



Framework for Transboundary Cooperation on Management and Conservation of Wolves in Fennoscandia

**Participating authorities: Ministry of Agriculture and Forestry of Finland,
Norwegian Environment Agency, Swedish Environmental Protection Agency**

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The Framework for Transboundary Cooperation on Management and Conservation of Wolves in Fennoscandia describes how the relevant authorities in Finland, Norway, and Sweden plan to further develop and strengthen the cooperative management of the Fennoscandian wolf populations in a way that is adapted to Fennoscandian challenges and conditions.

This document is not legally binding, rather it describes the long history of cooperation between governments and research institutions, and outlines ongoing and future cooperation to secure viable wolf populations in Fennoscandia.

It is important to acknowledge that this Framework builds on the Agreement between the Finnish Ministry of Agriculture and Forestry, the Norwegian Ministry of Environment, and the Swedish Ministry of Environment on developing collaboration on large carnivores – brown bear, wolf, lynx and wolverine of the 12th of August 2011. It is also necessary to recognise the important work done by the Large Carnivore Initiative for Europe in illuminating the need for transboundary cooperation in the challenging task of large carnivore management. Finally, it must be noted that Finland and Sweden are members of the European Union (EU) and thus bound by the EU Habitats Directive, whereas Norway is a signatory party to the Bern Convention, but not a member of the EU, and thus not bound by the EU Habitats Directive.

This document is the result of a close collaboration between relevant management institutions in Finland, Norway, and Sweden. It defines a common goal and identifies the actions needed to reach this goal. The Ministry of Agriculture and Forestry of Finland (MAF), the Norwegian Environment Agency (NEA), and the Swedish Environmental Protection Agency (SEPA) are dedicated to realising the goal set out in this document.

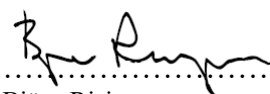
This is the first tri-lateral framework document between management authorities in Finland, Norway, and Sweden. The framework itself and the actions outlined herein will be evaluated and revised every six years in accordance with the reporting cycles of the EU Habitats Directive. The appendices will be reviewed and revised when necessary. This framework is thus valid through 2025.



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List of Acronyms

In this document, the following acronyms will be used:

FWA	Finnish Wildlife Agency
LUKE	Natural Resources Institute Finland
MAF	Ministry of Agriculture and Forestry (Finland)
NEA	Norwegian Environment Agency
SEPA	Swedish Environmental Protection Agency

1. Common goal

The overarching goal of the Framework for Transboundary Cooperation on Management and Conservation of Wolves in Fennoscandia is to support the long-term survival and favourable conservation status of the Fennoscandian wolf populations by securing connectivity between the populations through transboundary cooperation in management and research.

2. Background

Managing species across national boundaries is challenging. Most wildlife species are monitored, managed, and harvested based on regulations and limitations set by national authorities. While the Bonn Convention provides a framework for the conservation of truly migratory species, not all populations that disperse across country borders are covered under this convention. The Bern Convention and the EU Habitats Directive provide member countries with a framework for the successful management of their respective wildlife populations, and advocate for cooperation between countries to enhance management of transboundary populations covered by the convention.

Both the Standing Committee of the Bern Convention and the EU Commission have endorsed the guidelines for Population Level Management Plans for Large Carnivores in Europe¹ proposed by the Large Carnivore Initiative for Europe. Two fundamental concepts are recognised in this guidance document:

- 1) The unit for conservation planning should not be only the proportion of a population that falls within a given state's or country's boundaries. Rather it should be the entire biological unit, involving all administrative units within its distribution.
- 2) Conservation of large carnivores requires their integration with human activities in human-dominated landscapes. This means coexistence between large carnivores and humans, which is not always easy to achieve. It almost always requires active management (such as reintroduction, translocation, hunting, and lethal control) of large carnivore populations and coordinated planning with conflicting land uses and activities.

As is noted in the guidance document, the need - and the acceptance for - different management approaches will vary greatly throughout Europe². It is therefore essential that the Fennoscandian countries establish a framework which is both coordinated and flexible in order to permit local adaptation of the means employed to achieve a global vision.

2.1. Present cooperation agreements

Historically, information flow and monitoring methodology related to large carnivore management have been largely internal processes within each of the Fennoscandian countries, with limited information exchange between countries. With growing large carnivore populations and increased

¹ Linnell J., V. Salvatori & L. Boitani (2008). Guidelines for population level management plans for large carnivores in Europe. A Large Carnivore Initiative for Europe report prepared for the European Commission (contract 070501/2005/424162/MAR/B2).

² Boitani, L. (2003). Wolf conservation and recovery. In *Wolves: behavior, ecology, and conservation*: 317-340. Mech, L. D. and Boitani, L. (Eds.). Chicago: University of Chicago Press.

knowledge about the cross-border distribution of these populations, however, information sharing and collaboration have become a priority.

In 1991, the Environmental Council of Northern Finland, Norway, and Sweden established a working group with representatives from Nordland, Troms, and Finnmark counties (Norway), Norrbotten and Västerbotten counties (Sweden), and Lappland county (Finland). The working group's main task was to produce a report on the status of large carnivore populations in Fennoscandia and to develop a framework for coordinated population monitoring. As a result of this process, new methodology was implemented, field personnel in Norway and Sweden were connected in organised networks, joint research projects were established, and joint reporting between all three countries, e.g. on population numbers, became more common. This first attempt at regional transboundary cooperation has since been developed into a more refined and larger scale Fennoscandian cooperation.

Cooperation between the Fennoscandian countries has been further supported by a political consensus that the transboundary nature of large carnivore populations necessitates joint, transboundary management efforts. In 2011, the Ministry of Agriculture and Forestry of Finland, the Norwegian Ministry of Environment, and the Swedish Ministry of Environment signed a consensus statement on cooperation priorities. This political agreement resulted in increased monitoring efforts, new guidelines for the management of genetically important wolves, and the establishment of a Norwegian-Swedish large carnivore management database (Rovbase), with reciprocal access to data. In 2012, Norway and Sweden established a Memorandum of Understanding on data sharing and developed additional protocols for joint reporting on the annual population status of shared Scandinavian large carnivore populations.

In terms of management, Finland, Norway, and Sweden have faced similar challenges as a result of the expansion of large carnivore populations in Europe. This has necessitated regular meetings between management authorities, led to joint financing of research projects, and resulted in a significant increase in information flow and accessibility, both for management authorities and for the public.

Below is a list of currently active bilateral and trilateral agreements relating to cooperative management of large carnivores in Fennoscandia. The documents can be requested from the respective authorities in each country.

- Agreement between the Ministry of Environment, Sweden, the Ministry of Environment, Norway, and the Ministry of Agriculture- and Forestry, Finland in developing collaboration on large carnivores – brown bear, wolf, lynx and wolverine. 12 August 2011. (*Överenskommelse mellan Miljödepartementet, Sverige och Miljöverndepartementet, Norge och Jord- och skogsbruksministeriet, Finland om utvecklat samarbete om stora rovdjur- björn, varg, lodjur och järv. 12 augusti 2011*).
- Agreement between the Ministry of Environment, Sweden, and the Ministry of Environment, Norway on management of genetically important wolves in the Scandinavian wolf population. 12 August 2011. (*Överenskommelse mellan Miljödepartementet, Sverige och Miljöverndepartementet, Norge om förvaltning av genetiskt värdefulla vargar i den skandinaviska vargpopulationen. 12 augusti 2011*).

- Memorandum of Understanding regarding the establishment and continuance of a public web-based database (Skandobs) for geographic information on large carnivore observations in Norway and Sweden (Norwegian Institute for Nature Research and Swedish Environmental Protection Agency). 25 March 2012.
- Memorandum of understanding regarding management strategies for the Scandinavian wolf population (Norwegian Directorate for Nature Management and Swedish Environmental Protection Agency). 25 April 2012. (*Prinsippdokument om forvaltningsstrategier for den skandinaviske ulvepopulasjonen (Direktoratet for naturforvaltning, Norge og Naturvårdsverket, Sverige. 25. april 2012)*).
- Memorandum of Understanding regarding the establishment and continuance of a monitoring system for large carnivores in Sweden and Norway (Norwegian Environment Agency and Swedish Environmental Protection Agency). 25 March 2015

2.2. Fennoscandian wolf populations

The size and distribution of the two wolf populations in Fennoscandia (the Finnish-Karelian and the Scandinavian population) have varied over time, and these developments have been closely monitored by management authorities in all three Fennoscandian countries. The implementation of standardised monitoring methods and intensified monitoring efforts within each country have resulted in a comprehensive knowledgebase with regards to both population size and distribution. As a result of the early incorporation of DNA identification in the monitoring system there is also solid knowledge on the genetic status of the populations, and there is a nearly complete pedigree for the Scandinavian population. The Scandinavian wolf population and the Finnish part of the Finnish-Karelian wolf population are described in detail in Appendix 1.

2.3. Wolf management in Fennoscandia

Although Finland, Norway, and Sweden have ecological, social, and cultural similarities, the wildlife management systems differ significantly between countries. A thorough description of wolf management in each country is provided in Appendix 2.

3. Established and planned cooperation

Recently published research on transboundary wildlife management has emphasised the importance of cooperation in management and helped identify areas where management could benefit from increased cooperation³⁴. This chapter outlines cooperation between Finland, Norway, and Sweden with respect to wolf management. Here, cooperation is described with respect to both ongoing and well-established activities, as well as recently initiated or planned activities. The actions outlined in sections 3.1.1. to 3.2.4. may also be relevant in addressing management challenges relevant to other large carnivores, as well as other wildlife species in Fennoscandia.

³ Gervasi, V., Linnell, J.D.C., Brøseth, H. and Gimenez, O. (2019) Failure to coordinate management in transboundary populations hinders the achievement of national management goals: The case of wolverines in Scandinavia. *Journal of Applied Ecology* 1–11.

⁴ Bischof, R., Brøseth, H. and Gimenez, O. (2015). Wildlife in a Politically Divided World: Insularism Inflates Estimates of Brown Bear Abundance. *Conservation Letters* 1–9.

3.1. Established cooperation

Over the past decades, management authorities and researchers in Finland, Norway, and Sweden have developed a close dialogue with regards to wildlife management in general and large carnivore management in particular (see section 2). Sections 3.1.1. to 3.1.4. describe well-established and ongoing cooperation related to wolf management in Fennoscandia.

3.1.1. Administration

- *Regular meetings.* The framework parties organise a minimum of one physical or virtual meeting each year. This annual meeting is used to keep framework parties informed of national developments in politics, policy, and research, as well as to maintain an open dialogue regarding transboundary management challenges. Additional meetings can be arranged if specific needs arise.

- *Online space for shared documents.* NEA has created an online project room for storing meeting minutes, relevant research reports, national management policy documents, Memorandums of Understanding, and other relevant agreements and guidelines. This platform is available to all framework parties.

3.1.2. Monitoring

- *Common methodology and shared databases.* Since 2013, Norway and Sweden have collaborated in the monitoring of large carnivore species (see section 1) using a shared methodology and shared database for registering observations and other relevant data (Rovbase). Through Rovbase, limited large carnivore population information is also made available to the public through online interfaces (rovbase.no and rovbase.se). In order to revise and develop methodology, SEPA and NEA have established a working group with experts from both countries. Norway and Sweden use the same microsatellite markers to analyse biological samples and identify individual genetic profiles. In recent years, the increasing volume of samples analysed in Sweden has necessitated the switch to single-nucleotide polymorphism (SNP) chip methodology for wolf DNA analyses. Samples from identified individuals have been additionally analysed using microsatellite methodology in order to match and compare them to Norwegian samples.

Finland monitors its large carnivore populations using a different methodology and a different database. DNA-analyses are carried out using microsatellite markers, but only some of the markers used for analyses overlap with those used in Norway and Sweden.

- *Common evaluation meetings.* In order to evaluate and develop the common monitoring system, SEPA and NEA organise an annual Scandinavian meeting where personnel from both the national and regional levels participate. Beyond improvement of the monitoring system, the meetings also aim to facilitate cross-border cooperation at the regional level by providing a meeting place for relevant personnel.

- *Access to databases.* Management authorities in all three Fennoscandian countries provide access to their respective large carnivore databases (i.e. Rovbase, Tassu, and Riistavahinkorekisteri) to staff in each of the other Fennoscandian countries to the extent that such access is in accordance with national laws. This allows relevant staff to follow monitoring efforts related to transboundary wolf family groups or migrating individuals.

3.1.3. Research

- *Coordination of research financing.* Authorities from each of the Fennoscandian countries finance numerous wildlife research projects in their respective countries. In addition, Norwegian and Swedish authorities co-finance several research projects. SKANDULV - the Scandinavian Wolf Research Project⁵, is one such co-financed project which has coordinated research on the Scandinavian wolf population since 1999. In addition to SKANDULV, a number of other transboundary projects also conduct wolf research including Grensevilt⁶ and RovQuant⁷.

3.1.4. Field work

Field personnel are involved in several aspects of wolf management. This involvement includes but is not limited to monitoring, damage documentation, and evaluation of incidences where large carnivores roam or establish territories close to human settlements.

- *Cooperation between field personnel.* Field personnel in the northernmost regions of Finland, Norway, and Sweden meet regularly in order to discuss cooperation in large carnivore monitoring and common management challenges, as well as to calibrate field methods. As a result of these meetings, field personnel in the north have established effective cooperation with their transboundary counterparts.

- *Transboundary monitoring efforts.* Transboundary cooperation between field personnel is not only essential for maintaining information exchange, but also for ensuring the rational use of resources in remote or sparsely populated areas.

Cooperation between Swedish and Norwegian field personnel is well developed at the local scale in order to facilitate tracking of individual wolves who cross the Norwegian-Swedish border. Furthermore, in the western parts of Sweden, situated adjacent to the Norwegian monitoring area, Norwegian field staff occasionally conduct monitoring work in order to use resources effectively.

At the Finnish-Swedish and the Finnish-Norwegian borders, an ongoing cross-border monitoring effort has been established to keep regional management authorities informed with regards to potential immigrant wolves and their whereabouts. This area is of particular significance as it is an important immigration corridor between Finland and Scandinavia. In this area, there is an established network of local large carnivore contact persons including staff of the Finnish Wildlife Agency, the Norwegian Nature Inspectorate (SNO), and the Swedish County Administrative Boards, all of whom have experience and expertise monitoring the movements of large carnivores. The connections between local field personnel and regional managers in all three countries are well established.

⁵ <https://www.slu.se/institutioner/ekologi/forskning/teman1/rovdjur-och-vilt/skandulv/>

⁶ <https://www.slu.se/ew-nyheter/2018/1/grensevilt/>

⁷ <https://aqegbio.wixsite.com/home/rovquant-1>

3.2. Recently initiated and planned cooperation

Transboundary cooperation between Finland, Norway, and Sweden has intensified continuously over the past 10 years. Several cooperative measures have recently been initiated, and more are planned to start in the near future. These measures are described in this chapter.

3.2.1. Securing connectivity between populations (genetically important individuals)

A crucial goal in the management of wolves in Fennoscandia is to secure the genetic connection between the Scandinavian and Finnish-Karelian populations. To successfully maintain such a connection, the authorities in all three countries have identified different actions which will facilitate future transboundary migration.

- *Develop an information network for managing immigrant wolves.* In order to facilitate the influx of genetic variation into the Scandinavian population, authorities from each of the Fennoscandian countries aim to develop an information network to ensure that potential immigrants are detected and tracked as soon as they pass from Finland to Scandinavia. Immediate detection will enable authorities to prevent potential damages to reindeer, as well as to reduce the chances of poaching. By following individual immigrants, authorities will also be able to detect if and when any such individuals attempt to establish territories within reindeer husbandry areas. In such cases, alternatives such as translocation or protective hunting may need to be considered.

- *Faster detection of the origin of immigrant wolves.* To enable rapid identification of immigrants from the Finnish wolf population to Sweden and Norway, SEPA has initiated a cooperative agreement with LUKE, where samples from Finnish territorial wolves will be sent to Sweden for genetic analysis. These analyses will ensure that detailed genetic and geographic background information on immigrant wolves is already in place if and when these individuals are detected in Norway or Sweden. Together with the Swedish Board of Agriculture and the Swedish Veterinarian Institute, SEPA aims to evaluate whether such information can also be useful in determining the risk of disease transmission between populations, thus potentially reducing the time a specific immigrant will have to spend in the reindeer husbandry area before a translocation can be carried out, while still adhering to current regulations. In addition to identifying migrants, this work will also increase knowledge on the history of Finnish wolves migrating into Sweden and Norway.

- *Increasing the probability of migration from Finland to Scandinavia.* The Management Plan for the Wolf Population in Finland⁸ states that Finland aims to safeguard the migration of a minimum of one individual per five year period from the Finnish population to the Scandinavian population. To accomplish this, Finland aims to refrain from issuing derogations which allow the lethal removal of wolves (to prevent damages to reindeer herds) near the Swedish border as long as individuals are classified as vagrants. This measure should increase the probability of individual wolves crossing the border. Once wolves enter Sweden, they are handled in line with the Swedish plan for genetic reinforcement developed by SEPA in 2015⁹. This plan will be evaluated during 2020 and if necessary revised in order to better fulfil the goals therein.

If sufficient genetic diversity in the Scandinavian wolf population cannot be secured by natural migration alone, Finland is prepared to negotiate with Swedish authorities on a cooperative agreement to translocate wolves from Finland to south-central Sweden. Furthermore, according to the most recent management plan, Finland is also prepared to evaluate the possibility of, under specific conditions, allowing wolf family groups to establish in the southwestern reindeer herding

⁸ http://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/161867/MMM_2019_26.pdf?sequence=1&isAllowed=y

⁹ <https://www.naturvardsverket.se/Documents/publ-filer/6900/978-91-620-6927-8.pdf?pid=26757>

area and paying higher compensation for damages to affected reindeer herding cooperatives. This could be considered should a situation arise where Scandinavian management goals are at risk with respect to the migration of genetically important wolves into the Scandinavian population. Under such circumstances, the establishment of a wolf family group in the southwestern reindeer herding area could increase the natural migration of wolves from Finland to Scandinavia.

3.2.2. Genetic monitoring

DNA-methodology has been developed and implemented in all three Fennoscandian countries to monitor and manage wolf populations. As described previously, however, the implemented DNA-methodologies differ between countries. As a result of this, analogous identification and recognition of specific individuals is only possible within Norway and Sweden, or within Finland, but not between all three countries. Furthermore, the methodology implemented in Norway and Sweden enables analysis of sample origin, i.e. Scandinavian versus Finnish-Karelian/Russian, but is unable to identify whether a specific individual has Finnish or Russian origin. This limitation has important repercussions for management since Finland has been declared free from rabies since 1991, while Russia has not.

- *Establish a DNA-group.* In order to coordinate the use of DNA in monitoring and management of large carnivores, the authorities from all three Fennoscandian countries aim to establish a DNA-working group with representatives from each country. This group will meet regularly in order to hold all member countries updated on current and future plans for DNA-use within each country, and will, if possible, work towards future implementation of common methodologies and shared genetic databases.

- *Transition to analogous DNA-methodology.* LUKE has decided to shift from microsatellite-methodology to the same cost-effective single-nucleotide polymorphism (SNP) methodology used in Sweden for the analysis of Finnish samples. This shift in methodology is an ongoing process, and the calibration phase will require close cooperation between LUKE and the Swedish University of Agricultural Sciences.

3.2.3. Exchange of knowledge, management tools, and expertise

Although cooperation is already established between the Fennoscandian countries at different administrative levels, an increased exchange of knowledge and expertise would be beneficial for management within each country. The exchange of personnel has been identified to be of particular interest as it encourages development and network building for future intensified cooperation.

- *Increase personnel exchange between countries.* The authorities in all three Fennoscandian countries will work to facilitate and encourage exchange opportunities for personnel at all levels of management (i.e. administrative and field personnel) and at different geographic scales (i.e. national and regional). One example of such an exchange is that Finnish field personnel will be invited to the Scandinavian management evaluation meetings from 2020 onwards. Future personnel exchanges could also include longer and more formalised opportunities. International agreements regarding exchange opportunities for public servants are already established by The Nordic Council¹⁰.

- *Facilitating transboundary implementation of unique management strategies and tools.* Each of the Fennoscandian countries have developed unique strategies and tools to manage their respective

¹⁰ <https://www.norden.org/no/information/om-nordisk-tjenestemannsutveksling-tjut>

wolf populations. These include e.g. courses in depredation identification and prevention, training and use of dogs to identify carnivore species responsible for livestock attacks based on cadavers, intervention protocols for dealing with bold wolves, web applications to involve the public in monitoring, and models to estimate the magnitude of poaching, estimate population sizes, and predict future spatial distributions of wolves. In order to effectively share each country's unique competences and management tools, the respective authorities will work to communicate the effectiveness of various strategies, and to facilitate the implementation of these strategies and tools in the other countries when needs are identified.

3.2.4. Research

Increased coordination in research financing would be beneficial to all Fennoscandian countries, particularly with regards to research efforts that address issues relevant for transboundary management.

- *Encouraging transboundary scientific cooperation.* Where similar research projects are ongoing or proposed in more than one Fennoscandian country, collaboration between institutions will be encouraged in order to produce more robust and widely applicable results, as well as to facilitate comparisons of potential differences between wolf populations.

4. Future prospects and goals

With the Framework for Transboundary Cooperation on Management and Conservation of Wolves in Fennoscandia as a foundation, the respective authorities in Finland, Norway, and Sweden have identified additional opportunities to cooperate with respect to the management of other large carnivore species. The authorities from each of the three Fennoscandian countries therefore aim to initiate development of a similar framework for the management of wolverines in Fennoscandia in 2021.

Wolf populations in Fennoscandia

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Introduction

The wolf populations in Finland, Norway, and Sweden are all transboundary populations and subpopulations of the larger European wolf population. The population in Norway and Sweden is normally referred to as the Scandinavian population, while the population in Finland is a part of the Finnish-Karelian population (Figure 1). Since the populations are transboundary, management responsibility is divided between several countries. As a result of this, the status of the populations and the threats they face differ between countries, as do management approaches.

The wolf population in Finland is connected to the Russian population along the entire length of the Finnish-Russian border (1290 km; Figure 1). It is thus possible to view the Finnish wolf population as a peripheral subpopulation of a larger population consisting of some 13,000 wolves in the European part of the Russian Federation (Laikre et al. 2016). As a result of this, Finland's wolf population plays an important role in linking the Finnish-Karelian and Scandinavian populations.

The wolf populations in Norway and Sweden are not separate populations, but rather part of a continuous, joint population on the south-central Scandinavian Peninsula (Figure 1). This population is considerably smaller than the Finnish-Karelian population, and is relatively isolated (Chapron et al. 2014).

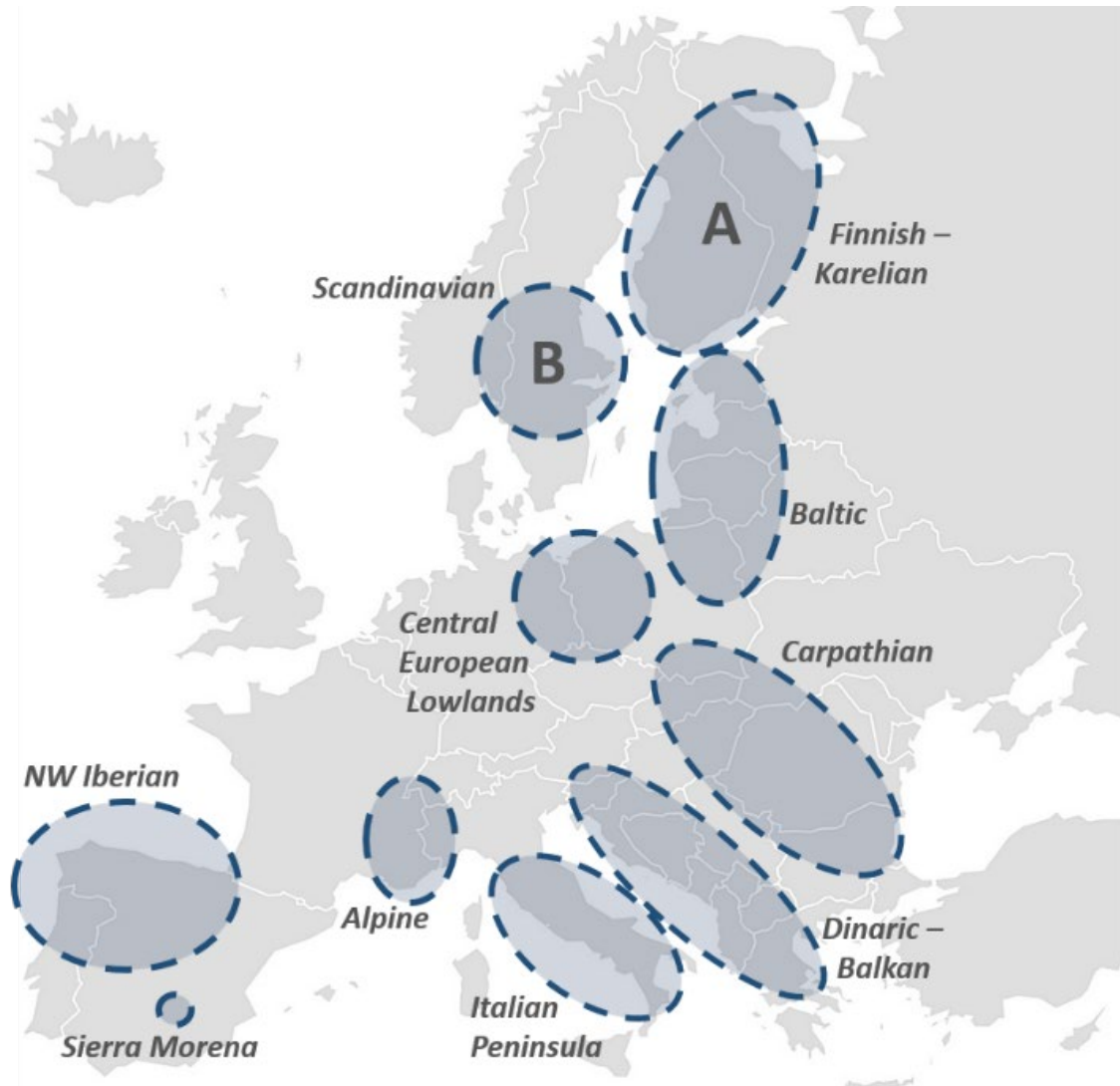


Figure 1: The ten wolf populations in Europe. Area A. shows the distribution of the Finnish-Karelian population and area B. shows the distribution of the Scandinavian population. Based on map from Boitani et al. 2015.

Population size

The size and distribution of the two wolf populations in Fennoscandia have varied over time and these dynamics have been closely monitored by management authorities in all three Fennoscandian countries. The following chapter describes the history and development of the Scandinavian wolf population and the Finnish part of the Finnish-Karelian wolf population with regard to both population size and distribution.

Finland¹¹

Finland supported a relatively large wolf population until the 1880s, when several consecutive wolf attacks sparked their systemic persecution. This persecution, incentivised by bounties, eventually

¹¹ The description of the Finnish population is based on the content from the Management Plan for the Wolf Population in Finland and the references therein (Ministry of Agriculture and Forestry of Finland 2015 and 2019). References on population development since 2008 can be found on the Natural Resources Institute Finland’s homepage (Natural Resources Institute Finland homepage 2020).

brought the population to near extinction. In the 1970's, wolves were granted partially protected status in Finland, and the number of wolves gradually increased throughout the remainder of the 20th century. Finland's accession to the EU in 1995 further increased the protection of wolves, and the population expanded considerably from 2000 onwards. In 2004, 16 litters were registered in Finland, compared to just 4 in 1996. At the end of 2004, Finland's wolf population consisted of an estimated 185–200 individuals.

The first management plan for the wolf population in Finland was adopted in 2005. During the preparation of this management plan the wolf population continued to grow, reaching its modern-day peak in 2007 with a minimum population estimate of 270–300 individuals (Figure 2).

Between 2008 and 2013 Finland's wolf population declined considerably. Poaching was considered the main reason for this decline, and the implementation of stricter legislation and enhanced monitoring measures appeared to mitigate this threat. By the start of 2015 the wolf population once again showed growth (Figure 2).

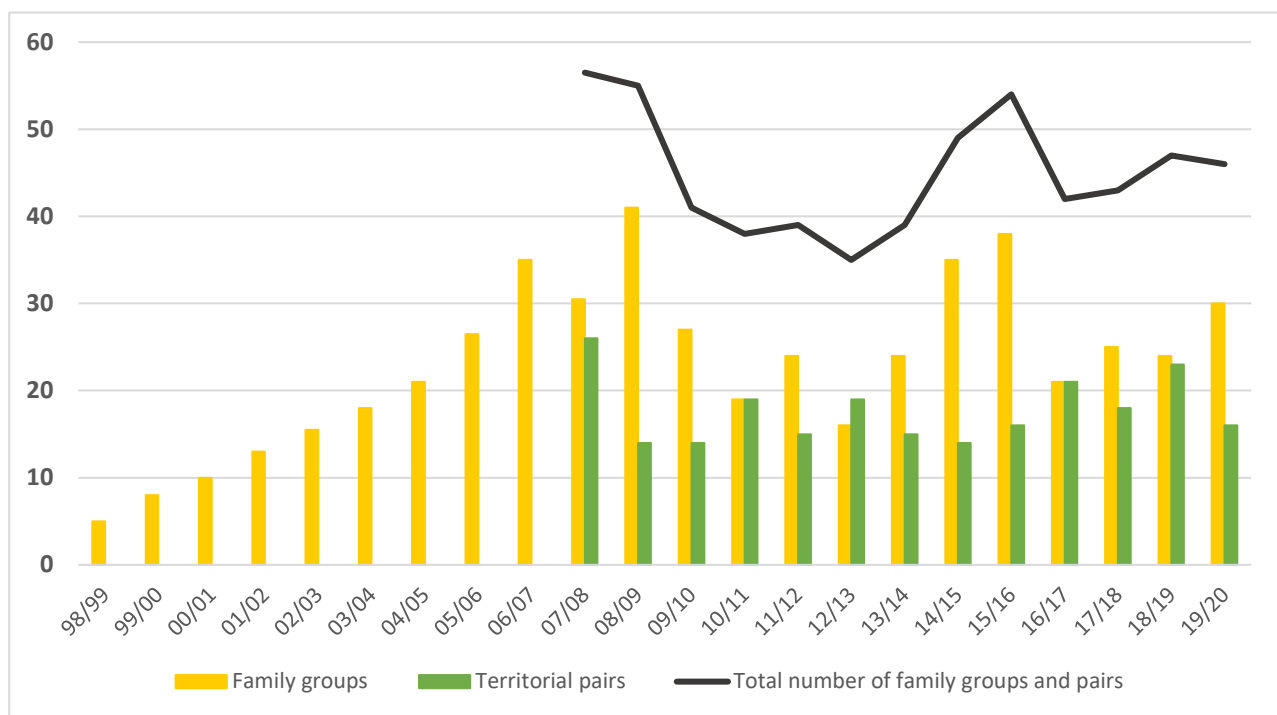


Figure 2: *Development of the Finnish wolf population during the period 1998/1999 – 2019/2020. Source: Annual population assessment reports from the Finnish Game and Fisheries Research Institute (1998 - 2014) and data from the Natural Resources Institute Finland (2015 – 2020). Data on territorial pairs was included in the reports from 2007/2008 onwards.*

In March 2017 the wolf population in Finland declined once again. This time, the decline was most likely the result of license hunting which was permitted as a population control strategy according to the revised population management plan adopted in 2014. The considerable number of wolves killed and the high incidence of alpha individuals among them were probably the main causes of the decline, as well as a shift in the population's geographic distribution from eastern to western Finland (Figure 3).

Less than ten years ago, the core of the wolf population in Finland was situated in eastern Finland. Today, the wolf population is more evenly distributed in Finland, and one of the larger subpopulations of breeding wolves is based just outside the southwestern reindeer herding area in Northern Ostrobothnia. This is closer to the Swedish border than the wolf population in Finland has been historically. As a result, the likelihood of individual wolves crossing the Finnish-Swedish border is higher than it was a decade ago.

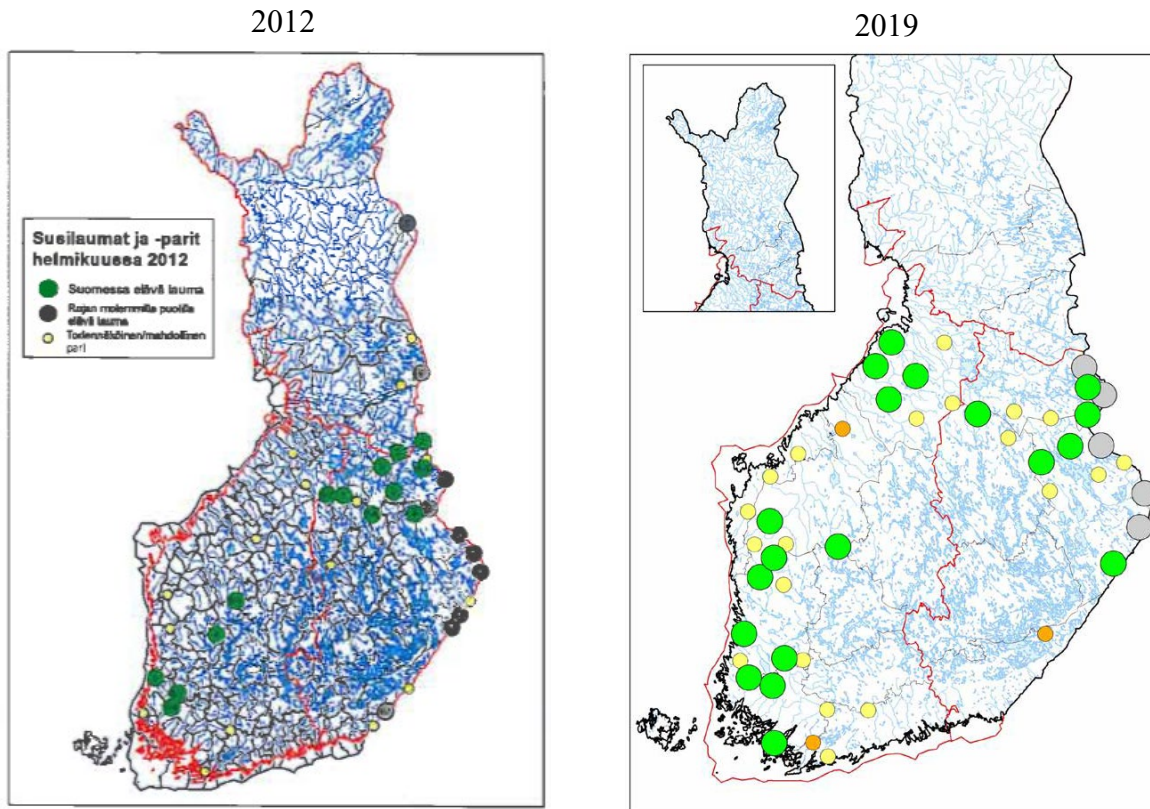


Figure 3: Maps showing the change in wolf distribution in Finland from 2012 to 2019. Source: LUKE, annual reports on the assessment of the Finnish wolf population.

Despite considerable population fluctuations in more recent years, the wolf population in Finland has shown an overall increasing trend since 2013. According to the Natural Resources Institute(LUKE), 29 wolf family groups (packs with litters) were registered in Finland in 2020, including family groups in the border regions between Finland and Russia, and 14 territorial pairs were confirmed. The total estimated population size as of March 2020 was 210–250 wolves. Interestingly, the number of territories held by family groups and territorial pairs in 2019/2020 was almost the same as during the previous year, despite a considerable increase in population size . This was due to a marked increase in the family group to territorial pair ratio, which almost doubled (from 1.2 to 2.1) from 2018/2019 to 2019/2020. The increase in the number of family groups and change in the family group to territorial pair ratio occurred primarily in western Finland, while the ratio remained unchanged in eastern Finland.

The wolf population estimate in Finland describes the population status in March, as this is the period when the most comprehensive population data is available. Snow cover is the predominant factor enabling the collection of faeces and urine samples for DNA analyses, as well as the ability to

carry out field tracking. In March, the size of the wolf population is at its lowest, as new cohorts are not born until late April and early May. LUKE uses a modelling approach to estimate the number of family groups, territorial pairs, and the total population size after the breeding season. Monitoring results and scenarios from modelling are presented annually in a status report published on the LUKE's webpage.

As the monitoring systems differ slightly between Finland and the Scandinavian countries, caution should be exercised when comparing estimates from these two populations.

Norway-Sweden

Wolves were abundant in Norway and Sweden up until the early 1800s. During the mid-1800s, however, the political focus shifted towards the eradication of all predatory species. The intent of this shift was to eliminate conflict with livestock and competition for game species. Hunting of large carnivores was incentivised using bounties, and by the mid-1900s the wolf population in Scandinavia was nearly extinct. Wolves were granted protected status in Sweden in 1965 and Norway in 1972. Despite this protection, however, only one wolf litter was confirmed in Scandinavia between 1964 and 1982, occurring in northern Sweden in 1978.

In 1983, a single wolf litter was documented in south-central Sweden for the first time in decades. DNA analyses later showed that both wolves in the pair were likely Finnish-Russian immigrants, rather than survivors from the original Scandinavian wolf population (Vila et al. 2003, Liberg et al. 2005, Smeds et al. 2019). Throughout the 1980s, this pair and their offspring were the only confirmed family group in Scandinavia, until a third immigrant arrived, established a new territory, and produced a litter together with one of the resident offspring in 1991 (Vila et al. 2003). In the decade that followed, the number of wolf packs increased steadily (Wabakken et al. 2001). Despite this growth, however, the original Finnish-Russian pair and the third immigrant were the sole founders of the extant Scandinavian population between 1983 – 2007. Between 2008 and 2020 another 6 immigrants reached and reproduced in Scandinavia, contributing new genetic variation to the population (Viltskadecenter homepage 2020a). The descendants of 2 of these immigrants have successfully reproduced (Åkesson et al. 2016), while the remaining descendants either failed to reproduce or may reproduce for the first time in 2020. The future genetic contribution of these descendants will be followed through the monitoring system.

Following the successful establishment of Finnish-Russian immigrants, the Scandinavian wolf population reached a peak during the winter of 2014/2015 with an estimated population size of 460 individuals (Figure 4). Interestingly, the Scandinavian population experienced a brief period of decline following this peak, occurring primarily in Sweden. Although the reason for this decline is still not fully determined, a recent scientific article concluded that increased rates of poaching in Sweden may have been an important explanatory factor (Liberg et al. 2020).

Since 2013, Norway and Sweden have collaborated in the monitoring of all large carnivore species. Monitoring results for wolves are presented annually in a Norwegian-Swedish status report where results are presented for Scandinavia as a whole as well as at the national level for both countries (including transboundary wolf packs). These reports are published in an online open access database (Rovdata homepage 2019a).

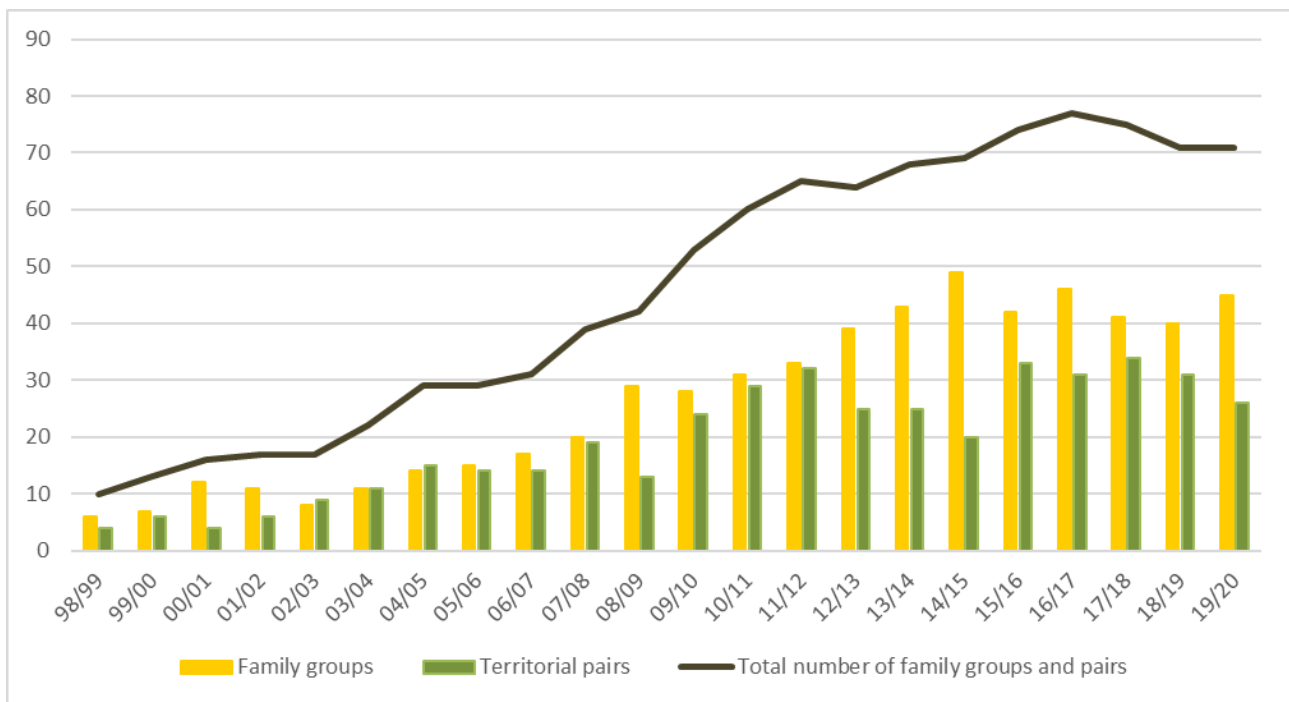


Figure 4: The development of the Scandinavian wolf population during the period 1998/1999 – 2019/2020. Source: Swedish Environmental Protection Agency (2019a).

The most recent population estimates for Scandinavia were published in a monitoring report published June 1st 2020, and are based on monitoring carried out during the period October 1st 2019 to March 31st 2020 (Wabakken et al. 2020). During winter 2019/2020, a total of 45 family groups (packs with litters born in spring 2019) were documented in Scandinavia; 34 within Sweden, 6 within Norway, and 5 along the Swedish-Norwegian border. Additionally, 26 territorial pairs were confirmed; 17 within Sweden, 5 within Norway, and 4 along the border. The total Scandinavian population in 2019/2020 was estimated to consist of 450 individuals (95% CI = 365-585). At the national level, the Swedish subpopulation was estimated to consist of 365 wolves (95% CI = 289-474), including half of the transboundary wolves. In Norway, the size of the wolf population is determined based on the registration of individual wolves. For 2019/2020, a total of 80-81 wolves were documented in Norway, including half of the 47-50 transboundary wolves. Population statistics for Scandinavia include both living and dead wolves registered during the 6-month monitoring period (Rovdata homepage 2020b).

Population genetics

DNA-based methods have been used in Finland, Norway, and Sweden to monitor and manage wolf populations. As a result of the early incorporation of this methodology as a monitoring tool, there is solid knowledge on the genetic status of the the Fennoscandian wolf populations. While all three countries employ genetic monitoring techniques, however, the implemented DNA-methodologies differ between countries. As a result of this, analogous identification and recognition of specific individuals is only possible within Scandinavia, or within Finland, but not across Fennoscandia as a whole.

Finland

Finland's wolf population is connected to the larger Russian population along the entire length of the Finnish-Russian border. Despite this connection and relatively high documented levels of genetic diversity within Finland, however (Aspi et al. 2006), genetic analyses have suggested that the level of gene flow between Russian-Karelia and Finland is low (Aspi et al. 2009). Furthermore, between 1996 – 2009, a gradual decrease in heterozygosity and increase in inbreeding was documented in Finland. One reason for this trend might be a decrease in the influx of migrants from the Russian wolf population (Jansson et al. 2012).

Norway-Sweden

The Scandinavian wolf population is relatively small and isolated, and this has resulted in high levels of inbreeding and inbreeding depression in the population (Liberg et al. 2005, Åkesson et al. 2016). As a result of this, population viability in Scandinavia is highly dependent on the regular influx of new genetic material from genetically different subpopulations (Bruford 2015). The nearest genetically distinct wolf population is the Finnish-Karelian population. This population is located sufficiently near to the Scandinavian population as to allow individual wolves to enter Scandinavia through natural dispersal north of the Bothnian bay.

Population connectivity

The northern parts of Finland, Norway, and Sweden are part of a defined reindeer herding area, where reindeer husbandry is practiced primarily by native Sámi people (Sámi Parliament homepage 2019, Norwegian Reindeer Herding Act 2007-06-15-40, Finnish Reindeer Herders' Association homepage 2020). Wolves can pose significant threats to reindeer husbandry, both through depredation of reindeer and through disruption of herds. Consequently, the presence of wolves is considered incompatible with reindeer husbandry. To address this threat, management authorities in all three Fennoscandian countries have actively limited the distribution of wolves within reindeer husbandry areas. As a result of this, the Scandinavian wolf population is confined to the south-central parts of Norway and Sweden, south of the Norwegian, Swedish, and Finnish reindeer herding areas (Figure 1). Migrants from the Finnish-Karelian or other Russian wolf populations must therefore pass through these reindeer husbandry areas in order to reach the Scandinavian population. This is a considerable dispersal distance, and wolves that disperse along this route often cause damages to reindeer herds along the way. In order to limit such damages, lethal removal of immigrant wolves is frequently deemed necessary.

Migration events and resulting damages are more easily detected during winter months when there is sufficient snow cover. This is due to both the detectability of tracks (almost impossible without snow), and accessibility to remote back-country areas (very difficult without snowmobile use). As a result of this, the successful migration of wolves from the Finnish reindeer herding area into Sweden and Norway occurs primarily in spring and summer when detection probability is low. Between 2010 and 2020 a total of 18 wolves have been detected migrating from Finland and Russia to Sweden and Norway. Of these 18 migrants, 5 reached the Scandinavian population, while 13 were killed during their vagrant phase (Viltskadecenter 2020b). Wolves from the Scandinavian population have also been documented to migrate to Finland and as far as Russia on multiple occasions (Wabakken et al. 2007, Wabakken et al. 2017, Mikael Åkesson, personal communication, 9 Apr 2020).

To help facilitate the natural migration of wolves, significant economic commitments have been made to subsidise preventative measures which reduce reindeer depredation caused by migrating wolves. This reduces the frequency with which lethal removal is deemed necessary, and increases the

probability of successful migration events. In addition, continuous surveillance of individual migrants is performed routinely in both Norway and Sweden, to prevent depredation and poaching.

In 2015, the Swedish Environmental Protection Agency (SEPA) conducted a scientific evaluation of the importance of immigrants for securing a viable Scandinavian wolf population (Swedish Environmental Protection Agency homepage 2019b). The evaluation concluded that a minimum of one successfully reproducing immigrant per generation (~ 5 years) was necessary to secure the long-term viability of the Scandinavian wolf population. Based on these results, SEPA developed a plan to genetically enhance the Scandinavian wolf population (Swedish Environmental Protection Agency homepage 2019c). The plan emphasises that facilitating natural migration between subpopulations is preferable, but that translocating wolves could be considered as a last alternative. SEPA also specified that possible translocations should be assessed on a case-by-case basis. The current plan for genetic enhancement will be reviewed and revised in 2020.

When translocations are deemed necessary, it is important to assess the risk of disease transmission, particularly with respect to rabies. To address this, Swedish authorities have implemented an assessment period of at least four months, and translocations can only be considered if immigrant wolves do not display any signs of rabies during this period. This regulation, however, can lead to problems if a wolf settles in a reindeer husbandry area during the assessment period.

With respect to disease transmission, the origin of migrant wolves is particularly important, as Finland has been declared free from rabies since 1991, while Russia has not (Finnish Food Authority, homepage 2019). Consequently, rapid identification and communication about the origin of potential immigrants is critical. It is also valuable to know how long a migrant individual has been locally monitored and confirmed free of rabies symptoms if it migrates from Finland.

In 2020, the Norwegian Environment Agency (NEA) in conjunction with the Norwegian Food Safety Authority will develop a protocol for handling situations where genetically important wolves migrate into Norway. This protocol will address health and safety concerns, as well as practical procedures related to possible translocations. NEA aims to involve Swedish authorities in the development and coordination of this protocol.

References

Aspi J., Roininen E., Ruokonen M., Kojola I. & C. Vila (2006). Genetic diversity population structure effective population size and demographic history of the Finnish wolf population. *Molecular Ecology* 15:1561-1576.

Aspi J., Roininen E., Kiiskilä J., Ruokonen M., Kojola I., Bljudnik L., Danilov P., Heikkinen S. & E. Pulliainen (2009). Genetic structure of the northwestern Russian wolf populations and gene flow between Russia and Finland. *Conservation Genetics* 10: 815-826.

Boitani, L., F. Alvarez, O. Anders, H. Andren... & D. Zlatanova, (2015). Key actions for Large Carnivore populations in Europe. Institute of Applied Ecology (Rome, Italy). – Report to DG Environment, European Commission, Bruxelles. Contract no. 07.0307/2013/654446/SER/B3

Bruford, BW. (2015). Additional Population Viability Analysis of the Scandinavian Wolf Population. Swedish Environmental Protection Agency, Stockholm. Report 6639.

Chapron, G., Kaczensky, P., Linnell, J. D. C., ... & Boitani, L. (2014). Recovery of large carnivores in Europe's modern human-dominated landscapes. - *Science* 19: 1517-1519.

Finnish Food Authority. Homepage (2019).

<https://www.ruokavirasto.fi/sv/odlare/djurhallning/djurhalsa-och-sjukdomar/djursjukdomar/gemensamma-sjukdomar-for-flera-arter/rabies-eller-vattuskrack/> (Retrieved 2020-01-27).

Finnish Reindeer Herders' Association. Homepage (2020) <https://paliskunnat.fi/reindeer/reindeer-herding/> (Retrieved 2020-01-28).

Jansson, E., Ruokonen, M., Kojola, I. & Aspi, J. (2012). Rise and fall of a wolf population: genetic diversity and structure during recovery, rapid expansion and drastic decline. – *Molecular Ecology* 21: 5178–5193.

Laikre, L., Olsson, F., Jansson, E., Hössjer, O. & Ryman, N. 2016: Metapopulation effective size and conservation genetic goals for the Fennoscandian wolf (*Canis lupus*) population. – *Heredity* 117 (4), 279-289.

Liberg, O., Andrén, H., Pedersen, H.-C., Sand, H., Sejberg, D., Wabakken, P., ... Bensch, S. (2005). Severe inbreeding depression in a wild wolf (*Canis lupus*) population. – *Biology Letters*, 1(1), 17–20.

Liberg, O., Suutarinen, J., Åkesson, M., Andrén, H., Sand, H., Wabakken, P. and Wikenros, C. (2020). Poaching-related disappearance rate of wolves in Sweden was positively related to population size and negatively to legal culling. – *Biological Conservation* 243.

Ministry of Agriculture and Forestry of Finland. (2015). Publications of the Ministry of Agriculture and Forestry 2015:4 https://mmm.fi/documents/1410837/1720364/Suomen_susikannan_hoitosuunnitelmat.pdf/cf2138e7-6a9b-4955-9b93-d719c734590f (retrieved 2020-02-18).

Ministry of Agriculture and Forestry of Finland. (2019). Publications of the Ministry of Agriculture and Forestry 2019:26. https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/161867/MMM_2019_26.pdf?sequence=1&isAllowed=y

Natural Resources Institute Finland. Homepage (2020).

<http://riistahavainnot.fi/suurpedot/kannanarviointi/lausunnot?lang=fi> (Retrieved 2020-04-27).

Norwegian Reindeer Herding Act 2007-06-15-40 (2007).

<https://lovdata.no/dokument/NL/lov/2007-06-15-40?q=2007-06-15-40> (Retrieved 2020-05-27).

Rovdata. Homepage (2019a). <https://rovdata.no/Ulv/Rapporter.aspx>. (Retrieved 2020-01-27).

Rovdata. Homepage (2019b). <http://hdl.handle.net/11250/2599641>. (Retrieved 2020-01-27).

Sámi Parliament homepage (2020). <https://www.sametinget.se/underlag>. (Retrieved 2020-01-27)

- Smeds, L., Kojola, I., & Ellegren, H. (2019). The evolutionary history of grey wolf Y chromosomes. *Molecular Ecology*. doi: 10.1111/mec.15054
- Swedish Environmental Protection Agency. Homepage (2019a). <https://www.naturvardsverket.se/Sa-mar-miljon/Statistik-A-O/Varg-population-skandinavien/> (Retrieved 2020-01-27)
- Swedish Environmental Protection Agency. Homepage (2019b). <https://www.naturvardsverket.se/Miljoarbete-i-samhallet/Miljoarbete-i-Sverige/Regeringsuppdrag/Arkiv/Redovisade-2014/Vargstammen/> (Retrieved 2020-01-27).
- Swedish Environmental Protection Agency. Homepage (2019c). <http://www.naturvardsverket.se/Sa-mar-miljon/Vaxter-och-djur/Rovdjur/Fakta-om-varg/Genetisk-forstarkning-varg/> (Retrieved 2020-01-27).
- Vila, C., Sundqvist, A.-K., Flagstad, O., Seddon, J., rnerfeldt, S. B., Kojola, I. Ellegren, H. (2003). Rescue of a severely bottlenecked wolf (*Canis lupus*) population by a single immigrant. *Proceedings of the Royal Society B: Biological Sciences*, 270(1510), 91–97.
- Viltskadecenter. Homepage (2020a). <https://www.slu.se/centrumbildningar-och-projekt/viltskadecenter/Inventering/inventering-av-stora-rovdjur/inventering-av-varg/> (Retrieved 2020-04-08).
- Viltskadecenter. Homepage (2020b). <https://www.slu.se/globalassets/ew/org/centrb/vsc/vsc-dokument/inventering/finsk-ryska-vargar-i-skandinavien.pdf> (Retrieved 2020-04-24).
- Wabakken, P., Sand, H., Liberg, O., & Bjärvall, A. (2001). The recovery, distribution, and population dynamics of wolves on the Scandinavian peninsula,. *Canadian Journal of Zoology* 79(4):1978-1998.
- Wabakken, P, Sand, H., Kojola I., Zimmerman, B., Arnemo J.M., Pedersen H.C. and Liberg, O. (2007). Multistage, Long-Range Natal Dispersal by a Global Positioning System–Collared Scandinavian Wolf. *The Journal of Wildlife Management* 71(5):1631-1634.
- Wabakken, P., Maartmann, E., Eriksen, A. Zimmermann, B., Flagstad, Ø. Liberg, O., Sand, H. & Wikenros, C. 2017. Ulv som skadegjører på bufe, tamrein og hund i Norge – Skadehistorikk og skadepotensiale i forhold til ulvens spredningsmønster. Høgskolen i Innlandet. Oppdragsrapport 2-2017. 57 s.
- Wabakken, P., Svensson, L., Maartmann, E., Nordli, K., Flagstad, Ø. & Åkesson, M.. 2020. Bestandsovervåking av ulv vinteren 2019-2020. Bestandsstatus for store rovdyr i Skandinavia 1-2020. Rovdata, Viltskadecenter-SLU, Høgskolen i Innlandet. 55 s.
- Åkesson, M., Liberg, O., Sand, H., Wabakken, P., Bensch, S., & Flagstad, Ø. (2016). Genetic rescue in a severely inbred wolf population. – *Molecular Ecology* 25(19):4745–4756.

Wolf Management in Finland, Norway, and Sweden.

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List of Acronyms

The following acronyms will be used in this document:

CABs	County Administrative Boards (Sweden)
FWA	Finnish Wildlife Agency
GMAs	Game Management Associations (Finland)
LCMBs	Large Carnivore Management Boards (Norway)
LUKE	Natural Resources Institute Finland
MAF	Ministry of Agriculture and Forestry (Finland)
NEA	Norwegian Environment Agency
SEPA	Swedish Environmental Protection Agency

Introduction

The expansion of wolf populations in northern Europe has introduced similar management challenges in Finland, Norway, and Sweden. Despite this, the management structures and policies related to wolves differ substantially between countries. These differences are apparent both in the way that management authorities are organised, as well as by the administrative level at which management decisions are made. The unique management structures in Finland, Norway, and Sweden are described below.

Finland

The overarching long-term objective of the Finnish large carnivore policy is for wolf, brown bear, wolverine, and lynx populations to reach and maintain favorable conservation status in accordance with the EU Habitats Directive (92/43/EEC), while taking into account both social and economic sustainability. The Habitats Directive has been incorporated into both the Finnish Hunting Act (615/1993) and the Hunting Decree (666/1993).

In Finland, the parliament does not set political goals regarding large carnivore populations. Rather, large carnivore policy is steered and controlled by means of policy decisions made by the Finnish Ministry of Agriculture and Forestry (MAF). The implementation of wildlife management policy in Finland is carried out by the Finnish Wildlife Agency (FWA). The FWA is responsible for educating hunters and implementing preventative measures to reduce damages caused by large carnivores. The FWA also regulates hunting and lethal removal of large carnivores through the issuing of derogations. Derogation decisions are made independently by the FWA, without

guidance or direction from the ministry, the government, or the parliament. Both policy decisions (MAF) and derogation decisions (FWA) are made based on large carnivore research and population estimates provided by the Natural Resources Institute Finland (LUKE).

At the local level, Game Management Associations (GMAs) operate under the FWA and carry out operational tasks including administering hunting exams and shooting tests, inspecting wildlife damage sites, and supervising and enforcing lawful hunting. Game wardens from Metsähallitus, the Finnish Forest Administration, work in close cooperation with the police to ensure that hunting and fishing are practiced in accordance with the regulations and restrictions defined by Finnish law. Finally, the Finnish Food Authority is responsible for zoonosis and the administration of subsidies for damages caused by large carnivores.

Both the Finnish National Wildlife Council and Regional Wildlife Councils promote national game policy and large carnivore policy in Finland. The objective of these wildlife councils is to secure transparent and interactive stakeholder cooperation in game management and to promote the harmonisation of diverse interests. Wildlife councils also participate in the preparation and revision of national management plans and organise stakeholder consultations related to both national and regional management planning work.

A descriptive diagram of the Finnish management system is given in the figure below (Figure 1).

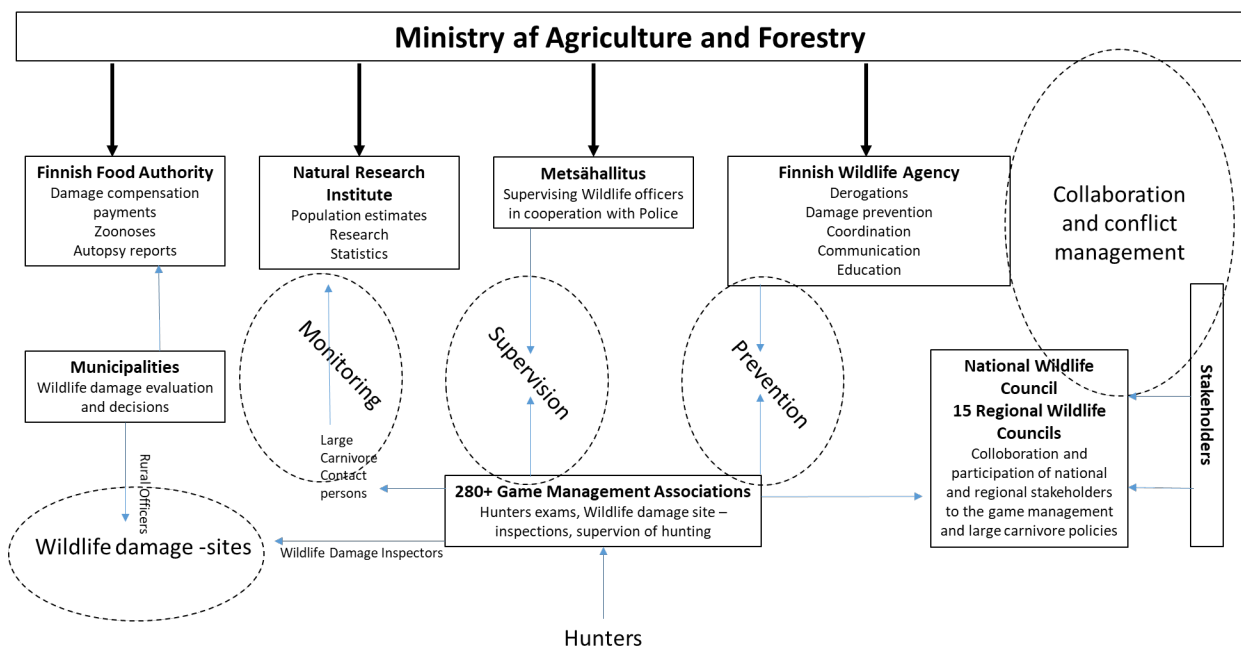


Figure 1: Diagram showing the responsibilities of the authorities involved in the Finnish large carnivore management system.

As there are no political goals for Finland's large carnivore populations, population management plans are the most important tool for implementing large carnivore management strategy. Management plans are approved by MAF and prepared in collaboration with key stakeholders and interest groups from both the national and regional levels. The present Management Plan for the

Wolf Population in Finland was approved in 2019¹². The objective of this management plan is to build a foundation for acceptance of wolves through tolerance, and to promote the long-term objective of achieving favourable conservation status of the wolf population as set out in the Habitats Directive. According to the management plan, tolerance and acceptance of wolves may be supported by preventing damages, issuing compensation for damages, and through information dissemination. The objectives, goals, and key components of the current Management Plan for the Wolf Population in Finland are depicted in Figure 2 and Figure 3.

Maintaining minimum viable population size is an interim target of the Management Plan for the Wolf Population in Finland. According to the plan, the minimum viable population size for wolves in Finland is 25 breeding pairs. Breeding pairs are defined as pairs with offspring less than one year old, and half of the breeding pairs living on either side of the Finnish-Russian border are included in this estimate. Achieving minimum viable population size, however, does not fulfil the long-term objective of achieving favourable conservation status. Favourable conservation status is determined by an expert group every six years based on requirements set out by the EU Habitats Directive, following a procedure referred to in Article 17 of the Habitats Directive.

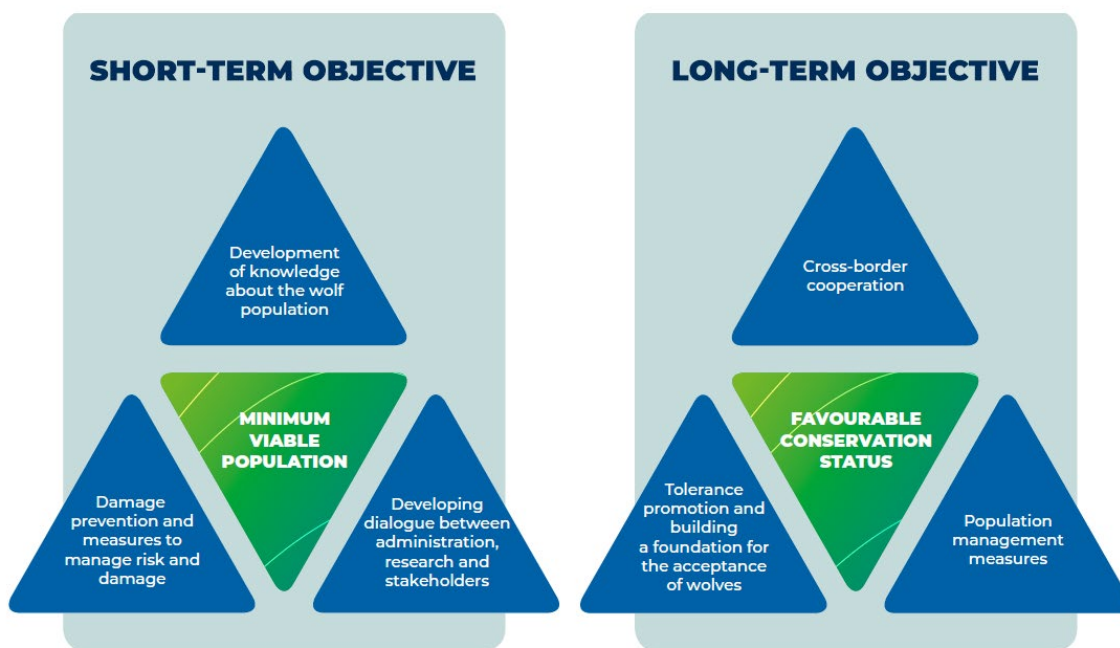


Figure 2: Short-term and long-term objectives of the Management Plan for the Wolf Population in Finland.

¹² Publications of the Ministry of Agriculture and Forestry 2019:26

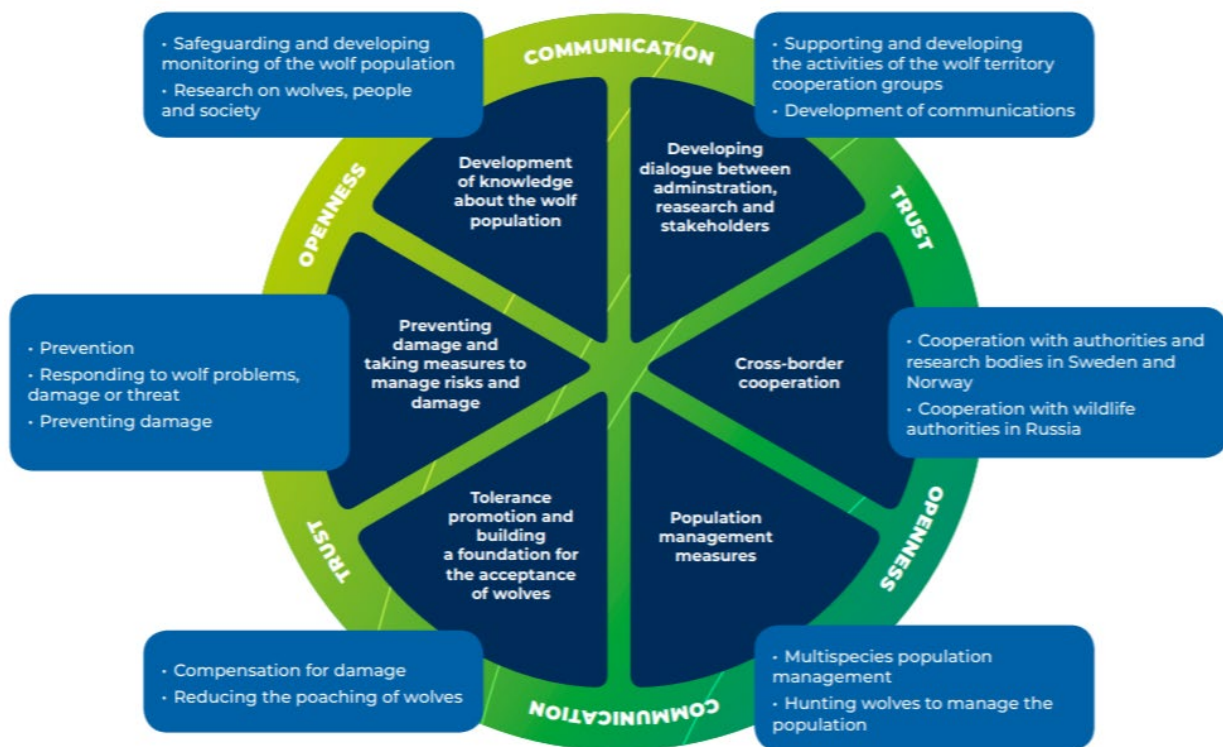


Figure 3: Goals and key components of the Management Plan for the Wolf Population in Finland.

Wolves and other large carnivores are classified as protected game species in Finland and fall under the management authority of MAF. All large carnivore species in Finland are protected under the Hunting Act, however the FWA can grant derogations from this protection in accordance with requirements laid out in the Habitats Directive and the Finnish Hunting Act (613/1993). Derogations can be divided into two main categories: those granted based on damage to livestock or to protect human safety, and those granted on the basis of population management. Derogations are issued by the FWA after request by application, and derogation decisions can be appealed to the Finnish Administrative Court.

The following criteria must be assessed when issuing derogations:

- the existence of other satisfactory solutions or alternatives for preventing the damage
- whether the derogation will affect the probability of reaching or maintaining favourable conservation status
- whether the derogation can help to prevent particularly significant damage (this criterion is only relevant for damage-based derogations)

Damage-based derogations are issued by the FWA based on criteria laid out in the Finnish Hunting Act (41§ and 41a§ 1-2 mom, 615/1993), which is an implementation of article 16.1 a-d of the Habitats Directive. In addition, past court rulings may determine and define the limits and outcomes of future derogation decisions. Each case, however, must be assessed by the FWA on its individual merits, and no general policies can be developed to guide the decision-making. The administrative burden related to damage-based derogations and the limitations related to their implementation are based on judgments made by the European Court of Justice (C-342/05 Commission of the European

Communities v Republic of Finland). When derogations are granted based on damage to livestock, any lethally removed large carnivores belong to the state and cadavers must be turned over to LUKE and the Finnish Food Authority for analysis.

In acute cases where bold wolves endanger human life or health, cause significant damage to property, or display undesired behavior in proximity of human settlements, the Police Act 2:16 § (872/2011) contains provisions which give police officers authority to, as a last resort, lethally remove problem animals.

Derogations granted on the basis of population management are covered in the Government Decree on Derogations (452/2013). These derogations may only be granted when specific criteria are met (see above), and under carefully defined conditions which limit hunting or lethal removal to select individuals of a given species. At present, derogations granted based on population management are not granted for wolves in Finland. If such derogations were to be allowed in the future, MAF, by ministerial decree, would regulate how many wolves could be hunted each year under derogations. Such a decree would be based on the latest population estimates from LUKE and on the population's growth trend. The maximum number of individuals to be hunted or lethally removed under derogations would be determined in accordance with the Habitats Directive's requirements for achieving and maintaining favourable conservation status.

Norway

The dual governing principle of the Norwegian large carnivore policy is to ensure the survival of Norway's brown bear, wolf, lynx, wolverine, and golden eagle populations, while still ensuring viable free-range grazing livestock husbandry and semi-domestic reindeer herding practices.

The Norwegian large carnivore management policy is based on a government report (white paper) to the Parliament in 2004 (WP No. 15 (2003-2004)) and a unanimous Parliamentary agreement in 2011 (Document 8:163 S (2010-2011)) where the Parliament set population targets for each of the four large carnivore species in Norway (brown bear, wolf, lynx, and wolverine). In June 2016, the Parliament amended the population target for wolves in Norway following a white paper specifically related to wolf management (WP No. 21 (2015–2016)).

Norwegian large carnivore management is hierarchically organised. The Parliament sets the agenda and policy, and ministries are responsible for implementing policy. In Norway, the Parliament also sets the national population targets for all large carnivore species. Large carnivore management is decentralised, and several actors are involved in the management hierarchy (Figure 4). The main authorities are the Ministry of Climate and Environment, the Norwegian Environment Agency (NEA), the Regional Large Carnivore Management Boards (Rovviltneemnder in Norwegian, hereafter LCMBs), and the County Governors.

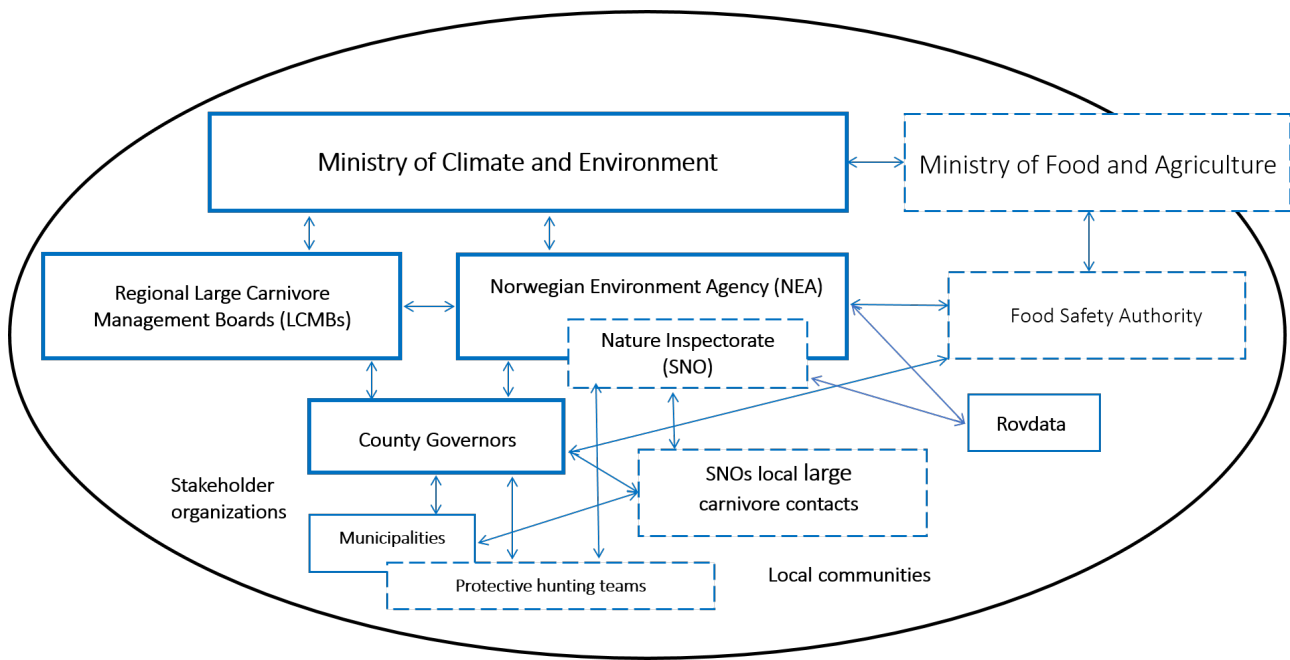


Figure 4: Schematic figure outlining the hierarchical relationship between authorities involved in large carnivore management in Norway.

The Ministry of Climate and Environment is principally responsible for ensuring that large carnivore management policy is implemented, as outlined by the Parliament, and does so by creating and amending national legislation. Day-to-day public administration of large carnivore management is carried out by NEA at the national level and County Governors at the regional level. The Norwegian Nature Inspectorate (SNO) is NEAs operative field branch, responsible for monitoring natural areas and ensuring compliance with environmental regulations and legislation. Municipalities with wolf packs also play a role in wolf management and are responsible for allocating funds through the "subsidy scheme for municipalities with wolf packs". The goal of this subsidy scheme is to fund projects which mitigate wolf related conflicts.

On an administrative scale, Norway is divided into eight large carnivore management regions (Figure 5a). Each management region is represented by a LCMB made up of representatives from the pertinent county councils, in addition to representatives from the Sámi parliament in reindeer herding regions. One of the County Governors in the region is appointed as the secretariat for the LCMB and plays an advisory role in regional large carnivore management.

In the Norwegian large carnivore management system, NEA and the LCMBs represent the same hierarchal level, but have different responsibilities. As the national management agency, NEAs role is to carry out policies as instructed by the Ministry, as well as to contribute in an advisory capacity to the Ministry and politicians in matters related to large carnivore management. The LCMBs are responsible for creating regional management plans for the large carnivore species in their respective regions, and in doing so must adhere to the national large carnivore policy and its dual governing principle. Both NEA and the LCMBs may set quotas for the lethal removal of wolves in order to avoid and prevent damages. In large carnivore management regions that have a wolf population target, the LCMBs may set quotas and County Governors may issue derogations provided the wolf population target is met or exceeded. If the wolf population falls below the national target, NEA assumes responsibility for setting quotas and issuing derogations. In regions

that do not have a wolf population target, the LCMBs are the primary authority responsible for setting quotas.

The current Norwegian large carnivore policy advocates for geographically differentiated management, which involves designating certain areas as *large carnivore areas* and others as *free-range grazing livestock areas*. LCMBs must address these requirements when creating regional large carnivore management plans. Inside areas prioritised for large carnivores, animal husbandry practices must adapt to the permanent presence of large carnivores and preventative measures should be prioritised to reduce damage to livestock. In free-range grazing livestock areas, free-range grazing husbandry practices are prioritised and lethal removal of large carnivores through *licence* and *protective hunting* are the primary management tools employed to reduce damages. These management tools are implemented through issuing derogations in accordance with requirements set out in the Norwegian Nature Diversity Act.

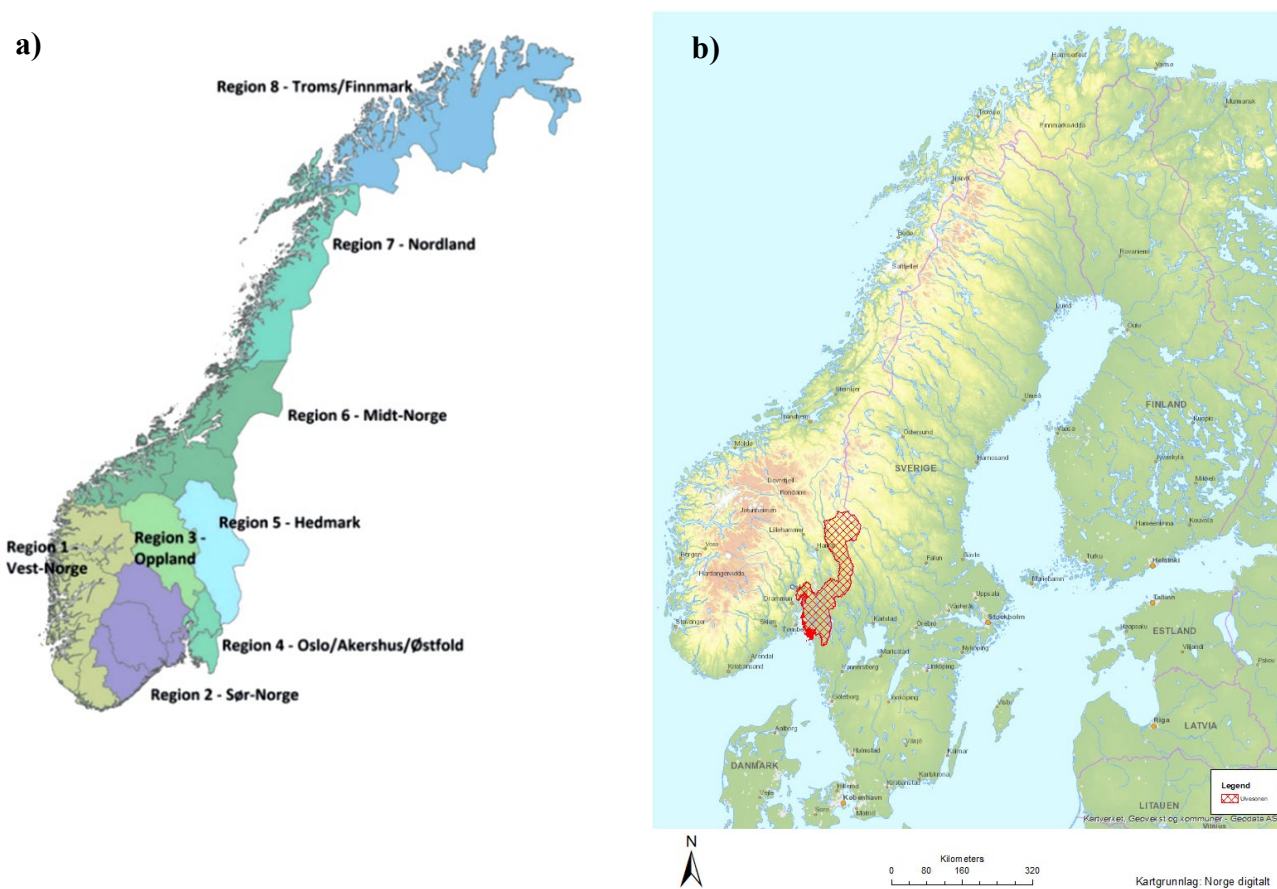


Figure 5: a) Map showing the spatial distribution and extent of Norway's eight large carnivore management regions, b) Map showing the location and extent of Norway's wolf management area, also referred to as the wolf zone.

Norway has a single wolf management area referred to as the *wolf zone*. This national management area was designated by the Parliament and runs along the Norwegian-Swedish border in south-eastern Norway (Figure 5b). The geographical extent of the wolf zone takes into account both the existing range of the Scandinavian wolf population as well as Norway's traditional farming practices and extensive use of grazing areas in large parts of the country.

The national management target for Norway's wolf population is 4 – 6 yearly reproductions, i.e. packs with a litter born that year, and includes litters born both inside and outside of the wolf zone

in addition to litters born in transboundary packs (shared with Sweden). Transboundary packs count toward the Norwegian population target as 0.5, or one half of a reproduction. In order to reach the population target, three of the documented reproductions must occur in wolf packs that have their entire territory within Norway.

Within the boundaries of the wolf zone, sheep are confined to grazing in areas protected by large carnivore deterring fences, and only a small proportion of livestock graze freely. As a result, most of the documented damages caused by wolves occur outside the wolf zone in prioritised free-range grazing livestock areas.

Wolves and other large carnivores in Norway are protected under the Norwegian Nature Diversity Act (Naturmangfoldloven, LOV-2009-06-19-100) and through Norway's commitment to the Bern Convention. In order to mitigate damage caused by wolves, however, management authorities can set quotas for license and protective hunting and issue derogations from the strict protection in accordance with requirements laid out in the Nature Diversity Act, paragraph 18, which is further regulated by the Regulation on Large Carnivore Management (FOR-2005-03-18-242).

Derogations related to wolf management can be divided into two main categories: those granted on the basis of preventing damage to livestock, domestic reindeer, or other property, and those granted on the basis of protecting public health and safety or other significant public interests.

Derogations can only be issued if the following criteria are met:

- the derogation and subsequent removal will not threaten the survival of the population
- the damage or safety concern cannot be addressed in any other satisfactory way

In Norway, licence hunting is implemented primarily to regulate populations and to reduce damage potential. Only registered licence hunters can participate in licence hunting. Outside the wolf zone, the licence hunting season for wolves spans from December 1st to May 31st. Quotas are set during late winter and early spring (while hunting conditions are good) in order to reduce the number of potentially dispersing wolves before the sheep grazing season starts May/June. Within the wolf zone, the licence hunting season is limited to January 1st through February 15th to take into account the breeding season and dependent young.

Protective hunting is implemented primarily to prevent damages, and in acute situations can also be used to stop impending or ongoing incidents. Protective hunting derogations can only be issued against specific individuals within a restricted area and for a defined period.

Under certain conditions, game species may also be lethally removed if removal is considered necessary to eliminate a current threat or significant risk of human injury, or an immediate and significant risk of damage to livestock, dogs, or domestic reindeer (Norwegian Nature Diversity Act § 17).

Large carnivores lethally removed through protective hunting are the property of the state Wildlife Fund and cadavers must be turned over for analyses and genetic identification. Applications to assume the rights to skins or skeletons from such animals are submitted to the Wildlife Fund and processed by NEA. Large carnivores killed through license hunting must also be turned in for scientific analysis and genetic identification, however, license hunters are permitted to retain skins from such animals. In the event that hunters fail to comply with regulations regarding dead game

species, the Wildlife fund assumes all rights to the specimens in question. All specimens legally retained by hunters or acquired by application are marked and registered in an online database.

Sweden

The overall long-term objective of the Swedish large carnivore policy is for the wolf, brown bear, wolverine, lynx, and golden eagle populations to reach and maintain favorable conservation status, while ensuring that livestock husbandry is not severely hindered, and that socioeconomic consideration is taken. Favorable conservation status is defined in accordance with guidelines from the EU Habitats Directive.

The Swedish large carnivore management policy is based on several white papers which served as the basis for succeeding government bills. The most recent white paper on large carnivores was published in 2012 (SOU 2012:22) and followed by a government bill in 2013 (prop. 2012/13:191) which was adopted by the Swedish Parliament the same year (bet. 2013/14:MJU7, rskr. 2013/14:99).

In Sweden, state authorities are independent units governed by laws, governmental ordinances, and parliamentary decisions. The main authorities involved in large carnivore management in Sweden are the Swedish Environmental Protection Agency (SEPA), the County Administrative Boards (CABs), and the Sami Parliament (Figure 6). As the national wildlife management agency, SEPA's role is to carry out policies as instructed by the Ministry, as well as to contribute in an advisory capacity to the Ministry, politicians, and the CABs in matters related to large carnivore management. The CABs are regional operational authorities whose responsibilities include issuing derogations, inspecting carnivore-related damages, administering reimbursements for damages, and implementing preventive measures.

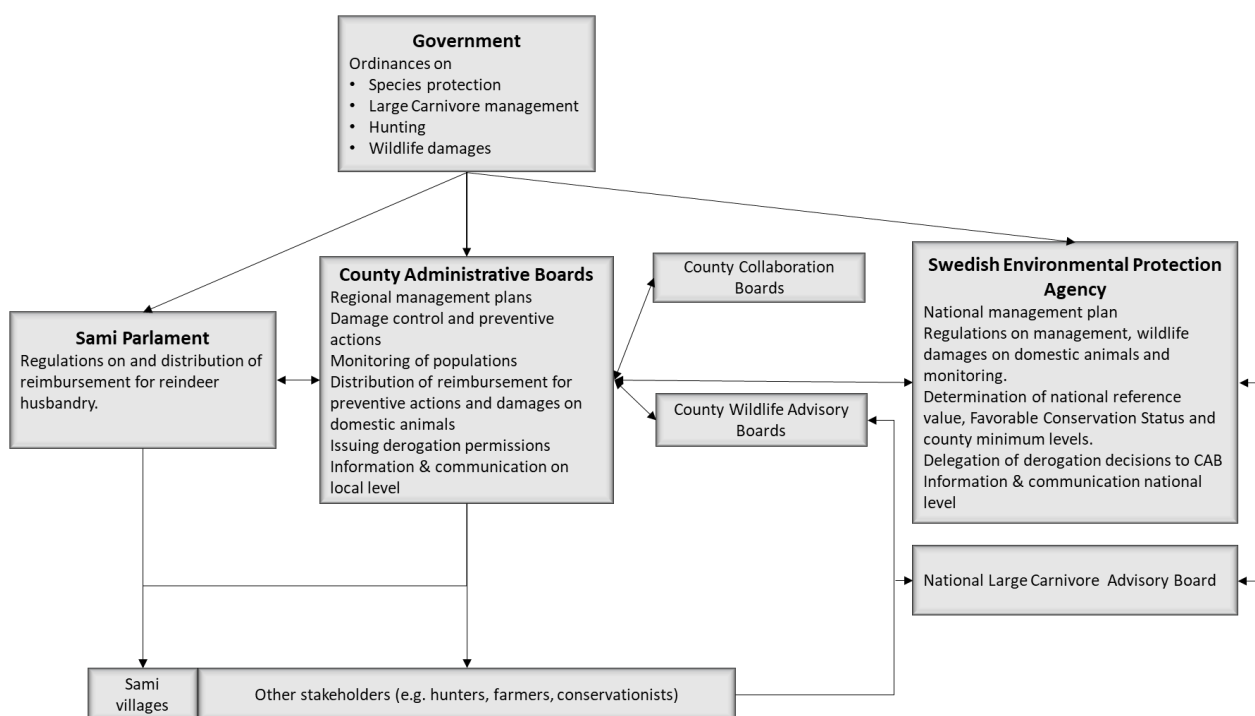


Figure 6: Schematic diagram outlining Swedish management authorities, their responsibilities, and the legal framework regulating wolf management in Sweden.

The CABs are also responsible for creating regional management plans for the large carnivore species in their respective counties. The Sami Parliament is primarily involved in large carnivore management through their role as the national agency for carnivore damage reimbursements related to reindeer herding.

Although the management structure in Sweden is relatively flat, both SEPA and the Sami Parliament can establish further regulations which may steer or govern other authorities. Regardless of their role in the management system, however, all authorities must adhere to the requirements set out by the Habitats Directive, the corresponding Swedish Ordinance on Species Protection (SFS 2007:845), the hunting legislation (SFS 1987:259 and 1987:905), and the Ordinance on Management of Large Carnivores (SFS 2009:1263).

In Sweden, population management plans are the most important tools for implementing large carnivore management strategy. The present National Management Plan for the Wolf Population in Sweden was adopted by SEPA in 2014 (ISBN 978-91-620-8758-6) and will be revised for the upcoming period 2021-2027. Based on the national management plan, the 21 CABs prepare or revise regional management plans. Counties that do not have wolves are still required to establish long-term goals for wolf population development and distribution in their counties. The only Swedish county that does not have a management plan for wolves is the island county of Gotland.

The following figure describes the main objectives of the current National Management Plan for the Wolf Population in Sweden (Figure 7):

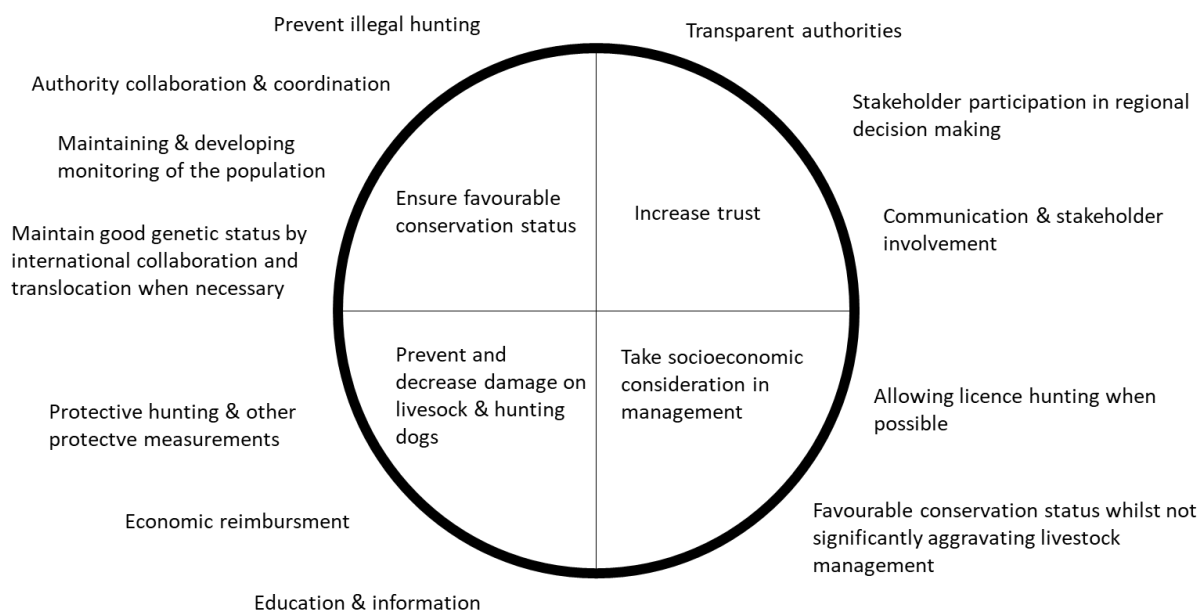


Figure 7: *The main objectives of the National Management Plan for the Wolf Population in Sweden.*

Based on a scientific evaluation requested by the Swedish government in 2015, SEPA concluded that the minimum population size requirement for achieving favorable conservation status in Sweden (referred to as the *reference value*) was 300 wolves, provided that a minimum of one immigrant entered the population every generation. This reference value must be met when the CABs distribute and define population goals in their regional management plans (Figure 9). To coordinate this, the Swedish management system has defined three large carnivore management areas (Figure 8), each of which is represented by a regional collaboration board.

The CABs are responsible for implementing management plans within their respective counties, in addition to collaborating with other CABs within their large carnivore management area. Regional stakeholder advisory boards assist the CABs in making decisions on overall guidelines for wildlife management. The function and composition of the stakeholder advisory boards is regulated in an ordinance (SFS 2009:1474), and all major stakeholder groups are represented, e.g. conservation organisations, hunting organisations, forestry, agriculture, reindeer husbandry and politicians. Regional large carnivore management is to be conducted in accordance with both national and regional management goals, and the same legislation is applicable at both the national and regional levels.

In Sweden, wolves are protected by the Swedish Ordinance on Species Protection (SFS 2007:845). In cases where wolves cause damage or in order to prevent damages, however, management authorities (SEPA and the CABs) may issue derogations from this protection in accordance with requirements laid out in the Habitats Directive and the Swedish Ordinance on Hunting (SFS 1987:905). SEPA is the main authority responsible for issuing derogations to allow the lethal removal of wolves. SEPA can, however, delegate this authority to the CABs, in accordance with the political decision in 2013 to regionalise large carnivore management in Sweden. With this delegation, the CABs assume responsibility for formulating rules and restrictions, setting quotas for hunting, and carrying out surveillance to ensure that hunting is performed in line with the given rules and restrictions. The derogation decisions issued by the CABs can be appealed to the National Administrative Court. When management authority is delegated to the CABs, SEPA maintains an advisory role in interpreting the legislation, and a supervisory role in ensuring that the conservation status is not endangered. If favorable conservation status is not upheld, SEPA can withdraw their delegation of authority.

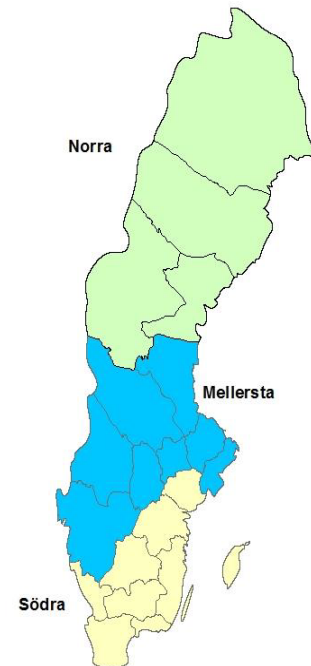


Figure 8: The three large carnivore management areas in Sweden.

In response to damage caused by wolves, CABs may issue derogations to allow *protective hunting*. When issuing derogations, CABs must assess the criteria laid out in the Hunting Ordinance 23 a-b §§ (SFS 1987:905), which is an implementation of article 16.1 a-d of the Habitats Directive (92/43/EEC).

The criteria that must be assessed when issuing derogations to allow protective hunting include:

- the existence of other satisfactory solutions for preventing the damage
- whether the derogation will affect the probability of reaching or maintaining favourable conservation status
- whether the derogation will help to prevent particularly significant damage

Past court rulings may also determine and define the limits and outcomes of derogation decisions.

Under certain conditions, for example when a wolf is close to domestic animals and an attack is imminent, domestic animal owners have the right to defend or protect their animals through protective hunting, without the need for a specific protective hunting permit (§ 28 a-d, SFS 1987:905).

After delegation from SEPA, the CABs can also issue derogations to allow *license hunting*. The regulations for licence hunting can be found in the Hunting Ordinance § 23 c-f (SFS 1987:905), which is an implementation of article 16.1 e of the Habitats Directive (92/43/ EEC). License hunting of large carnivores can be allowed when there are no other suitable management solutions, as long as the hunt does not impede maintenance of favorable conservation status for the pertinent species in its natural range. For wolves, both population size and population composition from the preceding monitoring season must be taken into consideration when considering license hunting as a population management tool. License hunting can only be permitted during years when the population exceeds the reference value and must be implemented under strictly controlled conditions (Figure 9).

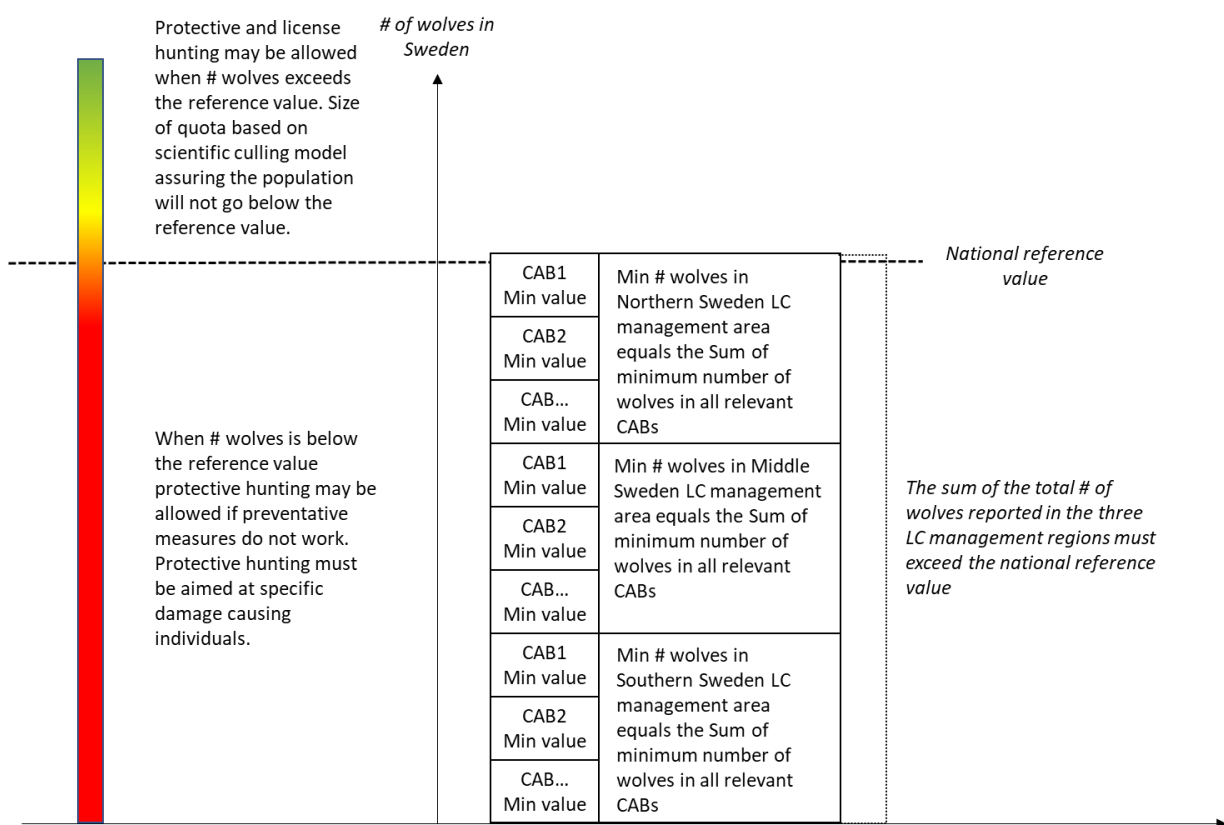


Figure 9: Schematic diagram describing how favorable conservation status is secured in Sweden and how hunting relates to favorable conservation status. LC management area = Large carnivore management area.

License hunting of wolves has not been permitted in Sweden since the ruling of the EU Court of Justice in case C-674/17 on the 10th of October 2019 concerning the Finnish license hunting of wolves. SEPA, however, may still delegate the authority to make decisions regarding license hunting to the CABs when the population reference level has been exceeded.

All dead wolves in Sweden, e.g. dead as the result of accidents, legal hunting, or poaching, must be turned over to the Swedish Veterinarian Institute for analyses and genetic identification. As a result of this regulation, most dead wolves are recovered and studied, and the information obtained is used for population modelling and to inform future management decisions.