

December 2023



CASE STUDY

**Livestock depredation and large carnivores in Europe: Sweden-livestock damages and wolf, bear, lynx, wolverine, golden eagle**

# EU PLATFORM ON COEXISTENCE BETWEEN PEOPLE & LARGE CARNIVORES

Minimizing  
Conflict

Finding  
Solutions

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## Sweden

Sweden is one of the few countries that is home to all four of Europe's large carnivore species: wolf, lynx, bear and wolverine. As in many other parts of the world, these species were hunted and pushed to the brink of extinction during the first half of the 20<sup>th</sup> century. Following their protection, Swedish carnivore populations have increased, especially since the 1980s<sup>1</sup>. Their expansion has sparked an often heated and politically charged conflict, especially in the case of wolves. The special case of semi-domestic reindeer herding, by indigenous Sámi reindeer herders also leads to heated debate<sup>2</sup>.

The current Swedish wolf population goes back to three founder animals that arrived themselves from Russia across Finland in the early 1980s after their prior functional extinction in Sweden in the late 1960s<sup>3</sup>. Since then, the Swedish wolf population has been increasing in numbers and expanding southward, recently reaching new counties. Nevertheless, the population is (genetically) isolated and highly inbred, resulting in concerns about its long-term genetic health and viability<sup>4</sup>. The Scandinavian wolf population is shared between Sweden and Norway, with a joint monitoring system but different management strategies.

Sweden is divided into three large carnivore management regions: the north, the south and the central region<sup>5</sup>. The monitoring of the wolf population through winter inventory of 2022-2023 (1 October – 31 March), showed that currently 76% of the wolves in Sweden are located in the central management region and that numbers are slightly lower than the previous winter inventory. In contrast, numbers increased in the southern management region and plateaued in the northern region. In southern Sweden, wolves have not only increased in numbers but also expanded their distribution area to new counties as a new territory was formed on the border between Kalmar and Kronoberg county. In Sweden as a whole, the number of individual wolves has not changed much in the last counts (between winter 2021-2022 and 2022-2023<sup>6</sup> following a general gradual increase over the last ten years (see below).

After almost having been eradicated in Sweden during the 1930s, the population of brown bear increased rapidly during the last decade of the 20<sup>th</sup> and the first decade of the 21<sup>st</sup> century. In 2008, the population was estimated at around 3300 individuals. Since then, hunting has reduced the number of bears<sup>7</sup>. In 2022, the population was estimated to consist of about 2800 bears, in 2023 of 2500 bears<sup>8</sup>.

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<sup>1</sup> Eklund (2019), On the other side of the fence: Multidisciplinary perspectives on intervention use to prevent large carnivore attacks on domestic animals in Sweden. <https://res.slu.se/id/publ/101824>

<sup>2</sup> Eriksson & Dalerum (2018), Identifying potential areas for an expanding wolf population in Sweden. <https://doi.org/10.1016/j.biocon.2018.02.019>

<sup>3</sup> Hagenblad et al. (2009). Population genomics of the inbred Scandinavian wolf. <https://doi.org/10.1111/j.1365-294X.2009.04120.x>

<sup>4</sup> Laikre et al. (2022), Planned cull endangers Swedish wolf population. <https://doi.org/10.1126/science.add5299>

<sup>5</sup> Dalerum et al. (2020), Relationships Between Livestock Damages and Large Carnivore Densities in Sweden. <https://doi.org/10.3389/fevo.2019.00507>

<sup>6</sup> Svensson et al. (2023), Inventering av varg vintern. 2022-2023 <https://hdl.handle.net/11250/3068933>

<sup>7</sup> Schneider et al. (2023), The management of brown bears in Sweden and Fennoscandia. – In: *Bear and Human: Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe*, ed. by Oliver Grimm (Turnhout: Brepols, 2023), pp. 77–98.

<sup>8</sup> Sköld & Åsbrink (2023), Björnpopulationens storlek och utbredning i Sverige 2022. - Rapport från Naturhistoriska Riksmuseet

The Scandinavian lynx population has slightly increased between winter 2021-2022 and winter 2022-2023, however in Sweden as a whole, lynx numbers have marginally decreased, overall, the trend is fluctuating. The Swedish lynx population is distributed across the three management regions, but most concentrated in the central region<sup>9</sup>.

The wolverine population has been slightly increasing over the last ten years. It remained roughly the same from 2021 to 2022 across Scandinavia as a whole and slightly decreased in Sweden. The northern management region had the highest numbers in the counties Norrbotten, Västerbotten and Jämtland<sup>10</sup>.

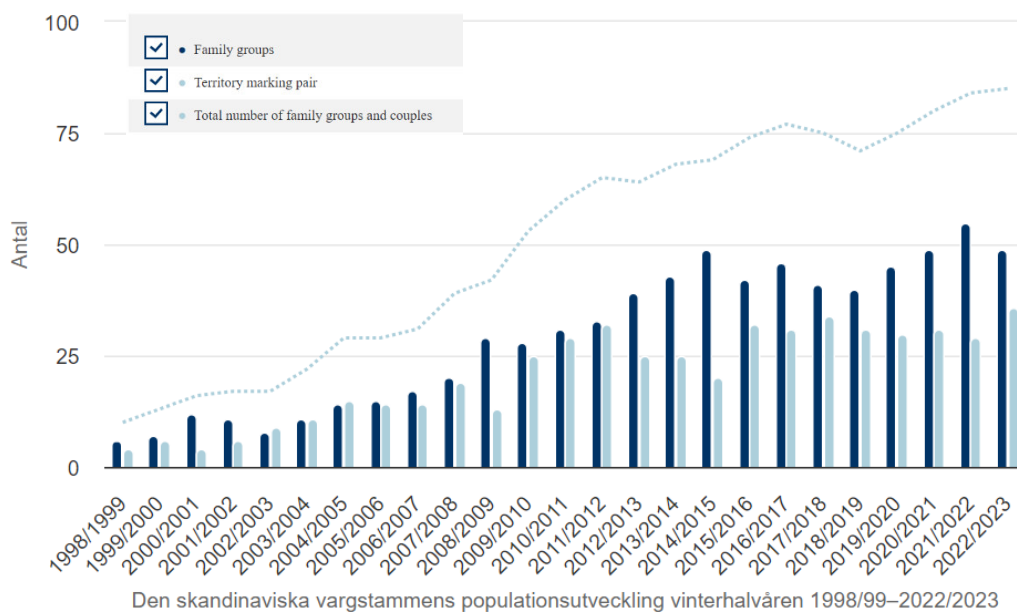


Figure 1. Wolf estimate = 40 families and 29 territorial pairs, 450 individuals (2022/2023)<sup>6</sup>

<sup>9</sup> Frank & Tovmo (2023), Inventering av lodjur 2023. <https://hdl.handle.net/11250/3071522>

<sup>10</sup> Mattisson et al. (2022), Bestandsövervakning av jerv i 2022. <https://hdl.handle.net/11250/3026507>

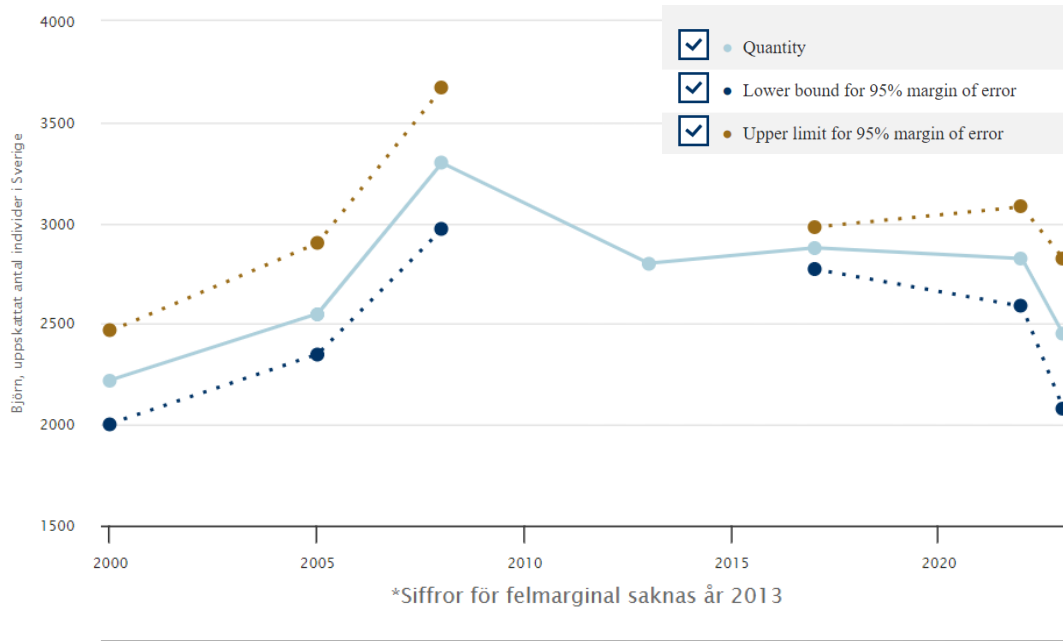


Figure 2. Bear estimate = 2,800 bears (2022/2023) after that year's license hunt<sup>11</sup>

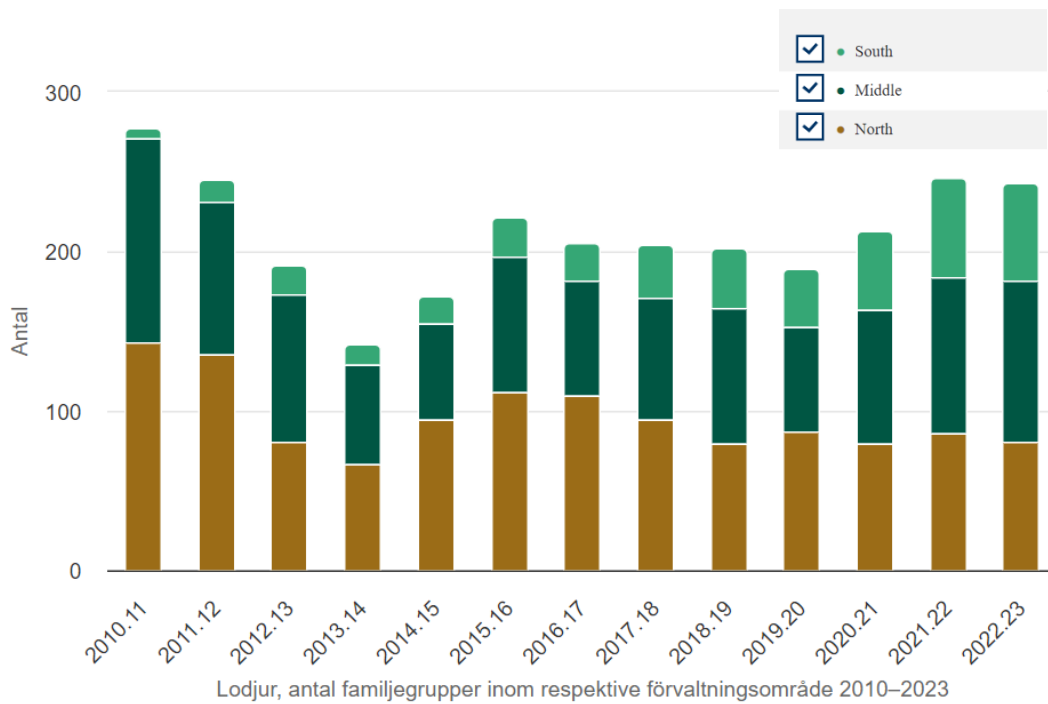


Figure 3. Lynx estimate = 242 families, 1417 individuals (2022/2023)<sup>9</sup>

<sup>11</sup> SEPA website (2023: <https://www.naturvardsverket.se/data-och-statistik/vilt/bjorn-populationsutveckling/>)



Figure 4. Lynx tracks © Schneider

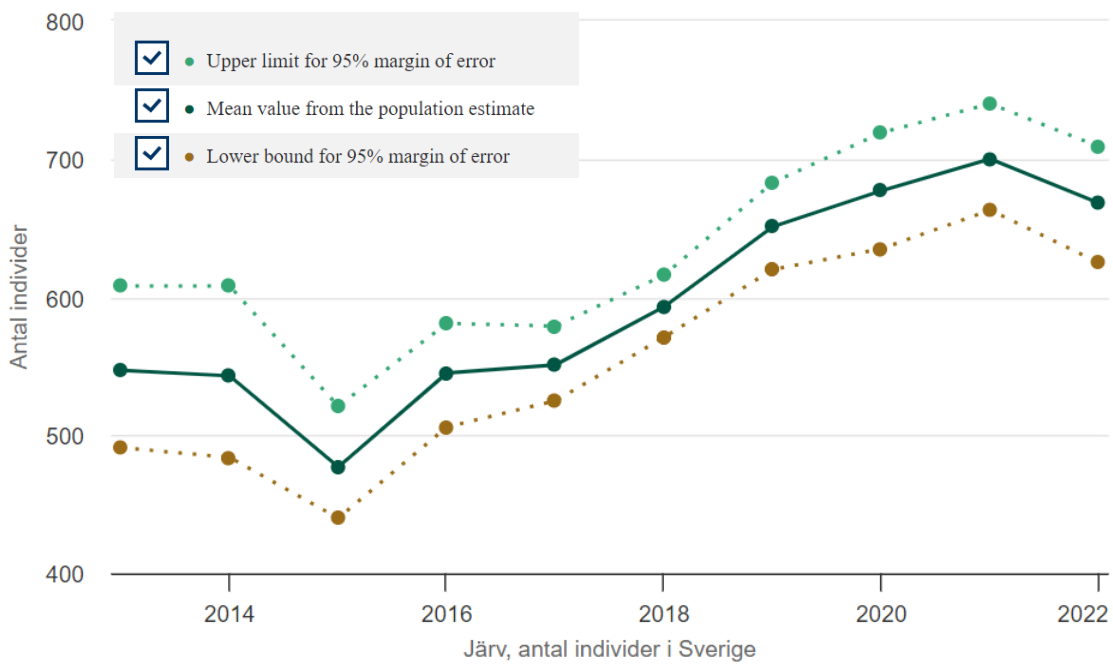


Figure 5. Wolverine estimate = 119 reproductions, 668 individuals (2022)<sup>10</sup>

## **Institutional structure**

In Sweden, large carnivores are managed by the Swedish Environmental Protection Agency (SEPA) which is responsible for implementing national policies, however most practical management tasks are handled at regional level.

Each county is responsible for creating and implementing their individual carnivore management strategy including the definition of regional minimum population sizes and implementation of sustainable hunting strategies<sup>2</sup>.

A Delegation for Game Management has been established at every county administration to support these decisions. These delegations are advisory boards and support county administrations during decision-making but do also make decisions of their own in general and overarching questions on game management. The delegations are meeting places for politicians and for the different groups in society that are affected by or interested in carnivores. By meeting each other and talking to each other, the different groups can develop an understanding of the other side's problems, attitudes and approaches towards carnivores. These delegations are also a good forum for county administrations to collect data, information, and visions regarding large carnivores from all different parties.

Administrations can also use this forum to spread information and to encourage stakeholders to be active and involved. Representatives of the different groups in the delegations are supposed to disseminate what they learned during delegation meetings to the members of the organisations they represent.

## **Livestock damages**

Livestock damages vary greatly within Sweden due to differences in large carnivore densities, prey abundances, landscape and farming techniques. Damages to domestic livestock and semi-domestic reindeer are recorded differently due to the very different management systems.

In 2022, in terms of damages on domestic livestock by large carnivores, wolves were responsible for the most of killed, injured or missing animals<sup>12</sup>. In total 251 sheep, five cattle, four goats, and one "other" domestic animal were injured or killed by wolves (in total 238). Sweden has as a proportion of the total livestock damages, relatively high damages by lynx compared with other EU countries. Lynx were responsible for a total of 178 killed, injured, or missing domestic animals, including 129 sheep, 7 goats, 27 fenced deer and two "other". Bears accounted for damages on ten sheep and one cow as well as 97 beehives and 47 silage bales. No damage to domestic animals were documented for wolverines in 2022. To put these figures into context however, damages to domestic livestock are relatively low compared with other countries.

The killing and injury of hunting dogs by large carnivores, especially wolves, receives a lot of attention in Sweden and is a particularly emotional issue for many hunters. Popular hunting methods include free-running dogs to track prey and leave dogs vulnerable to attack. In 2022, 22 dogs were killed by wolves, 13 by lynx and three by bear.

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<sup>12</sup> Frank et al. (2023), Viltskadestatistik 2022. <https://www.slu.se/globalassets/ew/org/centrb/vsc/vsc-dokument/vsc-publikationer/rapporter/viltskadestatistikrapporter/viltskadestatistik-2022.pdf>



For reindeer, the documentation of damages is often not possible, as reindeer are only semi-domesticated and free-ranging on natural pastures throughout most of the year. This makes it extremely difficult to estimate the actual number of kills, but estimates for Sweden, based on different predation studies, suggest that around 50,000 reindeer are killed by large carnivores per year<sup>13</sup>.

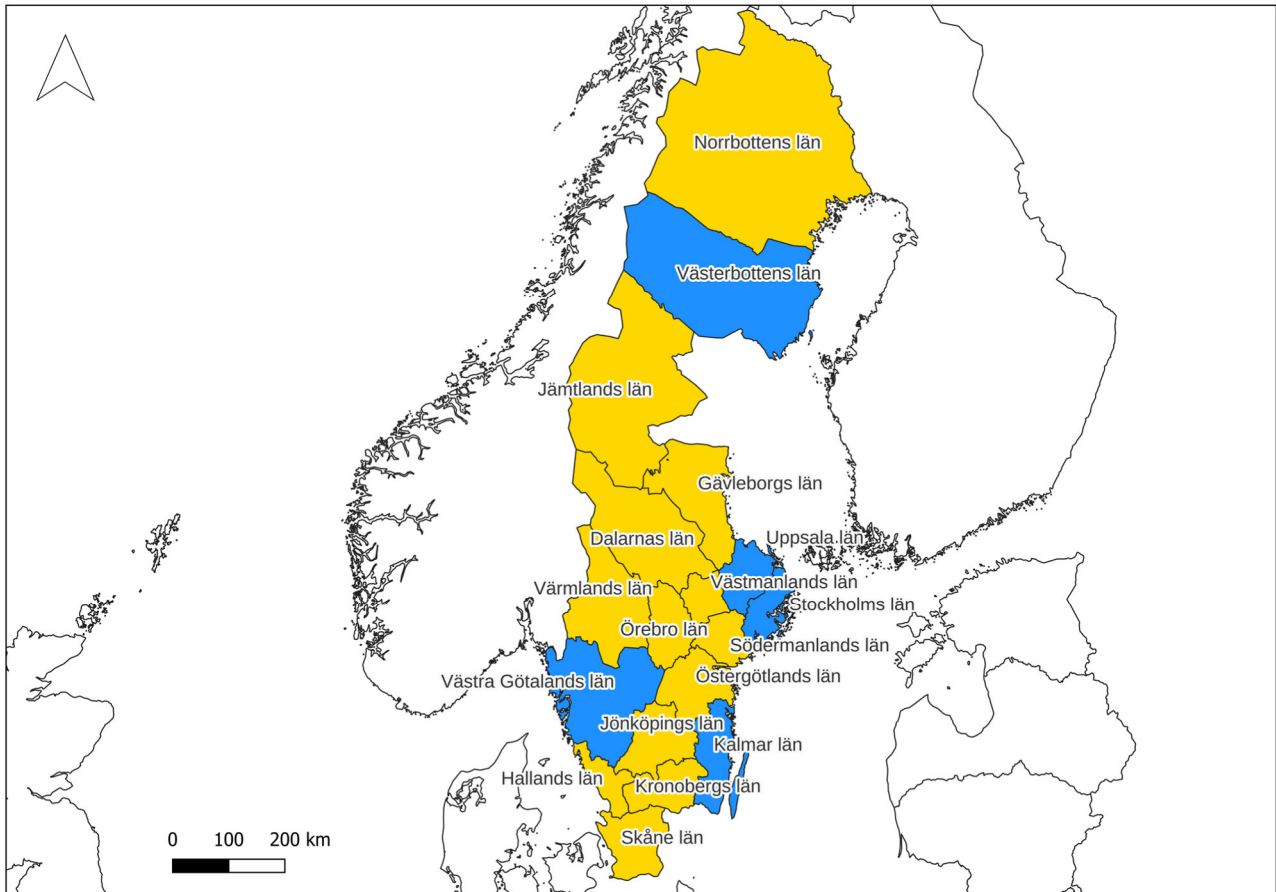


Figure 6. Trends in damages across Sweden, yellow increasing, blue decreasing trend. See EU LC Platform (2023) for more information<sup>14</sup>

**Overall national trend: fairly stable with fluctuations**

**Management response**

**Compensation**

The Swedish Environmental Protection Agency provides a budget to the counties for compensations for large carnivore damages based on the number of large carnivores present. Each injured or killed domestic animal has to be examined by the County Administrative Board through a commissioned

<sup>13</sup> Pekkarinen et al. (2020), Predation costs and compensations in reindeer husbandry. <https://doi.org/10.2981/wlb.00684>

<sup>14</sup> EU Platform on Coexistence Between People and Large Carnivores (2023) Livestock depredation and large carnivores in Europe: Overview for the EU Platform: [https://environment.ec.europa.eu/topics/nature-and-biodiversity/habitats-directive/large-carnivores/eu-large-carnivore-platform/national-large-carnivore-management\\_en](https://environment.ec.europa.eu/topics/nature-and-biodiversity/habitats-directive/large-carnivores/eu-large-carnivore-platform/national-large-carnivore-management_en)



inspector and compensation is provided by the Board when preventive measures have been taken. There is some flexibility for the board to decide what counts as protective measures (see example below) The same budget received for compensations is also intended for preventive measures, education of the inspectors and public education<sup>15</sup>. In 2022, county administrative boards (CABs) provided a total compensation for livestock damage of SEK 2.7 million (around 236,000 €). Of this, SEK 502,500 was paid for compensation for killed and injured dogs. As comparison, in 2022, SEK 8.6 million compensation was paid for damage by birds (cranes, swans, geese) to agricultural crops<sup>16</sup>.

For damages on reindeer, a territorial ex ante compensation system is used. Under this system, compensation is paid before damage has occurred, based on the size of large carnivore populations and the predation pressure in a given area. This means that damage to reindeer does not have to be proven, as is the case in Finland or Norway, which apply a different compensation system. In Sweden, compensation has been paid for approximately 50,000 killed reindeer annually<sup>17</sup>. Compensations are paid by the state to reindeer herding cooperatives, so called Sami villages, which can decide how to use and manage the money within the village<sup>18</sup>.

## Protection

In 2022, grants with a total of SEK 13,9 million (1.2m €) were distributed for measures aimed at preventing damage by large carnivores to livestock. Of these, SEK 10,9 million for installation of predator-repellent fences and SEK 3 million for the restoration of already existing fences<sup>19</sup>. Regarding dogs, SEK 1 million were granted for damage prevention measures usually in form of vests that are designed to protect the dogs from serious injuries<sup>16</sup>.

Prevention measures are currently funded entirely through national and regional financing. In previous funding periods, Sweden also included livestock protection measures in its rural development program. However, this was not continued in the current funding period.

## Culling and hunting

The legal hunting of large carnivores is restricted, due to the critical conservation status of some species and due to international legislation. Once every fifth year, the Swedish EPA decides on minimum levels for the population sizes of the large carnivores, which are needed for the species to have a favorable conservation status. The national minimum level for a species is then distributed amongst counties as regional minimum levels. The share which each county must take care of is determined by the current size of the population within the county, as well as on negotiations between the counties in a given management region, and between management regions<sup>20</sup>.

There is a hunting season for bears in autumn (August-October), for wolves in late winter (January-February) and for lynx in spring (March-April), i.e., license hunting. Also, in Jämtland county, the first

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<sup>15</sup> Levin (2000) Education of Wildlife Damage Inspectors in Sweden.

[https://www.protectiondestroupeaux.ch/fileadmin/doc/International/CDP\\_and\\_General\\_Infos/CDPNews1\\_March\\_2000.pdf](https://www.protectiondestroupeaux.ch/fileadmin/doc/International/CDP_and_General_Infos/CDPNews1_March_2000.pdf)

<sup>16</sup> Frank et al. (2023), Viltskadestatistik 2022. <https://www.slu.se/globalassets/ew/org/centrb/vsc/vsc-dokument/vsc-publikationer/rapporter/viltskadestatistikrapporter/viltskadestatistik-2022.pdf>

<sup>17</sup> Pekkarinen et al. (2020), Predation costs and compensations in reindeer husbandry. <https://doi.org/10.2981/wlb.00684>

<sup>18</sup> Zabel & Holm-Müller (2008). Conservation Performance Payments for Carnivore Conservation in Sweden.

<https://www.jstor.org/stable/20183378>

<sup>19</sup> Frank et al. (2023), Viltskadestatistik 2022. <https://www.slu.se/globalassets/ew/org/centrb/vsc/vsc-dokument/vsc-publikationer/rapporter/viltskadestatistikrapporter/viltskadestatistik-2022.pdf>

<sup>20</sup> Naturvårdsverket (2023), Vägledning om översyn av miniminivåer för björn, varg, järv och lodjur 2023. – Report from the Swedish EPA

license hunting of wolverines has been conducted in early winter (October-December). Hunting quotas are set by the county administrations, based on minimum population levels set by the Swedish Environmental Protection Agency and population targets in regional management plans. In January 2023, the Swedish government approved the biggest wolf cull in modern times removing 75 wolves despite major protest from members of the scientific community and nature conservation organizations<sup>21</sup>.

County administrations also have the possibility to give permits for the killing of bears, wolves, lynx and wolverines, if individuals cause severe problems, i.e., protective hunting. This must be justified by the county administration demonstrating a lack of alternatives. The minimum requirements for allowing protective hunting are currently a topic of controversial discussion in Sweden. The Swedish Environmental Protection Agency can issue permits to kill problematic Golden eagles, but no permits have been issued so far.

Furthermore, the current hunting legislation gives the owner or keeper of an animal the right to kill approaching carnivores, to make it possible to protect dogs or livestock even without a prior written permit. The police can kill animals that threaten the health or life of people. Carnivores may even be killed in self-defence, if they attack people, or by reasons referring to animal welfare, if they are encountered sick or injured and a quick death is preferable to relieve an animal from its misery.

## Zoom in: Värmland

The county of Värmland is located in west-central Sweden, bordered by Norway to the west. Its landscape is rich in agricultural land and boreal forest production<sup>22</sup>. It has an area of approximately 17,586 km<sup>2</sup> and over 10,000 lakes. Around 67.78% of the county's land are covered in forests<sup>23</sup>. Around 90% of the forests, in total 14,450 km<sup>2</sup>, are commercial forests and 1160 km<sup>2</sup> are semi-natural forests<sup>24</sup>. 1047.98 km<sup>2</sup> of Värmland consist of arable land and 75.5 km<sup>2</sup> of fallow land. 306.4 km<sup>2</sup> of the land are used for cereal production, 592.1 km<sup>2</sup> for hay and grazing, 13.4 km<sup>2</sup> for legumes and 26.9 km<sup>2</sup> for green fodder. The pasture area comprises 71.8 km<sup>2</sup>, hay meadows cover 2.5 km<sup>2</sup>, forest grazing spans 0.42 km<sup>2</sup>, and mountain pastures extend over 0.63 km<sup>2</sup><sup>25</sup>. In total, 12,920 sheep are kept in Värmland and 48,528 cattle are kept in 622 holdings<sup>26</sup>. Värmland belongs to the central large carnivore management region, together with seven other counties<sup>27</sup>.

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<sup>21</sup> Laikre et al. (2022), Planned cull endangers Swedish wolf population. <https://doi.org/10.1126/science.add5299>

<sup>22</sup> Flykt et al. (2022), "Landscape of Stress" for Sheep Owners in the Swedish Wolf Region.

<https://doi.org/10.3389/fevo.2022.783035>

<sup>23</sup> Global forest watch (2022).

<https://www.globalforestwatch.org/dashboards/country/SWE/17/?location=WyJjb3VudHJ5IiwU1dFliwiMTciXQ%3D%3D>

<sup>24</sup> Sveriges Lantbruksuniversitet (2023). Forest statistics 2023.

[https://www.slu.se/globalassets/ew/org/centrb/rt/dokument/skogsdata/skogsdata\\_2023\\_webb.pdf](https://www.slu.se/globalassets/ew/org/centrb/rt/dokument/skogsdata/skogsdata_2023_webb.pdf)

<sup>25</sup> Statens Jordbruksverk (2021). Jordbruksmarkens användning 2020.

[https://www.scb.se/contentassets/2e011f0876324b1a918c1e70b5ef088a/jo0104\\_2020a01\\_sm\\_jo10sm2001.pdf](https://www.scb.se/contentassets/2e011f0876324b1a918c1e70b5ef088a/jo0104_2020a01_sm_jo10sm2001.pdf)

<sup>26</sup> The Swedish Board of Agriculture (2023), Compilation of agricultural statistics 2023. <https://jordbruksverket.se/om-jordbruksverket/jordbruksverkets-officiella-statistik/jordbruksverkets-statistikrapporter/statistik/2023-08-10-jordbruksstatistik---sammanstallning-2023#h-Kapitel15Industriproduktion>

<sup>27</sup> Dalerum et al. (2020), Relationships Between Livestock Damages and Large Carnivore Densities in Sweden.

<https://doi.org/10.3389/fevo.2019.00507>



Figure 7. Värmland, county of water bodies © Wilde



Figure 8. Värmland under snow © Wilde

### **Large carnivores present**

Wolves, lynx and bears are all present in Värmland and it is the county with the highest wolf density in Sweden<sup>28</sup>.

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<sup>28</sup> Svensson et al. (2023), Inventering av varg vintern. 2022-2023 <https://hdl.handle.net/11250/3068933>



Wolf estimate = 13 families and 3 territorial pairs (2022/2023)<sup>29</sup>

Lynx estimate = 10 families (2022/2023)<sup>30</sup>

Wolverine estimate = 1 reproduction (2022)<sup>31</sup>

Bear estimate = 15-20 individuals in autumn 2022<sup>32</sup>

## Damages

In 2022, livestock damages in Värmland were very low. In fact, according to the livestock damage statistics, there was only one cow killed by wolves and no reported damages of livestock by bear, wolverine or lynx. Seven dogs were killed or injured in 2022, one was killed by lynx, three by wolves and a further three dogs were injured by wolves<sup>33</sup>. The number of livestock damages in Värmland has fallen considerably in recent years. From 1999 to 2018, Värmland was the county with the highest number of damages to sheep (wolf: 500-750; lynx 300-400; bear (10-0)); cattle (wolf:25-30; lynx: 2-3) and dogs (wolf: 100-150; lynx: 35-55; bear: 5-10)<sup>34</sup>.

## Protection

In 2022, Värmland administrative boards granted SEK 1,1 million for damage prevention measures. Of these, SEK 806,000 were to install predator-repellent fences and SEK 321,000 for restoration of already existing fences. Additionally, 34 grants for damage preventions measures for dogs totaling SEK 65,000 were provided<sup>35</sup>.



Figure 9. Protective fence © Langöen

<sup>29</sup> Svensson et al. (2023), Inventering av varg vintern. 2022-2023 <https://hdl.handle.net/11250/3068933>

<sup>30</sup> Frank & Tovmo (2023), Inventering av lodjur 2023. <https://hdl.handle.net/11250/3071522>

<sup>31</sup> Mattisson et al. (2022), Bestandsövervakning av jerv i 2022. <https://hdl.handle.net/11250/3026507>

<sup>32</sup> Åsbrink et al. (2023), Resultat från inventering av brunbjörn i Dalarnas, Gävleborgs och Värmlands län 2022. Rapport från Naturhistoriska riksmuseet, 2023:2, Naturhistoriska riksmuseets småskriftserie.

<sup>33</sup> Frank et al. (2023), Viltskadestatistik 2022. <https://www.slu.se/globalassets/ew/org/centrb/vsc/vsc-dokument/vsc-publikationer/rapporter/viltskadestatistikrapporter/viltskadestatistik-2022.pdf>

<sup>34</sup> Dalerum et al. (2020), Relationships Between Livestock Damages and Large Carnivore Densities in Sweden. <https://doi.org/10.3389/fevo.2019.00507>

<sup>35</sup> Frank et al. (2023), Viltskadestatistik 2022. <https://www.slu.se/globalassets/ew/org/centrb/vsc/vsc-dokument/vsc-publikationer/rapporter/viltskadestatistikrapporter/viltskadestatistik-2022.pdf>

## Compensation

In Sweden, the regional country boards are responsible for managing the compensation system and checking that damages are caused by large carnivores. In counties where wolves have been present for longer, such as Värmland, inspectors are regular members of the county board team with a range of responsibilities. There is a hotline for calling an inspector in the case of an incident. Recently it has been decided to make the hotline only available during working hours (to normalise small damage incidents). In the case of serious damages, the county can be contacted through other emergency lines.

Inspectors across Sweden receive training at the Wildlife Damage Centre<sup>36</sup>. For new employees a three-day training is proposed. Regular training updates are also held. Training involves learning to inspect animal carcasses and recognising the different types of damage. In general, a trained inspector can recognise damages in this way but DNA testing may be carried out in the case of uncertainty or if a case is contested by the claimant.

There is also a strong social aspect to damage inspection. Inspectors are the first point of call for livestock breeders who may be very upset, especially in the case of a first incident. They need to balance an appropriate, sympathetic reaction with a thorough inspection to ascertain the real cause of livestock death. As representatives of the County Board, they have a role to play in showing that the administration is sympathetic to breeders and available to listen to them.

Compensation is received if the death is caused by large carnivores but not, for example if dogs have caused the damage. Compensation should only be given in the case that appropriate protection measures are in place. There is some flexibility for the regions to interpret “appropriate” according to the land area and risk. Generally, in the case of a first attack, compensation would be given even if stock is not appropriately protected. At the same time, measures to best protect the flock against future damage would be discussed. In the case of future attacks, the inspection would check whether advice had been taken. Well-installed fencing with no specific inroads (e.g. gaps over water) would be considered an appropriate protection measure. It does not have to be electric fencing or specially funded wolf fencing.

## Hunting and Culling

Between 2010-2023, the following number of carnivores were killed through licenced hunting in Värmland: Bear 29; wolf 106; lynx 25<sup>37</sup>.

## Communication and collaboration measures

As part of a *'Regional Platforms on People and Large Carnivores'* project initiated by the European institutions, a Swedish dialogue platform process on large carnivores was established. The primary objective of this larger project is to establish regional platforms that address conflicts between humans and large carnivores. Given the preexistence of national and regional platforms in Sweden focusing on this issue, this dialogue platform was created with the intent of enhancing real exchange within these established platforms.

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<sup>36</sup> Wildlife Damage Centre (VSV) (2022) <https://www.slu.se/en/Collaborative-Centres-and-Projects/wildlife-damage-centre/>  
[https://www.lfl.bayern.de/mam/cms07/itz/bilder/fittosize\\_600\\_0\\_c8733324f1af178c6f8cd791d4ea0bc8\\_herdenschutz\\_grundschutz\\_bild2a\\_gehegeelektrifizierung.jpg](https://www.lfl.bayern.de/mam/cms07/itz/bilder/fittosize_600_0_c8733324f1af178c6f8cd791d4ea0bc8_herdenschutz_grundschutz_bild2a_gehegeelektrifizierung.jpg)

<sup>37</sup> According to information from the Scandinavian large carnivore database Rovbase, extracted on 2023-12-11.

First dialogues started on a national level, involving representatives from key national stakeholder organizations, and then expanded to both regional and national levels, involving governors and officials representing counties and the Swedish Environmental Protection Agency leadership. They focused on the interpretation and implementation of “protective hunting” legislation and the revision of the national management plan for large carnivores. Furthermore, it was decided to test local dialogues, in Värmland focusing on livestock protection, and in the Mullsjö area, focusing on a newly established wolf territory.

The dialogue in Värmland was attended by county officials, the governor and various stakeholders from the fields of agriculture, livestock breeding, tourism and nature conservation. The first meeting was constructive and several issues related to the authorities were addressed, including mistrust and contempt towards authorities and politicians and anxiety regarding large carnivores. Additionally, the role of traditional and social media was discussed, addressing their impact on conflict escalation<sup>38</sup>.

## Zoom in: Västerbotten



*Figure 10 Upland Västerbotten © Schneider*

Västerbotten is the second largest (55 000 km<sup>2</sup>) and second most northerly of Sweden’s counties, covering about 14 % of the country’s area. The County stretches from the coast of the Bothnian Bay in the East up to almost 1800 m above sea level in the mountain range near the Norwegian border

<sup>38</sup> <https://circabc.europa.eu/ui/group/3f466d71-92a7-49eb-9c63-6cb0fadf29dc/library/7dee4351-88f1-4a58-8de8-9d834bd447f2/details>



in the West. The climate varies considerably between different parts of Västerbotten, but generally is characterized by cold winters with heavy snow. More than 50 % of the County is covered by forest, which is intensively used by large-scale forestry. Mountains, mires and water bodies cover another 45 %, while agricultural land is rare and mostly confined to the coastal plains and river valleys.



*Figure 11. Forest and pasture Västerbotten © Schneider*

About 66,772 ha of Västerbotten's land area consist of arable land and 8,435 ha of the land are used for cereal production, 2,254 ha for hay and grazing, 321 ha for potatoes and other crops and 48,280 ha for green fodder. Pastures cover an area of 1,551 ha, hay meadows 197 ha, forest grazing 326 ha, and mountain pastures 182 ha. Fallow land covers 8,714 ha.

In total, 8,798 sheep and 34,753 cattle are kept in Västerbotten in 188 and 380 holdings, respectively (2022)<sup>39</sup>. Västerbotten belongs to the northern large carnivore management region, together with three other counties<sup>40</sup>.

Most of Västerbotten's 276,000 inhabitants live along the coast in the East, where the biggest cities are located. Human population density decreases steadily from the East to the West, with few inhabitants in the forested inland areas and especially so in the mountain range.

<sup>39</sup> The Swedish Board of Agriculture (2023), <https://statistik.sjv.se/PXWeb/pxweb/sv/Jordbruksverkets%20statistikdatabas/>

<sup>40</sup> Dalerum et al. (2020), Relationships Between Livestock Damages and Large Carnivore Densities in Sweden. <https://doi.org/10.3389/fevo.2019.00507>



## Large carnivores present

Wolves, lynx, wolverines and bears are all present in Västerbotten. The Golden eagle is another carnivorous species that is part of the management system<sup>41</sup>.

Wolf estimate = 0 families and territorial pairs (2022/2023). At present, the wolf population in Västerbotten consists of a variable but low number of dispersing individuals, originating in the Scandinavian population in central Sweden and southern Norway, or, exceptionally, having immigrated from the Finnish-Russian population. These lone animals are most often not stationary and can emerge anywhere in the county at any time. During recent years, up to four individuals have been known to be present in the county simultaneously. Due to the problems which reindeer herders experience with some wolves, the wolf population is not supposed to increase in the near future in northern Sweden.

Lynx estimate = 18.5 families (2022/2023)<sup>42</sup> During the lynx survey in 2023, 18,5 family groups (i.e., females with young from the previous year) were found, which had at least parts of their home range in the county. Population size is currently within the limits set for the species (14-32 reproductions per year). The distribution is uneven, with most animals occurring in the central and southern parts of Västerbotten's inland, while few dwell in the mountains and the coastal areas.

Wolverine estimate = 22 reproduction (2023)<sup>43</sup> During the wolverine survey in 2023, 22 dens of females with cubs were found in Västerbotten. Population size is currently around the lower limit set for the county (22-34 reproductions per year). The distribution is uneven, with most dens in the mountains in the West. However, the population in the forests has been increasing and dispersing in recent years. Historically, a reproducing wolverine population occurred in most of the county.

Bear estimate = about 350 individuals after hunting in autumn 2023 <sup>44</sup>. The brown bear is one of the most numerous of the large carnivores in Västerbotten. The latest bear dropping survey, conducted in 2019, revealed a population of about 450 animals. The annual rate of harvest has been over 15 % of the population in recent years and the number of bears has decreased according to plan to the set population goal (350 bears, limits 280-420 individuals). The distribution of bears is uneven, especially the females, which mostly occur in the southern and north-western parts of the County. Most males live in the central parts of Västerbotten, while densities are low in the mountains and in the coastal areas.

Golden eagle estimate = 88 occupied territories, 29 of the pairs breeding successfully in 2023. Corresponding figures for 2022 were 107 occupied territories and 60 successful broods. The golden eagle is common in the central parts of the county and breeds both in the mountains and the forested inland. No breeding pairs are known from areas close to the coast, and the reason for this absence of the species remains uncertain. On average, 90 territories are occupied by golden eagles each year and 40 pairs breed successfully. The size of the known population is currently below the estimated carrying capacity for the species (200 pairs), and breeding success is relatively low.

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<sup>41</sup> Schneider, M. (2017), Managing large carnivores in Västerbotten County. – Report from the Västerbotten County Administration

<sup>42</sup> Frank & Tovmo (2023), Inventering av lodjur 2023. <https://hdl.handle.net/11250/3071522>

<sup>43</sup> Höglund & Tovmo, (2023), Inventering av järv 2023. - Beståndstatus för stora rovdjur i Skandinavien. 3-2023.

<sup>44</sup> Sköld & Åsbrink (2023), Björnpopulationens storlek och utbredning i Sverige 2022. - Rapport från Naturhistoriska Riksmuseet

## Damages

In Västerbotten, most cattle farms, sheep farms and horses can be found in the coastal areas of the county. Depredation on and damage to livestock by predators can be considerable in certain places and at certain times, but are generally not a big problem in the county.

In 2022, livestock damages in Västerbotten were low, as usual. According to the livestock damage statistics, there were only one sheep killed and two injured by wolves, five beehives were destroyed by bears, and no damages to livestock were reported for wolverine or lynx. Four dogs were injured in 2022, one by lynx, one by bear and two by eagles<sup>45</sup>. The number of livestock damages in Västerbotten tends to be rather low, with a few sheep, dogs and beehives attacked per year<sup>46</sup>.

The entire county is situated within the area of reindeer husbandry in Sweden. Wild reindeer were extirpated in Sweden in the 19<sup>th</sup> century and all reindeer are semi-domestic and owned and managed by Sami reindeer herders. The Swedish reindeer population has a size of about 240,000 animals during the winter<sup>47</sup>. All five species of large carnivore prey on reindeer, but especially lynx and wolverine. There is a system to compensate the herders for losses inflicted by carnivores.

Some 50,000 semi-domestic reindeer roam Västerbotten, owned by 330 reindeer herders, and all large carnivores prey upon reindeer to some extent. Most of the reindeer that are killed by predators in Västerbotten are taken by wolverines and lynxes. Wolves may kill reindeer as well, but the biggest problem with wolves is that they can disturb reindeer herds and scatter the animals. Brown bears can inflict rather big losses in the calving grounds of reindeer in spring. Golden eagles are a minor problem, but some individuals may specialise on reindeer calves. Reindeer are among the favourite food for all five predator species in the county at least during a part of the year, and the resulting conflict between reindeer owners and predators has previously resulted in heavily diminished predator populations.<sup>48</sup>

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<sup>45</sup> Frank et al. (2023), Viltskadestatistik 2022. <https://www.slu.se/globalassets/ew/org/centrb/vsc/vsc-dokument/vsc-publikationer/rapporter/viltskadestatistikrapporter/viltskadestatistik-2022.pdf>

<sup>46</sup> Dalerum et al. (2020), Relationships Between Livestock Damages and Large Carnivore Densities in Sweden. <https://doi.org/10.3389/fevo.2019.00507>

<sup>47</sup> Sametinget (2023), Årsredovisning 2022. – Report from the Sami Parliament.

<sup>48</sup> Schneider, M. (2017), Managing large carnivores in Västerbotten County. – Report from the Västerbotten County Administration



Figure 12. Reindeer © Schneider

## Compensation

In Västerbotten as in Värmland, the regional county board is responsible for managing the compensation system and checking that reported damages really have been caused by large carnivores. The inspectors who do that are regular members of the wildlife management team at the county board and work as rangers, mostly in the field.

Relatively few depredation events on dogs and livestock occur in northern Sweden. Animals that have been killed or injured or that have disappeared during a carnivore attack are compensated for financially by the state. Appropriate protection measures should be in place in order to receive compensation (fencing against wolves and to protect beehives against bears).

Reindeer are an important prey for many of the carnivores in northern Sweden. As it is hard to find remnants of dead reindeer, Sweden introduced a compensation system where reindeer herding cooperatives, so-called Sami villages, are compensated according to the numbers of carnivores present. Instead of reindeer herders having to find carcasses, county administrations must find carnivores and report numbers to the Sami parliament, which decides on compensation payments to Sami villages. During recent years, compensation payments have summed up to SEK 50-60 million annually in Sweden. In 2022, compensation payments from the Sami parliament to reindeer herders in Västerbotten amounted to about SEK 9.5 million.

Furthermore, the Sami Parliament pays SEK 15 000 per hunt to reindeer herding cooperatives as compensation for their efforts while conducting protective hunts that have been granted by the County Board.

## Protection

In 2022, the County board of Västerbotten did not grant any money for damage prevention measures regarding livestock or dogs, because no applications for such grants were submitted.<sup>49</sup> Prevention measures for reindeer are difficult to apply, due to the large areas over which reindeer herds roam and the large number of reindeer in each herd. Possible solutions that are discussed include increased guarding of the herd, fencing the reindeer, feeding the herd to keep it gathered in one place and make it easier to survey, moving the herd to an area without carnivores, and scaring away carnivores from the herd. Radio transmitters on reindeer can show when parts of scattered herds behave unusually due to carnivore attacks, so that herders can move to attack sites and intervene. However, all these measures are expensive, and the Sami Parliament is reluctant to finance them. According to the Sami Parliament, the preferred measure against large carnivore predation is to shoot the carnivores.

In the above-mentioned process of negotiation on distribution of minimum numbers of large carnivores between the counties, the northern counties aim to move the responsibility for more and more carnivores to the central and southern management areas. In this way, the predation pressure on reindeer is decreasing over time.

## Culling and hunting

The populations of large carnivores in northern Sweden are regulated by both internal and external factors. Food availability seems to govern much of the population dynamics of lynx, wolverine and golden eagle. Eagles are also sensitive to weather conditions during the breeding season. Bears and wolverines kill conspecifics to some extent. Illegal killing of carnivores occurs and seems to be widespread in some areas and during certain periods of the year<sup>50</sup>. Legal hunting is restricted due to the conservation status of large carnivore species (see above)

Many carnivores are killed to keep populations relatively low in counties with reindeer husbandry. Table 1 summarizes the numbers of large carnivores killed during license hunting and protective hunting during the last 14 years (2010-2023) in Värmland and Västerbotten counties. There are pronounced differences, but these do not only depend on reindeer husbandry, but also on the size of the populations in the two counties, and the area - Västerbotten is about three times the size of Värmland.

*Table 1. Large carnivores shot during license hunting and protective hunting in Värmland and Västerbotten counties during 2010-2023<sup>51</sup>*

	Värmland	Västerbotten
Bear	29	654
Wolf	106	6
Wolverine	0	40
Lynx	25	150

<sup>49</sup> Frank et al. (2023), Viltskadestatistik 2022. <https://www.slu.se/globalassets/ew/org/centrb/vsc/vsc-dokument/vsc-publikationer/rapporter/viltskadestatistikrapporter/viltskadestatistik-2022.pdf>

<sup>50</sup> Schneider, M. (2017), Managing large carnivores in Västerbotten County. – Report from the Västerbotten County Administration

<sup>51</sup> According to information from the Scandinavian large carnivore database Rovbase, extracted on 2023-12-11.

## Communication and collaboration measures

Västerbotten has not been an active part in any large carnivore platform. Communication and collaboration are nevertheless important aspects of the regional management system. Västerbotten has, like all counties in Sweden, chosen an approach that includes practical local involvement of stakeholders, decision-making at a regional scale, and an adaptive management strategy, where policies, objectives and management measures are evaluated regularly, and adjustments are made if necessary. Local people are closely involved in the practical management of carnivores, including survey and monitoring as well as hunting and the removal of problem animals. Stakeholders are more formally represented through the Delegation for Game Management.

In Västerbotten, a regional predator council, the predecessors of today's delegation, has been very active while regional management plans for the carnivores were developed. Regional management plans have been produced to meet the different requirements and varying circumstances of carnivore populations and management problems in different parts of the heterogeneous country which Sweden is.<sup>52</sup>

Wildlife managers in Västerbotten communicate with reindeer herders, journalists, and the public daily. They cooperate with researchers from Scandinavia and Finland and teach courses and meet students at the two universities in Västerbotten. They keep themselves updated through local, regional, national, and international contacts and involvements.

One of the most important fields of work is the management of large carnivores with respect to damages that occur within reindeer husbandry. *Förvaltningsverktyget*, "The management tool", is a framework for that work at the interface between large carnivores, reindeer, and reindeer herders<sup>53</sup>. The tool consists of five different parts: yearly meetings between the county administration and every reindeer herding cooperative, a written plan for a constructive co-existence of reindeer husbandry and carnivores for each cooperative, a yearly list of focus areas and measures to be taken, an Internet portal that helps herders to quantify the losses of reindeer to carnivores, and the production of updated figures regarding the losses which the cooperative suffers.

Identification of the most relevant measures and an optimal distribution of hunting quotas in space and time, however is complicated by the fact that most of the reindeer herding cooperatives in Sweden do not deliver the information on total yearly losses, which the county administrations need for their work. Until now, the written plans for the cooperatives are mostly a description of how reindeer husbandry is done in the different areas and a compilation of problematic areas, not so much a vision for a beneficial coexistence. This impedes forward-looking management and focuses debate between managers and herders around ever increasing demands for killing predators. Reindeer herders' unwillingness to submit data is due to the perception that support has stagnated while multiple external pressures on the reindeer herding area mean that the impact of depredation comes on top of many other stresses from infrastructure developments<sup>54</sup>.

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<sup>52</sup> Schneider, M. (2017). Managing large carnivores in Västerbotten County. – Report from the Västerbotten County Administration

<sup>53</sup> Sametinget & Naturvårdsverket (2013), Förvaltningsverktyg för förekomst av stora rovdjur baserat på en toleransnivå för rennäringen - Redovisning av ett regeringsuppdrag. – Rapport 6555, Naturvårdsverket.

<sup>54</sup> Kløcker et al. (2016), Kumulativa effekter av exploateringar på renskötseln – vad behöver göras inom tillståndprocesser. – Rapport 6722, Naturvårdsverket.





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