Manamansalo alone, for example, the fencing would need to enclose hundreds of hectares of land.

Preparations must be made for preventing damage to decorative lichen. If wild forest reindeer herds migrate to what are now decorative lichen harvesting areas for the winter, and if their presence there is not wanted, an initial measure might be to frighten the animals away with ski-doos as allowed by hunting legislation. Such activities could be coordinated by the game management district within whose territory the area lies.

Measure:
Provisions will be made to prevent damage to decorative lichen.

10.8 Damage compensation

Compensation for damage caused by wild forest reindeer is provided for in the Government Decree on compensation for damage caused by cervids (1162/2000), issued under section 87 of the Hunting Act. The appropriations in the central government budget have been sufficient to cover the compensation paid.

A working group appointed by the Ministry of Agriculture and Forestry has been preparing a comprehensive reform of the system of compensating damage caused by game animals (Anon. 2005). This included damage by cervids.

The working group submitted its proposal to the Minister of Agriculture and Forestry on 19 October 2005. The working group proposed several amendments to existing legislation, for example a new act on compensating damage by game animals. The need for a completely new act stems partly from the need to harmonize the current compensation systems for damage by cervids and damage by predators, and partly from the need to upgrade the provisions on this matter from a Government Decree to an Act, as per the requirements of the Constitution. Moreover, the provisions concerning damage by game animals were proposed to be amended so as to drop the EUR 250 deductible currently enforced.

The proposal of the working group has been circulated widely for comment, and its reforms have found widespread support. The process of reforming the legislation on damage by game animals should be completed as soon as possible. At the same time, the basis for compensating damage by wild forest reindeer could be assessed.

Paying compensation for damages can of course make people less willing to undertake preventive measures. Therefore, the focus should be on active prevention of such damages. Some such measures may involve investment that could be supported with public funds, resources permitting.

Measures:
The system for compensating damage by game animals will be reformed.

The focus of public spending will be shifted from compensating to preventing damage by wild forest reindeer.

10.9 Hunting

The wild forest reindeer is a game animal and as such may be hunted according to the principles of sustainable use. The aim in hunting is to preserve the natural structure of the population, and also to prevent agricultural damage. In practice, this has translated into management of the wild forest reindeer subpopulations through hunting with a view to the quantitative and structural development of the subpopulation and focusing the hunting on locations with high damage potential.

The development of the population and development aims must be taken into account in the scaling of hunt-

ing. Hunting should continue to be focused in areas where the occurrence of wild forest reindeer could cause harm to human livelihood and other human activities. Although hunting wild forest reindeer on open fields is not considered particularly inspiring or challenging in hunting terms, it remains one of the means for preventing the animals from entering cultivated areas. Excessive depletion of sources of food for wild forest reindeer can also be prevented through carefully considered hunting of the animals. The organization of hunting and the means by which the hunting is carried out in the forest will develop with time.

So far, hunting has mainly targeted males (69% males in the catch of adult animals, see Table 3). This percentage is not particularly high compared for instance with the 90% recorded for barren-ground caribou in Greenland (Loison et al. 2001). On the other hand, if the culling continues at this rate, the gender distribution in the population will not remain natural as intended. Heavy culling of males leads to a lower average age among males. Because of the obligation to declare catches, there is now precise information on the numbers of adults and calves in the catch, but in the present situation more detailed information would be needed on the ages of the adult males and females in the catch.

In reindeer herds, it has been found that sufficient pregnancies can occur even if the percentage of males is as low as 10% (Holand et al. 2003). However, heavy and prolonged focusing on males in hunting is not without risks (see Ginsberg & Milner-Gulland 1994; Mysterud et al. 2002; McLoughlin et al. 2005; Nilsen 2006; Rankin & Kokko 2007), because it skews the population dynamics of the species through the age and gender distribution of the population. A disparate gender structure and lower average age of males in the population may affect rutting behaviour and, in the worst case, delay the time when the calves are born. This in turn may affect the survival of calves and the survival of individuals in the longer run too (see Holand et al. 2003).

The Suomenselkä subpopulation occupies the territories of the Ostrobothnia, Central Finland and Oulu game management districts. There is thus a clear need for cooperation in hunting coordination between these game management districts. So far, hunting has been governed mainly on the basis of a regional hunting plan and hunting recommendations in order to keep the gender and age distribution of the population as natural as possible without having to specify in detail on the hunting licence what the features of the animals to be hunted should be. Although the percentage of males in the catch has gradually decreased (Table 3), measures should be taken to guide hunting more forcibly towards practices that preserve the natural structure of the population. In particular, excessive culling of 'alpha males' and 'alpha females' should be avoided. This could be effected in practice by specifying conditions on the hunting licences to balance the numbers of calves, adult males and adult females caught (Appendix 4).

The hunting season could be brought forward in order to enable hunting and the removal of disruptive animals from farmland and inhabited areas in the summer feeding grounds of wild forest reindeer. If, for example, the hunting season began on 20 August, the holder of a hunting licence could hunt males before the rutting season. Males hunted at that time are in their best physical condition, and the quality of their meat is impeccable. This proposal would require an amendment of section 24 of the Hunting Decree.

Particular attention should be given to the regional allocation of hunting licences for wild forest reindeer. The party issuing the licence must consider on what grounds licences are allocated to different territories, the principal criteria being the damage caused by wild forest reindeer and the size and development trend of its population.

Measures:
Game management districts must cooperate to coordinate hunting planning and guide the hunting of wild forest reindeer through licence issuing procedures and conditions specified on hunting licences so that the structure of the wild forest reindeer population will remain as natural as possible.

The hunting season for wild forest reindeer will be brought forward to begin on 20 August, by an amendment of the Hunting Decree.

Regional hunting plans will be drawn up for wild forest reindeer hunting so as to govern the structural development of the population with specific reference to the grazing rotation of wild forest reindeer in space and time. These models can also govern the culling of the same herd at different points in the hunting season.

Methods to ensure the implementation and monitoring of the regional hunting plans will be investigated.

10.10 Research

Long-term research on the wild forest reindeer has mainly been conducted at the University of Oulu, involving the Kainuu and Russian Karelia subpopulations. There have also been shorter research projects at the University of Helsinki, at the Finnish Food Safety Authority Evira and at the Finnish Radiation and Nuclear Safety Authority. In 2006, the Finnish Game and Fisheries Research Institute launched an extensive three-year research project focusing on the Kainuu wild forest reindeer subpopulation. There have also been international projects studying the wild forest reindeer.

The growth of the wild forest reindeer population, the possible emergence of new subpopulations and the growing importance of the wild forest reindeer as a game animal prompt new research needs, with regard to which the Finnish Game and Fisheries Research Institute in particular should take a more prominent role.

New research data on the wild forest reindeer is needed at least in the following areas:

1) monitoring the wild forest reindeer population and developing monitoring methods,
2) condition and sufficiency of feeding grounds,
3) wild forest reindeer and large predators,
4) hunting plan models,
5) investigation of the health of the wild forest reindeer population and its diseases and parasites,
6) what kind of crop damage is caused by wild forest reindeer under different snow and frost conditions,
7) reasons for the decline of the Kainuu subpopulation, and
8) more detailed monitoring of the mobility and choice of habitat of the Suomenselkä subpopulation.

The focus areas of the research should be determined on the basis of the development of the wild forest reindeer population. Research cooperation with the Russian authorities and research institutions should also be continued and further developed.

Measures:
Research on wild forest reindeer will be coordinated with better anticipation, accuracy and cost-efficiency.

Research cooperation with Russian Karelia will be continued and further developed.

10.11 Training, advisory services and publicity

Wild forest reindeer are highly visible game animals in their territories. There is a particularly great need for local publicity whenever wild forest reindeer spread to new winter feeding grounds and large herds suddenly appear. The importance of wild forest reindeer as a game animal will increase in the future.

The training, advisory services and publicity related to the wild forest reindeer is easiest to manage through the statutory hunters' organization: locally through the game management associations, regionally through the game management districts, and nationally by the Hunters' Central Organization. The Metsästäjä and Jägaren magazines published by the Hunters' Central Organization and the www.riista.fi website are important publicity channels. These measures are expected to cause no extra costs to the hunters' organization. Training, advisory services and publicity measures should be coordinated with the relevant stakeholders as necessary.

Measures:
The role of the statutory hunters' organization in wild forest reindeer population management will be enhanced, because its network and publicity covers all hunters in Finland and a large portion of the rest of the population too.

The hunters' organization must distribute up-to-date information, provide training and give advisory services in order to prevent damage and to take targeted action to address problems related to the wild forest reindeer population.

10.12 Hunting supervision

Under section 88 of the Hunting Act, the police, Frontier Guard, customs authorities and game wardens appointed by game management associations are responsible for supervising in their respective jurisdictions that the provisions concerning hunting are complied with. In State-owned areas, the compliance with the law is supervised by officials to whom the supervision task is laid down or designated. A landowner or hunting right holder is entitled to supervise the compliance with this Act in their own area. Supervision undertaken by the Forest and Park Service in State-owned areas which it manages is provided for in the Act on Surveillance of Hunting and Fishing. The Act has been in force since 1 January 2006.

Under section 63 of the Hunting Act, it is the duty of a game management association to supervise hunting. The Hunters' Central Organization and the game management districts have contributed to improving hunting supervision and related cooperation as part of the advisory services provided for hunters and the coordination of the activities of game management associations.

The parties responsible for hunting supervision cooperate to improve supervision. Training related to enhanced hunting supervision has been jointly provided by the game management districts and the police. Various working groups and projects have also investigated the current state of hunting supervision and proposed measures to improve it. Hunting supervision has been hampered by the decline in resources available to the various parties.

Attention could be paid to wild forest reindeer in connection with hunting supervision in areas where wild forest reindeer occur. In addition to this, cooperation between the police, the Border Guard, the Customs authorities, the forest rangers of the Forest and Park Service, the statutory hunters' organization, landowners and hunting right holders in hunting supervision should be further developed. Concrete measures can be agreed upon in negotiations between the various parties.

Measures:
Cooperation between the police, the Border Guard, the Customs authorities, the forest rangers of the Forest and Park Service, the statutory hunters' organization, landowners and hunting right holders will be further developed. Concrete measures will be agreed upon in negotiations between the various parties at the national and local levels.

10.13 Monitoring diseases

Diseases and parasites can contribute to wild forest reindeer mortality, not only directly but also by weakening animals so as to make them more vulnerable to other pathogens and predators. Diseases and parasites can also have an effect on reproduction, as they may weaken the ability of females to care for their newborn calves.

To date, no major epidemics have occurred in the wild forest reindeer population. However, being a herd animal with a population divided up into small subpopulations, the wild forest reindeer is susceptible to the spread of pathogens at the level of the individual animal and of the subpopulation as a whole. Wild forest reindeer moving over an increasingly broader area also involves the risk of exposure to new pathogens. There are cervid parasites which are harmless to their definitive hosts but which can pose a danger to other cervids.

The Setaria tundra parasite, which causes an epidemic of peritonitis in reindeer, has been found in wild forest reindeer (Laaksonen 2006). The parasite is a strongyle, 3 to 9 cm long when fully grown. It lives in the abdominal cavity of reindeer and causes inflammatory changes in the peritoneum and in the organs in the abdominal cavity, particularly the liver and the spleen, their severity depending on the number of parasites and the condition of the host animal. A mature parasite releases microfilaria into the bloodstream, and insects feeding on blood — mainly mosquitoes — spread them from one animal to another.

This parasite is a particular problem in reindeer calves. The severity of the inflammation has been found to correlate with the number of parasitic worms present. In reindeer at least, the changes caused by the inflammation in the peritoneum and in the organs in the abdominal cavity can in the worst case lead to death. A reindeer with this parasitic infestation has tangled and matted hair; moulting may be delayed, and there may be a loss of muscle tone. The animal's fatty deposits may also be depleted. At the moment, there is no clear evidence of how the parasite affects the wild forest reindeer.

A condition similar to deer hair loss syndrome (DHLS), which occurs in North American species of deer, has been found in the Kainuu wild forest reindeer subpopulation. This involves hair severing and hair loss in the head and neck area. The symptoms are typically at their worst in late winter, and the condition may contribute to mortality through heat loss. In winter 2005, about 30% of the wild forest reindeer in Kainuu exhibited symptoms of the condition, and similar symptoms have been observed in reindeer in the southern reindeer herding area.

The wild forest reindeer may act as an intermediate host for *Echinococcus granulosus*, which can be passed on to humans through the faeces of the definitive host (predator). An infestation causes a slowly progressing serious condition where the parasite grows cysts particularly in the liver and the lungs. Available information suggests that the risk of infestation in Finland is very low (Maijala et al. 2002).

The Finnish Food Safety Authority Evira examines samples from both live and dead animals in order to diagnose animal diseases. Studying wild animals is an important part of monitoring animal diseases. Wild animals can be carriers for diseases that can be transmitted to humans (zoonoses), even if they do not themselves develop the condition. There are also diseases shared by domestic and wild animals. Studying samples from wild animals also contributes to the monitoring of the living environment. There is a new national zoonosis centre in Finland for coordinating the monitoring and prevention of zoonoses. The zoonosis centre is jointly run by Evira and the National Public Health Institute. The centre continues the work of the permanent zoonosis working group appointed by the Ministry of Agriculture and Forestry.

Measure:
Monitoring of and research into diseases of wild forest reindeer will be continued.

10.14 Cooperation between parties

10.14.1 Regional cooperation

The Ministry of Agriculture and Forestry has the principal national responsibility for the management of game populations in Finland. Regionally, this responsibility is delegated to game management districts, which form part of the statutory hunters' organization. The game management districts are subject to performance management by the Ministry of Agriculture and Forestry and are coordinated by the Hunters' Central Organization.

Game species population management is of interest to many parties, particularly as regards large predators. There are already large predator advisory boards in Kainuu, Central Finland, Kymi, North Karelia and North Savo for promoting cooperation and serving as forums for interaction and information exchange between various parties involved in the natural environment. The wild forest reindeer could easily be added to this model. Indeed, more attention should be paid to the harmonization of the management of populations of cervids on the one hand and of large predators on the other (Härkönen 2007; Härkönen & Hiedanpää 2007).

The initiative for a broad-based convening of parties could come from a game management district, for instance. The participants could then decide on how the forum (if one is to be set up) will function, how often it would need to meet, who would convene it and how it would be chaired. Forums can serve an important purpose in promoting interaction, cooperation, dialogue and exchange of information between parties, and also in collecting regional views.

Measures:
Stakeholder cooperation will be increased in those game management districts where wild forest reindeer occur. Regional forums will be set up as necessary.

The purpose of a regional forum is to employ cooperation and interaction to bring regional views and aims regarding wild forest reindeer population management to the attention of the Ministry of Agriculture and Forestry and hence to include them in political decision-making.

10.14.2 National cooperation

At the national level, responsibility for wild forest reindeer population management rests with the Ministry of Agriculture and Forestry. The Ministry of the Environment also has an official position in this matter, as it is the authority responsible for determining the threatened or endangered status of species. There are also many national authorities, organizations and associations with a growing interest in presenting their views with regard to the protection, management and population development of wild forest reindeer and also with regard to damage prevention, for example. So far, cooperation between these various actors has been running fairly smoothly.

The Ministry of Agriculture and Forestry should ensure that wild forest reindeer population management measures continue and are coordinated as cost-efficiently as possible. This requires the appointment of a national wild forest reindeer monitoring group. The Ministry must decide on its membership and agenda.

Measure:
The Ministry of Agriculture and Forestry will appoint a wild forest reindeer monitoring group.

10.14.3 International cooperation

Outside of Finland, wild forest reindeer are only found in Russia. Available data suggest that the wild forest reindeer in Russia has declined in recent years (e.g. Danilov 2003). If the trend continues, the significance of the Finnish wild forest reindeer population for the survival of the subspecies will be highlighted. Comprehensive management of the wild forest reindeer sub-

populations requires smooth cooperation with the Russian authorities and research institutions.

In several international treaties and through EU membership, Finland has committed to preserving biodiversity. The effects of international treaties and EU membership are discussed in detail in Part 1. International cooperation continues to increase in importance.

Measures:
The Ministry of Agriculture and Forestry will continue to maintain active contact and cooperation with the authorities responsible for wild forest reindeer management in Russian Karelia. Research cooperation should also be continued.

Efforts will be made to influence international treaties, European legislation and their interpretation so as to highlight national special characteristics in decision-making and to maintain the principle of sustainable development as the basis for the exploitation of natural resources.

10.15 Management responsibilities and division of duties

The division of duties between actors involved in wild forest reindeer population management can be described thus:

ACTOR	TASK
Ministry of Agriculture and Forestry	National responsibility for population management and protection Updating the management plan
Hunters' Central Organization	National publicity, training, advisory services and statistics Actor in and coordinator of national projects Special measures in accordance with performance management by the Ministry of Agriculture and Forestry
Game management districts	Regional publicity, training, advisory services Damage monitoring and prevention Responsibility for regional population management Special measures in accordance with performance management by the Ministry of Agriculture and Forestry
Game management associations	Regional publicity, training, advisory services Damage monitoring and prevention Hunting supervision
Finnish Game and Fisheries Research Institute	Responsibility for population monitoring Research and dissemination of information
Police, Border Guard and Customs	Hunting supervision
Forest and Park Service	Hunting supervision Special measures in accordance with performance management by the Ministry of Agriculture and Forestry
Reindeer Herders' Association	Publicity, training and advisory services Special measures in accordance with performance management by the Ministry of Agriculture and Forestry
Reindeer herding cooperatives on the southern edge of the reindeer herding area	Preventing reindeer from escaping the reindeer herding area
Finnish Food Safety Authority Evira	Game animal disease monitoring, research and publicity Special measures in accordance with performance management by the Ministry of Agriculture and Forestry

10.16 Risk factors in the preservation of the wild forest reindeer population

The development of the wild forest reindeer population has on the whole been favourable: over the past decades, the population has grown, and its geographical distribution has increased. This trend seems to continue particularly in Suomenselkä, and there is no imminent threat of the species becoming extinct in Finland.

Keeping the wild forest reindeer genetically pure remains an important point in population management in the Kainuu subpopulation. Preventing cross-breeding between reindeer and wild forest reindeer requires continuous monitoring and active measures. Reindeer farming and other reindeer husbandry in the Parkano area and elsewhere requires monitoring and may have an impact on the Suomenselkä subpopulation in particular. The decline in the Kainuu subpopulation between 2001 and 2007 also calls for special monitoring and targeted measures to halt and reverse the decline.

The Ruunaa and Ähtäri subpopulations both have a problem with slow growth. The Ruunaa subpopulation has not grown at all in practical terms for decades, and today it can be considered extinct. It is not know exactly why this has happened, although large predators have evidently played a part. The Ähtäri subpopulation has not grown as expected, and moreover the entire subpopulation consists of the direct descendants of a single male and a single female and as a result has a very narrow genetic base.

The attitudes and opinions of the local human population must be taken into account in the development of both the Suomenselkä and the Kainuu subpopulations. If a rapid increase in the number of animals causes a rapid increase in damages, negative attitudes towards wild forest reindeer may also increase. Unpredictable migrations due to feeding ground exhaustion can also lead to strong popular demands for reducing the wild forest reindeer population, which in turn can make it difficult to pursue planned management.

The wild forest reindeer has proved reasonably flexible with regard to its habitats, and the recent decline in its population has nothing to do with the disappearance, fragmentation or declining quality of its habitats. Indeed, the wild forest reindeer occupies a number of different habitats in the course of its annual cycle. Current knowledge suggests that the disappearance or changing of habitats is not a direct threat to the wild forest reindeer in Finland. How global warming will affect the species and its habitats, on the other hand, is pure guesswork.

The increasing large predator populations will have a limiting effect on the development of the wild forest reindeer population. Research findings on this already exist for the Kainuu subpopulation, and particularly for certain subspecies of caribou in North America. Preparations for reducing this effect can be made as necessary.

Wild forest reindeer may carry the parasite Setaria tundra, which causes peritonitis in reindeer. In reindeer at least, the changes caused by this infection to the peritoneum and organs in the abdominal cavity have in some cases led to the death of the animal. The incidence and effects of the parasite must be monitored. At the moment, it appears that the wild forest reindeer carries no other serious pathogens.

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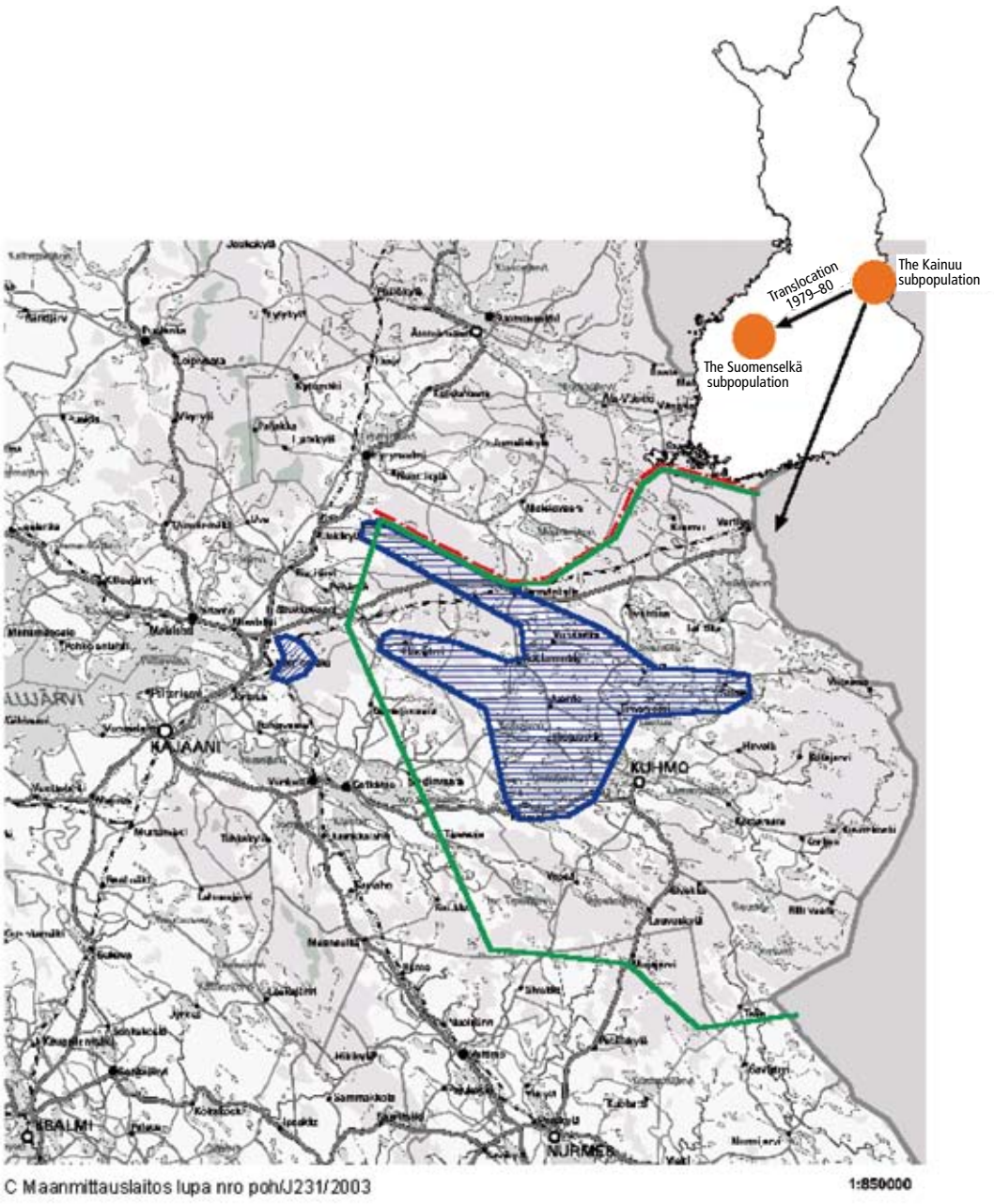
Appendix 1. Distribution of the Kainuu subpopulation. (Sources: Heikura 2002; Kilpeläinen 2003; Kainuu game management district)



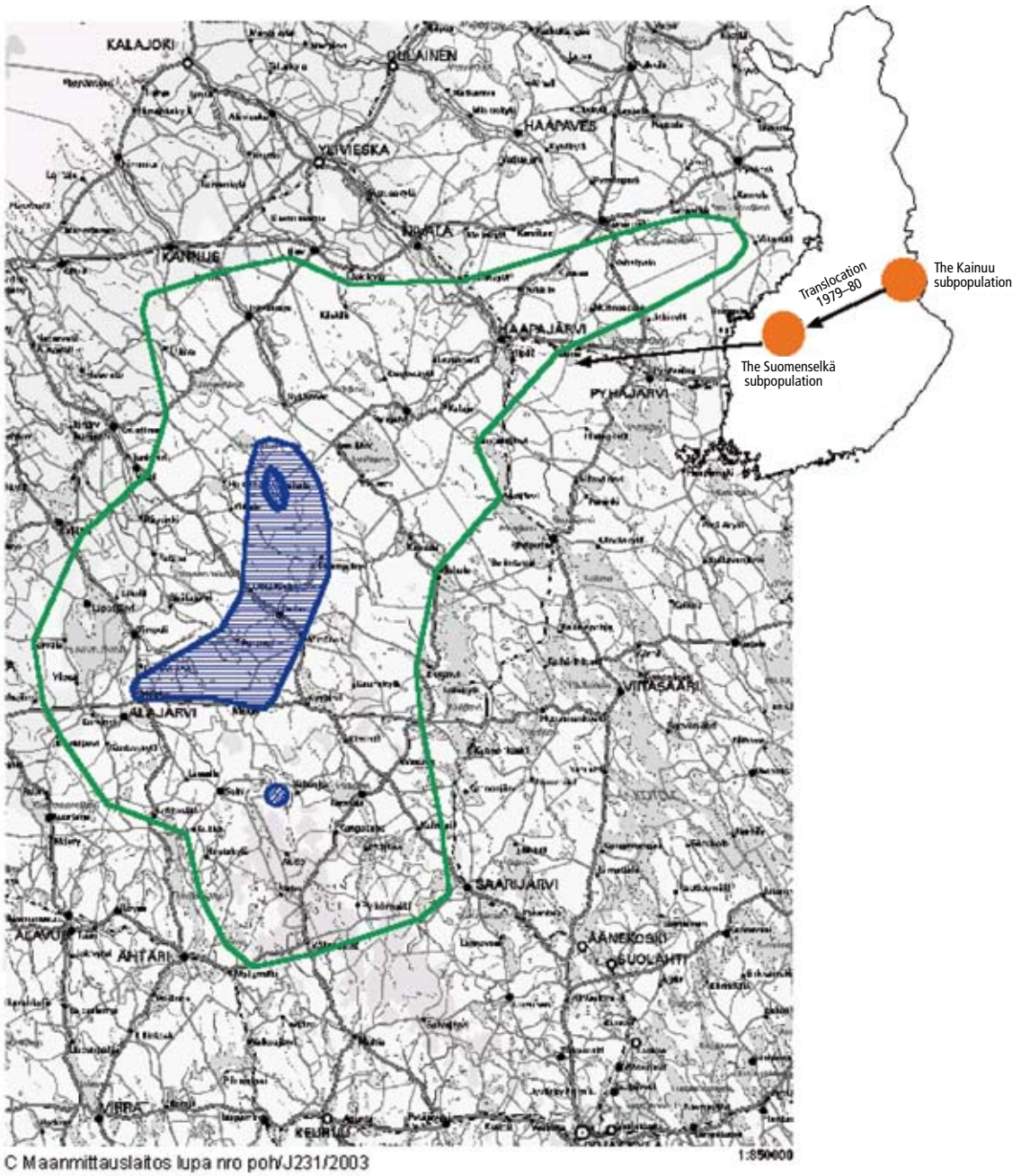
Wild forest reindeer fence at the southern edge of the reindeer herding area

Wild forest reindeer distribution in summer

Wild forest reindeer winter feeding grounds 1985–2003

Cluster of more than 1,000 animals in Puikkokoski in winter 2003

Appendix 2. Distribution of the Suomenselkä subpopulation.
(Source: Ostrobothnia game management district)



Wild forest reindeer summer distribution

Wild forest reindeer winter feeding grounds 1990–2003

Cluster of 905 animals in Halsua in winter 2003

Appendix 3. Estimated wild forest reindeer fence construction costs per km. (Source: Ari Meriruoko, Forest and Park Service 2003).

	EUR	Units	Cost A	Cost B
Price of wire-net fence per m (1.7 m)	1,22	1000 m	1220	
Price of wire-net fence per m (2.0 m)	2,44	1000 m		2440
Fence posts, pressure impregnated, 100 mm (each)	7,5	333 poles	2500	2500
Fence posts, pressure impregnated, 80 mm (each)	5	70 poles	350	350
Wave wire (m)	0,16	2000 m	320	320
Brackets (kg))	3	20 kg	60	60
Total			4450	5670
Material transport	40	1	40	40
Material transport into terrain	11	15	165	165
Off-road transport costs	15	10	150	150
Erecting the fence	11	240	2640	2640
Travel expenses	0,4	1000	400	400
Per diems	30	7	210	210
Total			3605	3605
Planning and supervision expenses			1500	1500
Grand total			9555	10775

Conclusions:

1) Building material costs with wire-net fence 1.7 m high are about EUR 4,450 per km.
2) Building material costs with wire-net fence 2.0 m high (moose fence) are about EUR 5,670 per km.
3) Materials, labour and travel cost EUR 8,055 per km for the first alternative, and EUR 9,275 per km with the more expensive wire-net fence.
4) In both alternatives, planning and supervision costs are about EUR 1,500 per km.
5) The total costs are EUR 9,555 per km for the first alternative, and EUR 10,775 per km with the more expensive wire-net fence.

Appendix 4. Wild forest reindeer population hunting plans.

Background

The drawing up and implementation of hunting plans for the wild forest reindeer population involve numerous factors related to the biology of the species due to which the methods employed for other cervid species in Finland are not suitable as is (see sections 9.2 and 9.3). Nevertheless, these methods too must be used within the confines of current legislation. In particular, the grazing migration patterns of the wild forest reindeer in time and in the territories of different hunting right holders makes it extremely difficult to apply the current hunting period and hunting licence practice to a single herd.

In Norway, the hunting of mountain/wild reindeer is organized through detailed individual licences with a distribution of 10% to 15% adult males, 45% to 50% young adult males or adult females, and 40% calves.

In caribou hunting, it has been estimated that a population of 2,500 to 3,000 animals (older than 1 year) can sustain an annual hunting of 200 to 250 animals (older than 1 year), provided that the population growth is constantly more than 10% (Miller & Gunn 2003). On the other hand, the wild forest reindeer is different from other subspecies of the Rangifer genus, and research results and practical experiences concerning other subspecies cannot be directly applied to the hunting of wild forest reindeer without closer analysis.

Actual hunting

Suomenselkä

Wild forest reindeer hunting is growing in Suomenselkä. In the Ostrobothnia game management district, the goal has been to hunt about 10% of the subpopulation (about 50% of the net growth of the subpopulation in recent years). The intention is that the distribution of hunting licences is 30% calves, 40% males and 30% females.

Between the 1998–1999 and 2006–2007 hunting seasons, the catch of adult wild forest reindeer in the Ostrobothnia game management district contained no less than 68% males. This means less hunting of calves and females of reproductive age (the 'meat-production model'), enabling continuous population growth. However, in the long term, a high percentage of males in the catch leads to a skewed gender and age distribution in the subpopulation. In addition to this, the culling of 'alpha females' may lead to unpredictable herd behaviour.

Kainuu

Because of the decline in the Kainuu subpopulation, no hunting licences for wild forest reindeer have been issued in Kainuu since the 2002–2003 hunting season. Prior to that, the structure of the catch was very similar to that in Suomenselkä: between the 1996–1997 and 2002–2003 hunting seasons, the catch of adult wild forest reindeer contained 70% males.

Hunting aims

So far, the aim in the hunting of wild forest reindeer has been to ensure a natural distribution of gender and age in the population. This, however, has not been achieved, as witness the high percentage of adult males in the catch. This is partly due to the fact that the hunting licences do not contain sufficiently detailed regulations on what kind of animals may be hunted. In other words, the recommendations issued with the hunting licences have not been sufficient to govern the hunting practices of the licence holders.

On the other hand, aiming at a natural population structure is not the only possible hunting plan. Hunting can be planned so as to maximize the number of trophies, the volume of meat or the availability of hunting opportunities, or indeed to minimize the damage caused by wild forest reindeer. Combinations of these aims are also possible. But every aim requires a different hunting plan, and regional special characteristics bring yet further factors into the equation.

Hunting must take into account the current gender and age distribution of the wild forest reindeer population, concerning which there is accurate monitoring data available from over a long period, particularly in the case of the Kainuu subpopulation. If the goal set is to maintain a natural structure in the population, hunting licences must be targeted at calves, females and males in appropriate proportions. Experiences have shown that hunting licences for wild forest reindeer must contain more detailed and more peremptory conditions binding upon the holders of the licences in order to prevent excessive hunting of males, particularly 'alpha males'. It would also be justified to spare 'alpha females'. The current Hunting Decree does allow for specification on hunting licences of the age and gender of the animals permitted to be hunted. What this means in practice is that game management districts must include regulations in the hunting licences they issue as to how many adult males, adult females or calves the licence allows the holder to hunt. Further limitations to the age of the adult animals can be imposed, for example, 'young' or 'of reproductive age' (cf. the hunting limitations on mountain reindeer in Norway). Such restrictions require hunters to have good practical knowledge in order to be able to make the relevant choices during the hunt, specifically to assess individual animals on the basis of their antlers and body size. As far as calves are concerned, the hunting is random enough to equalize numbers of male and female calves over time.

The different development trends in the Suomenselkä and Kainuu subpopulations make it difficult to draw up hunting plans that could apply to the entire wild forest reindeer population in Finland. Moreover, there is not enough research data available at the moment for the drawing up of detailed hunting plans. For example, no comprehensive study exists about mortality caused by large predators. However, this should not be considered a hindrance; more effort than before must now be invested in hunting plans and their improvement.

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