Status, management and distribution of large carnivores

– bear, lynx, wolf & wolverine –

in Europe

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- Part 1-

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Status, management and distribution of large carnivores – bear, lynx, wolf & wolverine – in Europe

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Part 1:

I. General introduction

Large carnivores (bears *Ursus arctos*, wolves *Canis lupus*, lynx *Lynx lynx* and wolverines *Gulo gulo*) are among the most challenging group of species to maintain as large and continuous populations or to reintegrate back into the European landscape. Political, socioeconomic and society changes challenge past management approaches in some of the large populations. At the same time local improvements in habitat quality, the return of their prey species, public support and favourable legislation allow for the recovery of some small populations. Several of Europe's large carnivore populations are large and robust, others are expanding, some small populations remain critically endangered and a few are declining.

Large carnivores need very large areas and their conservation needs to be planned on very wide spatial scales that will often span many intra- and inter-national borders. Within these large scales conservation and management actions need to be coordinated. To facilitate coordination, a common understanding of the present day conservation status of large carnivores at national and population level is an important basis.

The aim of this summary report is to provide an expert based update of the conservation status of all populations identified by the Large Carnivore Initiative for Europe (LCIE), available in the document "Guidelines for Population Level Management Plans for Large Carnivores" (Linnell et al. 2008) and/or in the various Species Online Information Systems (http://www.kora.ch/sp-ois/; also see Appendix 1).

However, methods used to monitor large carnivores vary and a direct comparison over time or among populations will never be possible at a continental scale. It is more realistic to have an insight into the general order of magnitude of the population, its trend and permanent range as the "currencies" for comparisons and assessments (see point 2). This summary also does not aim to replace the habitat directive reporting, but rather complement it. Discrepancies will likely occur due to different time periods covered and different agreements reached on common reporting criteria on a national level which has to deal with many more species. Furthermore, for several countries the most recent data or distribution map were not always available, yet.

Changes in monitoring methods likely result in changing population estimates, even in stable populations. Improved and more costly methods may suddenly discover that previous estimates were too high, or may detect more individuals than previously assumed. Examples of both occur. Being aware of the change in methodology the expert assessment may still be "stable" for the population even if numbers listed in tables have changed. On the other hand, large scale "official" (government) estimates may be based on questionable or non-transparent extrapolations that run contrary to data from reference areas within the country or similar regions from other countries. If the discrepancy is apparent, expert assessment needs to question official numbers.

This summary does not aim at reviewing monitoring techniques. Examples of parameters and principles for monitoring large carnivores and some "good practice" examples have been previously compiled by the LCIE (http://www.lcie.org/Docs/LCIE%20IUCN/LCIE_PSS_monitoring.pdf). Furthermore, references at the end of many country reports do provide ample examples of well documented and state of the art monitoring of large carnivores in Europe under a wide variety of different contexts.

II. Methods

1. Collection of information

1.1. European Species Summaries

In order to collect standardized information on the status and management of large carnivores a questionnaire was designed and mailed to all members of the LCIE and some other key experts in 2012. They were asked to either fill in the questionnaire themselves or ask colleagues to do so. The questionnaire had 8 sections focusing on (see Appendix 3):

1. Abundance
2. Range
3. Management & harvest
4. Livestock depredation & compensation system
5. Threat to survival
6. Conservation measures
7. Issues of particular interest
8. Ongoing or recently terminated conservation / research project

In total we received back 76 questionnaires (Table 1). Some additional material was compiled from recent reports or publications and/or by contacting national LC experts via e-mail or telephone.

Based on these questionnaires we compiled a Europe wide overview of the situation of lynx, bear, wolf and wolverine in Europe – trying to compile information on the level of populations outlined by Linnell et al. (2008) – as much as possible. Data from the questionnaires was cross-checked with the Country Species Reports (October 2012) and updated in case new or more detailed data had come forth in the time since the questionnaire survey (February 2012). It is important to note that in general we were not able to locate new updated information of suitable quality from Russia, Belarus or Ukraine, so in most these cases these countries have been left out of the tables although they were included in the Linnell et al. (2008) assessment.

Table 1: Questionnaires returned for update of status and management of large carnivores in Europe.

Country	Questionnaires available				Compiled by
	Bear	Lynx	Wolf	Wolverine	
Albania	x	x	x	NA	Aleksandër Trajçe, Bledi Hoxha, Kujtim Mersini, Ferdinand Bego
Austria	*no info*	x	*no info*	NA	Thomas Engleder (lynx - Bohemia)
Bosnia-Herzegovina	x	x	x	NA	Sasa Kunovac
Bulgaria	x	x	x	NA	Diana Zlatanova (bear, lynx), Alexander Dutsov (bear), Elena Tzingarska-Sedefcheva (wolf)
Croatia	x	x	x	NA	Josip Kusak & Jasna Jeremić (wolf), Djuro Huber (bear, wolf, lynx)
Czech Republic	NA	x	x	NA	Miroslav Kutal & Martin Váňa (wolf), Ludek Bufka (lynx)
Estonia	x	x	x	NA	Peep Mannil, Rauno Veeroja

Finland	x	x	x	x	Katja Holmala (lynx, bear), Ilpo Kojola (lynx, bear, wolf, wolverine)
France	x	x	x	NA	Eric Marboutin (lynx, wolf), Pierre-Yves Quenette (bear)
Germany	NA	*no info*	x	NA	Ole Anders (lynx - Harz), Ilka Reinhardt (wolf)
Greece	x	NA	x	NA	Yorgos Mertzanis (bear), Yorgos Iliopoulos (wolf)
Hungary	NA	x	NA	NA	Miklós Heltai and Peter Bedo
Italy - Appenine	x	NA	x	NA	Paulo Ciucci (bears), Luigi Boitani (wolves)
Italy - Alps	x	*no info*	x	NA	Claudio Groff (Trentino bears), Francesca Marucco (wolves)
Kosovo*	*no info*	*no info*	*no info*	NA	
Latvia	x	x	x	NA	Janis Ozolins
Lithuania	NA	x	x	NA	Linas Balciauskas
"The Former Yugoslav Republic of Macedonia"	x	x	x	NA	Gjorge Ivanov (bear), Dimce Melovski (bear, lynx), Aleksandar Stojanov (bear, wolf)
Montenegro	*no info*	*no info*	*no info*	NA	
Norway	x	x	x	x	Jon Swenson (bear), John Linnell & Henrik Brøseth (lynx, wolf, wolverine)
Portugal	NA	NA	x	NA	Francisco Álvares
Poland - W	NA	NA	x	NA	Sabina Nowak, Robert W. Mysłajek
Poland - Baltic	NA	x	x	NA	Sabina Nowak, Robert W. Mysłajek
Poland - Carpathian	x	x	x	NA	Sabina Nowak, Robert W. Mysłajek
Romania	x	x	x	NA	Ovidio Ionescu
Serbia - E	x	x	x	NA	Milan Paunovic
Serbia - W	x	NA	NA	NA	Milan Paunovic
Slovakia	x	x	x	NA	Robin Rigg (wolf, bear), Jakub Kubala (wolf, lynx)
Slovenia	x	x	x	NA	Miha Krofel & Klemen Jerina (bear), Ivan Kos & Hubert Potočnik (lynx), Aleksandra Majić-Skrbinšek & Tomaž Skrbinšek (wolf)
Spain-NW	x	NA	x	NA	Juan Carlos Blanco (wolf, bear), Guillermo Palomero (bear)
Spain-Sierra Morena	NA	NA	x	NA	Juan Carlos Blanco
Spain-Pyrenees	x	NA	NA	NA	Juan Carlos Blanco, Guillermo Palomero
Sweden	x	x	x	x	Guillaume Chapron (wolves), Jon Swenson (bears), Henrik Andrén (wolverine, lynx), Jens Persson (wolverine)
Switzerland	x	x	x	NA	Manuela von Arx
Total	**23**	**22**	**28**	**3**	

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

We assessed the threat to survival for each species via an adapted version of the standard IUCN threat list (see Appendix 3). The main modification was to add a section exploring areas of conflict, public acceptance and institutional capacity which does not exist in the standard version. We entered all data into IBM SPSS Statistics Version 19. In a first step we grouped the various threats into 19 main categories (Table 2). Although we had asked experts to rate threats as “moderately important” versus “very important”, many people used inconsistent rating symbols and we had to treat all selected threats equally. We could not use sums either, as the main threats encompassed different numbers of "sub-threats" and were not designed in a way that the selection of more “sub-threats” means a higher importance. Consequently, we checked only whether or not a threat under each main category was ticked off – if so the main threat was given the value “1 = was selected as a threat”. In a second step we derived the sums over all questionnaires for each species for the past, present and future. We also derived sums by population, however sample sizes are small and country reports may actually be more informative.

Table 2: Categorization of the threat list from the questionnaire.

Group	Threat code	Threat name	Variable
1	1.1.1.1	Habitat loss / Crop / Shifting agriculture	Habitat Loss (Agriculture), N=4
1	1.1.1.2	Habitat loss / Crop / Small holder farming	
1	1.1.1.3	Habitat loss / Crop / Agro-industry	
1	1.1.1.0	Habitat loss / Crop / General	
9	1.1.2.1	Habitat loss / Wood plantations / small-scale	Habitat Loss (Forestry), N=7
10	1.1.2.2	Habitat loss / Wood plantations / large-scale	
11	1.1.2.0	Habitat loss / Wood plantations / General	
28	1.3.3.1	Habitat loss / Extraction / Forestry / small scale subistence	
29	1.3.3.2	Habitat loss / Extraction / Forestry / selective logging	
30	1.3.3.3	Habitat loss / Extraction / Forestry / clear-cutting	
31	1.3.3.0	Habitat loss / Extraction / Forestry / general	
15	1.1.4.1	Habitat loss / livestock / Nomadic	Habitat Loss (Livestock), N=4
16	1.1.4.2	Habitat loss / livestock / small-holder	
17	1.1.4.3	Habitat loss / livestock / agro-industry	
18	1.1.4.0	Habitat loss / livestock / general	
12	1.1.3.1	Habitat loss / Non-timber plantations / small-scale	Habitat Loss (other), N=1
13	1.1.3.2	Habitat loss / Non-timber plantations / large-scale	
14	1.1.3.0	Habitat loss / General	
20	1.1.5.0	Habitat loss / Abandonment	
21	1.1.8.0	Habitat loss / Other	
23	1.2.1.0	Habitat loss / Abandonment of non-agricultural areas	
24	1.2.2.0	Habitat loss / Change of management of non-agricultural areas	
25	1.2.3.0	Habitat loss / Management of non-agricultural areas / General	
32	1.3.4.0	Habitat loss / Extraction / Non-woody vegetation	
46	1.6.0.0	Habitat loss / change in species dynamics	
47	1.7.0.0	Habitat loss / fire	
27	1.3.1.0	Habitat loss / Extraction / mining	Habitat Loss (Mining), N=1
35	1.4.1.0	Habitat loss / Infrastructure / industry	Habitat Loss (Infrastructure), N=8
36	1.4.2.0	Habitat loss / Infrastructure / human settlement	
37	1.4.3.0	Habitat loss / Infrastructure / tourism - recreation	
38	1.4.4.0	Habitat loss / Infrastructure / transport - land	
40	1.4.6.0	Habitat loss / Infrastructure / dams	
41	1.4.7.0	Habitat loss / Infrastructure / telecommunication	
	1.4.8.0	Habitat loss / infrastructure / power lines	
43	1.4.9.0	Habitat loss / Infrastructure / wind power development	
50	2.1.0.0	Invasive alien species / competitors	Invasive alien species, N=4
51	2.2.0.0	Invasive alien species / predators	
52	2.3.0.0	Invasive alien species / hybridizers	
53	2.4.0.0	Invasive alien species / pathogens & parasites	
58	3.1.3.0	Harvesting / food / regional	Harvest, N=5
62	3.5.1.0	Harvesting / recreational / subsistence & local	
63	3.5.2.0	Harvesting / recreational / sub-national and nationa	
64	3.5.3.0	Harvesting / recreational / regional and international	
65	3.6.0.0	Harvesting / population regulation	
66	3.7.0.0	Harvesting / over harvesting of wild prey	Overharvesting of wild prey, N=1
67	4.1.2.1	Accidental mortality / trapping & snaring	Accidental mortality, N=4
68	4.1.2.2	Accidental mortality / shooting	
69	4.1.2.3	Accidental mortality / poison	
72	4.2.2.0	Accidental mortality / Vehicle collisions	
75	5.1.0.0	Persecution / Pest control	Persecution, N=3
76	5.2.0.0	Persecution / other	
77	5.3.0.0	Persecution / unknown	
78	6.1.1.0	Pollution / global warming	Pollution (incl. Chlimate change), N=6
84	6.2.1.0	Pollution / agricultural	
85	6.2.2.0	Pollution / domestic	
86	6.2.3.0	Pollution / comercial	
88	6.2.5.0	Pollution / light	
89	6.2.6.0	Pollution / other	
105	7.1.0.0	Natural diasters / drought	Natural disasters, N=4
106	7.2.0.0	Natural diasters / storms & flooding	
108	7.4.0.0	Natural diasters / fire	
110	7.6.0.0	Natural diasters / avalanche & landslides	
113	8.1.0.0	Change in native species / competitors	Change in native species, N=5
115	8.3.0.0	Change in native species / prey & food base	
116	8.4.0.0	Change in native species / hybridizers	
117	8.5.0.0	Change in native species / parasites & pathogens	
118	8.6.0.0	Change in native species / mutualisms	
121	9.1.0.0	Intrinsic factors / limited dispersal	Intrinsic factors, N=10
122	9.2.0.0	Intrinsic factors / poor recruitment or reproduction	
123	9.3.0.0	Intrinsic factors / high juvenile mortality	
124	9.4.0.0	Intrinsic factors / inbreeding	
125	9.5.0.0	Intrinsic factors / low densities	
126	9.6.0.0	Intrinsic factors / skewed sex ratios	
127	9.7.0.0	Intrinsic factors slow growth rates	
128	9.8.0.0	Intrinsic factors / population fluctuations	
129	9.9.0.0	Intrinsic factors / restricted range	
130	9.10.0.0	Intrinsic factors / other	
132	10.1.0.0	Disturbance / recreation & tourism	Disturbance, N=4
134	10.4.0.0	Disturbance / transport	
135	10.5.0.0	Disturbance / fire	
136	10.6.0.0	Disturbance / other	
138	11.1.1.0	Low acceptance due to conflicts with livestock	Low acceptance, N=7
139	11.1.2.0	Low acceptance due to conflicts with hunters	
140	11.1.3.0	Low acceptance due to overprotection / legal constraints on allowing harvest	
141	11.1.4.0	Low acceptance due to symbolic and wider social-economic issues	
142	11.1.5.0	Low acceptance as form of political opposition to national / European intervention	
143	11.1.6.0	Low acceptance due to fear for personal safety	
144	11.1.7.0	Low acceptance due to fundamental conflict of values about the species presence in modern landscapes	
145	11.2.1.0	Lack of knowledge about species numbers and trends	Lack of knowledge, N=3
146	11.2.2.0	Lack of knowledge about species ecology	
147	11.2.3.0	Lack of knowledge about conflict mitigation	
148	11.3.1.0	Institutions / Poor enforcement of legislation (poaching)	^Poor management structures, N=6
149	11.3.2.0	Institutions / Poor dialogue with stakeholders	
150	11.3.3.0	Institutions / Poor communication and lack of public awareness	
151	11.3.4.0	Institutions / Lack of capacity in management structures	
152	11.3.5.0	Institutions / Fragmentation of management authority	
153	11.3.6.0	Institutions / Poor integration of science into decision making	
154	11.4.0.0	Other	not included

1.2. Distribution map of large carnivores

In addition to the questionnaire, LCIE members were asked to compile updated distribution maps for the last 3-5 years. In order to receive standardized maps that could be easily compiled they were asked to use the 10 x 10 km EEA grid (http://www.eea.europa.eu/data-and-maps/data/eea-reference-grids-1). We chose a 10 x 10 km grid because large carnivores have large ranges and an average home range of a lynx, wolf, bear or wolverine is likely to cover one to several grid cells. Because there is a north south gradient in home range size, the Scandinavian species data were buffered by 10 km to create a unit of presence more similar to a home range size.

Experts were asked to distinguish between two large carnivore distribution categories, ideally using the below definition:

- **Permanent presence:** cell was permanently occupied by the species (at least 50% of time over the relevant time period, but at least for ≥3 years) and/or there was confirmed reproduction.
- **Sporadic occurrence**: occasional presence (e.g. dispersers) and/or no reproduction.

We received maps for all species and countries with large carnivore presence in Europe with the exception of Russia, Belarus and Ukraine. We did not ask the very small countries (e.g. Lichtenstein, Andorra) as they are covered by monitoring and mapping in the surrounding countries.

We compiled maps in ArcMap 10.0 (ESRI Inc., Redlands, CA, USA) first on a national and then on an European level. Overlapping cells of transboundary populations were assigned to the higher level of occupancy, e.g. if a cell was defined to be of permanent presence by one country and of sporadic presence by the other country, the cell was given the status of permanent presence.

For countries / populations that provided range maps not based on the EEA grid, an overlay rule was defined together with the expert providing the map, e.g. a cell was defined as occupied if at least 50% of the cell fell into the distribution range (also see Appendix 2).

Distribution ranges were calculated based on the number of cells, in a first step on the national level, based on the layer provided by each country and in a second step on a population / European level based on the combined maps. Because neighboring countries share many grid cells along their borders, the sum of the occupied cells of the single countries is larger than the total on the population / European level. Population borders were defined according to Linnell et al. (2008). However, because population boundaries have not been formally fixed, assignment of cells to one or the other population is somewhat fuzzy for sporadic occurrence at contact zones. But sporadic occurrence ranges are by definition subject to changes anyways. Some genetic evidence has emerged in recent years that may also argue for a general revision of some borders.

1.3. Country Species Reports

In order to get more comprehensive information, we additionally asked for country reports for lynx, wolves and bears. The Country Species Reports give detailed information on how population estimates, range maps etc. are derived – thus are supplementary to the information provided in the Europe Species Summary. In total we received 56 full Country Species Report and compiled an additional 9 short Country Species Reports based on the information provided in the questionnaires

(Table 3). We did not compiled Country Species Reports for wolverines as the Europe Wolverine Summary only covers 3 countries and already gives very detailed information.

For the Species Country Reports we produced zoomed images of the merged distribution layers of the species. However, because border cells were assigned to the higher category, these distribution maps may be divergent from the original national maps and the national count of sporadic and permanent cells.

Table 3: Country reports for large carnivores in Europe.

Country	Questionnaires available			Compiled by
	Bear	Lynx	Wolf	
Albania	full	full	full	Aleksandër Trajçe
Austria	full	full	full	Petra Kaczensky with input by Georg Rauer (bear, wolf), Petra Kaczensky with input from Thomas Engleder & Christian Fuxjäger (lynx)
Bosnia-Herzegovina	short	short	short	compiled after data by Sasa Kunovac
Bulgaria	full	full	full	Diana Zlatanova and Alexander Dutsov (bear), Diana Zlatanova (lynx), Elena Tzingarska-Sedefcheva (wolf)
Croatia	full	full	full	Djuro Huber (bear, wolf, lynx)
Czech Republic	NA	full	full	Petra Kaczensky with input from Ludek Bufka (lynx), Miroslav Kutal (wolf)
Estonia	full	full	full	Peep Mannil
Finland	full	full	full	Katja Holmala and Ilpo Kojola (lynx), Ilpo Kojola (bear, wolf)
France	full	full	full	Eric Marboutin (wolf, lynx), Pierre-Yves Quenette (bear)
Germany	NA	full	full	Petra Kaczensky with input from Ole Anders, Sybille Wölfl, and Manfred Wölfl (lynx), Ilka Reinhardt (wolf)
Greece	full	NA	full	Yorgos Mertzanis (bear), Yorgos Iliopoulos (wolf)
Hungary	NA	short	NA	compiled after data by Miklós Heltai and Peter Bedo
Italy	full	NA	full	Paolo Cucci (bears Abruzzo) and Claudio Groff (bears Alps) and Luigi Boitani (wolves)
Latvia	full	full	full	Janis Ozolins
Lithuania	NA	short	full	Guillaume Chapron with input from Vaidas Balys, Raimonda Bunikyte & Linas Balciauskas (wolf)
"The Former Yugoslav Republic of Macedonia"	short	full	short	Compiled after data by Gjorge Ivanov, Aleksandar Stajanov & Dime Melovski (bear), Dimce Melovski (lynx), Aleksandar Stojanov (wolf)
Norway	full	full	full	John D. C. Linnell, John Odden & Henrik Brøseth (lynx), John D. C. Linnell & Jon Swenson (bear), John D. C. Linnell & Henrik Brøseth (wolf)
Portugal	NA	NA	full	Francisco Álvares

Poland	full	full	full	Sabina Nowak & Robert W. Mysłajek
Romania	full	full	full	Ovidio Ionescu
Serbia	full	full	full	Milan Paunovic
Slovakia	short	short	full	Robin Rigg (bear), Jakub Kubala (lynx), Robin Rigg, Jakub Kubala, & Michal Adamec (wolf)
Slovenia	full	full	full	Kos Ivan & Hubert Potočnik (lynx), Aleksandra Majić Skrbinšek (wolf, bear)
Spain	full	NA	full	Juan Carlos Blanco (wolf), Guillermo Palomero and Juan Carlos Blanco (bear)
Sweden	full	full	full	Guillaume Chapron (wolves), Jon Swenson (bears), Henrik Andrén (lynx)
Switzerland	full	full	full	Manuela von Arx with input from Fridolin Zimmermann (lynx), Andreas Ryser (bear) and Ralph Manz (wolf)

2. Level of data standardization

2.1. Population estimates for large carnivores

Estimating the number of large carnivores in a given area is always a difficult task even in a research context within a limited area. Estimating numbers at very large scales, such as within a whole country, with any degree of accuracy or precision requires a massive and well-designed effort. Across Europe there is a wide diversity of approaches that have been developed based on different ecological situations (e.g. the presence or absence of snow), different social situations (e.g. the extent to which hunters take part in the activity) and different financial situations. As a result the quality of the census data reported by the different countries for the different species and the different populations varies dramatically.

Different methods

In the worst cases there is nothing more substantial to go on than an expert's best guess (guesstimate) based on extrapolating a reasonable density across the known distribution. An example of this would be the size of the wolf or bear population in Albania. These guesstimates should be viewed for what they are, a mere approximation of the order of magnitude of the population size. At the other end of the spectrum are very well designed monitoring systems that use a combination of methods such as intensive snow-tracking and the power of DNA analysis (extracted from urine and faeces) to map out the numbers of wolf packs and the numbers, and genetic status, of individuals as seen within the western Alps or Scandinavia. In between is a wide diversity of methods that produce varying results. Some surveys are based around conservative minimum counts while others have used statistical methods to calculate the uncertainty associated with estimates.

It is a positive sign that an increasing number of countries are using modern methods such as camera-trapping (mainly for lynx, but increasingly for wolves) and DNA-based methods (extracting DNA from faeces, hairs and urine). It is also positive that there is an increasing recognition of the use of citizens and stakeholders (especially hunters and foresters) as partners in data collection. The increasing number of peer-reviewed papers from these approaches also permits an evaluation of the quality of the work and insight into the details of the processes.

However, many countries also have systems where the exact methodology is not well known or has never been validated. This particularly concerns countries from eastern Europe which have had wellstructured wildlife management institutions that census wildlife species based on reports from the individual hunting grounds, which are then collated and interpreted. However, the details of this process have rarely been evaluated or published making it hard to evaluate. These systems are probably very useful to map distribution, detect trends and give rough ideas of population size, and may well form the platform for a good system, but there is a need to evaluate, validate and restructure the approach, especially increasing the separation between field data collection and interpretation as has been done for wolves and lynx in Poland.

Double counting of transboundary animals

One issue that is also important concerns double counting of individuals that live on regional (e.g. administrational) or international borders. Although there is a good deal of intra- and international cooperation at an expert level this rarely extends so far as to joint reporting of data such that data from both sides of the a border is compared to ensure that the same animals or packs do not appear twice. In small populations the effect of double counting may be significant. Notable exceptions are the periodic status reports for wolves in the Alps and the annual reports on Scandinavian wolves.

Double counts are of concern also if the monitoring unit is smaller than the average activity range of the large carnivore of concern. This seems to be the case in several eastern European countries were a “sum of hunting ground counts” approach is used to determine not only trends but also population numbers without accounting for the potential mismatch in scales. The mismatch often results in diverging population estimates between “official data” and expert assessment (e.g. in the case of Slovakia).

Different units & times of the year

Another issue is the monitoring unit. Wolves are mainly monitored as packs, rather than individuals. Packs are then extrapolated to total numbers, often without having data on average pack sizes for the region or country. Bears are monitored in several populations as females with cubs of the years (COYs), the most important and often most visible segment of the population. Again conversion of females with COYs to individuals is not straight-forward or always meaningful. The same is true for lynx, which in areas with reliable snow cover are monitored by counts of family groups. Formal statistical approaches to convert between units exist for Scandinavian lynx and bears.

Furthermore, the total population size may be differently reported including dependent young or based only on the number of adult or independent individuals. This difference in reporting can generate a difference of 10-50% between estimates.

The timing of the count also makes a difference as population highs will be reported after reproduction and before harvest and lows after harvest and before reproduction. The interval between population estimates obviously also makes comparisons difficult. Annual estimates will be more likely to pick up population changes, especially in small populations, than surveys conducted at larger time intervals. In several cases no comparison with past population estimates were possible because of the lack of updated range wide population surveys (e.g. Spain for a large part of the NW Iberian population).

Producing accurate numbers on large carnivores on large scales is always going to be difficult and expensive. There are also many statistical issues concerning sampling and estimating precision and accuracy that pose real challenges, while new methods become available. The choice of the approach will have to vary with the local context and needs. However, there is a clear need for a better documentation, an improvement in access to raw data and more validation of some approaches to facilitate comparisons between different methods. It is also important to gain better knowledge of the ability of the different methods to detect trends in their populations**.** Rectifying these weaknesess is both a priority task and potentially a key area for engagement between managers, scientists and many stakeholders,

Given the high variability of the data base it becomes clear that population estimates are not 1:1 comparable among countries / populations or between time periods. Nevertheless, we are confident that this summary provides presently the best available and most complete large scale assessment of large carnivore population estimates in Europe that is possible at this point in time.

2.2. Distribution map of large carnivores

Distribution maps are not a substitute for population estimates as they are not necessarily correlated and densities can vary widely according to habitat, prey density and human influence. Nevertheless, mapping large carnivore distribution is largely subject to the same constraints as estimating population size. The more intense and large-scale the monitoring system, the more likely even dispersing individuals will be detected. Furthermore, the range map will depend on the data type used for mapping, the criteria used to define a cell as "permanently occupied" or having only "sporadic occurrence", and the time period over which presence signs have been collected.

The first standardized population wide distribution mapping was introduced by the Status and Conservation of the Alpine Lynx Population project (SCALP; Molinari-Jobin 2012). SCALP categorizes lynx presence signs into three categories:

- Category 1 (C1): "Hard facts", verified and unchallenged observations;
- Category 2 (C2): Observations controlled and confirmed by a lynx expert (e.g. trained member of the network); and
- Category 3 (C3): Unconfirmed category 2 observations and all observations such as sightings and calls which, if not additionally documented, by their nature cannot be verified

Based on these categories, Alpine wide maps have been produced at 2-year intervals (http://www.kora.ch/ge/proj/scalp/index.html). The SCALP criteria have since being widely used in their original or refined form for other lynx and some bear and wolf populations. However, the SCALP project remains the exception and mapping methods vary within as well as among countries and populations.

Data type

Data type used for producing the maps varied and in respect to reliability of signs:

- C 1 - hard facts: dead animals, DNA, camera trapping
- C2 - likely presence: snow tracking, single tracks, wild prey remains, livestock depredation
- C3 - soft facts (difficult to assess): unconfirmed category 2 observations and all observations such as sightings and calls which cannot be verified
- Interviews with local people
- Habitat suitability maps
- Expert assessments
- Various combinations of the above

Criteria for defining a cell

The underlying data for determining whether a grid cell was occupied or not was highly variable:
Point based, i.e. a data point falling into the

- Point based with / without reliability criteria (e.g. SCALP)
- Point based with / without frequency criteria (e.g. ≥2 C2 for lynx in Germany)
- Point based and buffered (e.g. by 10 km for shot female bears in Sweden)
- Points and other information merged into a distribution map with minimal gaps (e.g. lynx in Croatia)
- Data collected on a different unit (e.g. hunting districts, rather than grid cells) and intersected with the EEA grid based on subjective assessment or mathematical rules (e.g. Romania where data is collected on the unit of hunting grounds)
- Data collected for a different grid (e.g. old SPOIS 10x10 km UTM grid) and intersected with the EEA grid based on subjective assessment or mathematical rules (e.g. for bears in the Cantabrian population)
- Extrapolated distribution maps intersected with the EEA grid based on subjective assessment or mathematical rules (e.g. bear, lynx and wolf in Bosnia and Herzegovina)

The definition of "Permanent presence" was linked to different criteria:

- Reproduction (e.g. natal dens, pups, COYs)
- Minimum number (e.g. pairs or packs for wolves)
- Time / frequency (e.g. in 50% of the monitoring time, in 3 out of 5 years)
- Density of signs
- Proportion of the grid cell that falls within the carnivore range (e.g. >50%)
- Habitat quality
- Expert assessment
- Any possible combination of the above

Time periods

Time periods covered ranged from 1-20 years, but with the majority covering the requested period of the most recent 3-5 years. It is obvious that more presence signs will accumulate over a longer time period, than over a short time period

Given the national or local conditions and the availability of data, there may be good reasons for utilizing one or the other approach. However, the examples in Appendix 2 illustrate that for a meaningful comparison at least a basic level of standardization is needed, in a first step focusing on:

- Common use of the 10 x 10 km EEA grid
- Equal time periods (e.g. using the 7-year FFH reporting interval)
- Equal presence criteria over time for permanent presence (e.g. 4 out of 7 years)
- Request for hard facts, rather than extrapolations (e.g. C1 & C2 signs)
- Point based data rather than extrapolated data

Given the high variability of the data base it becomes clear that the distribution maps are not readily comparable among countries / populations or between time periods. Nevertheless, the maps do provide the best and most complete large scale assessment of large carnivore distribution in Europe.

III. Europe Summaries

Bear – Europe summary

Compiled by Djuro Huber

***Fig. 1: Brown bear distribution in Europe 2006-2011**. Dark cells: permanent occurrence, Grey cells: sporadic occurrence. Red borders mark countries for which information was available.*

[Please note: neighboring countries can have different criteria and time periods for the definition of cells with permanent and sporadic presence. Data from Belarus, Ukraine and Russia are not included.]

1. Distribution
In Europe, the brown bears occur in 22 countries. Based on the existing data on distribution, as well as a range of geographic, ecological, social and political factors these can be clustered into 10 populations: Scandinavian, Karelian, Baltic, Carpathian, Dinaric-Pindos, Eastern Balkan, Alpine, Central Apennine, Cantabrian, and Pyrenean (Fig. 1).

2. Population estimates & monitoring
The estimated total number of brown bears in Europe seems to be in the range of 17'000 individuals. Based on reported and updated census data, the largest population is the Carpathian population (>7000 bears), followed by the Scandinavian and Dinaric-Pindos populations (> 3000 bears). The other populations are much smaller ranging from several hundred (e.g. Baltic ~700, Cantabrian ~200) to less than hundred (e.g. Alps 45-50, Pyrenean 22-27).
Compared to the last survey that included data up to 2005 (Bear Online Information System for Europe, BOIS) the Scandinavian, Karelian, Dinaric-Pindos, Baltic, Cantabrian, and Pyrenean population have recorded a clear increase. The other populations remained stable. The decrease in the Eastern Balkan population is likely due to new monitoring techniques. All population ranges have been relatively stable or slightly expanding. In the Alpine population the loss of the central Austrian segment was counterbalanced by the expansion of the north Italian segment in Trentino.

Monitoring in a number of countries/populations is based on genetic methods that use non-invasively collected DNA (from scats or hairs): Scandinavia, Italy, Austria, Spain, France, Greece, Slovenia. In other countries genetic methods are used to compliment or confirm data obtain by other methods (counts at feeding sites, snow tracking and telemetry): Croatia, Poland, Slovakia. In the countries without genetics and telemetry, absolute estimates are based on much weaker grounds. The small populations are generally subject to more intense and costly monitoring methods trying to count individuals, although the most closely monitored large population is in Scandinavia. In hunted populations harvest data is used to identify population trends.

3. Legal status and removal options
Most of the bear populations are strictly protected. The parts of populations that fall within EU countries, are strictly protected under pan-European legislation (the Habitats Directive) and no exceptions under annex 5 exist. Sweden, Finland, Romania, Estonia, Bulgaria, Slovenia and Slovakia currently use derogations under article 16 of the directive to allow a limited cull of bears by hunters. Croatia, Bosnia and Herzegovina and Norway manage bears as a game species with annual quotas as they are only limited by the Bern Convention in this respect. For Croatia this will end in 2013 when the EU regulations will be adopted. Nearly all countries have some kind of bear management plan, action plan or bear management strategy. However, in a number of countries such a document is still waiting to be adequately implemented.

4. Conflicts and conflict management
Bears are large, opportunistic and omnivorous carnivores with a wide range of biological needs during their life cycle, which may bring them into conflict with humans. Some conflict types threaten human interests (e.g. property loss like livestock depredation or attacks on humans), some threaten bears (e.g. habitat fragmentation and den disturbance) and some are mutually problematic (e.g. traffic accidents).
Most countries pay damage compensations either from the state budget or from funds contributed by interest groups, mostly by hunters. The rough economic cost (based on reported compensation only and excluding mitigation) is in the magnitude of 2.5-3.0 M€ per year. Livestock losses are the most important damage type, but the variety of damages are much wider than for wolves, wolverines, and lynx and include damages to bee hives, orchards, crops, trees, and even vehicles and buildings. More than half of all money is paid for compensations in Norway (1.5 M€), followed by 321'000 € in the Cantabrian Mountains, and 252'000 € in Slovenia. Other countries pay between

6000 € (Croatia) and 141'000 € (Greece) annually. The amounts paid are not at all proportional to the number of bears in the population. Costs per bear / year are generally higher in smaller populations than in larger ones: e.g. 12'666 € in Norway, 6114 € in the Pyrenees, 3445 € in Central Apennine, 1605 € in the Cantabrian Mountains, 1371 € in the Italian Alps, 555 € in Slovenia, 511 € in Greece, 102 € in Poland, 45 € in Bulgaria, 15 € in Estonia & Latvia, 8 € in Slovakia, 6.0 € in Croatia, and 3.6 € in Sweden. It should be noted that there is no data to show that countries which pay more have better acceptance of their bears.

5. Population goals & population level cooperation

All countries state the goal to have at least a stable bear population. All except two populations (Central Apennine and Cantabrian) are shared among two or more countries. For the Central Apennine and Cantabrian bear populations the management authority is delegated to the level of autonomous regions. Population level management has been generally accepted as the prescribed model, however the implementation of this concept is far from satisfactory, especially in counties not implementing their own national plans. Agreements between countries include some degree of, or steps towards joint or coordinated-management (France with Spain, Greece with Bulgaria, Slovakia with Poland, Slovenia with Croatia, Sweden with Norway), sharing information (Sweden and Norway, Slovenia and Croatia), or most commonly working groups between scientists or managers. However, in no case is there a formal population level management plan as outlined in Linnell et al. (2008). For many populations no progress in implementing population level management has been made.

6. Threats

The smallest bear populations are critically endangered. However, the current prevailing public interest, most management actions, and financial backup, seem to presently secure at least their short to midterm survival. Almost half of the populations are currently growing, but to guarantee long-term survival, all present and potential future threats have to be taken in account.

The most relevant threats (grouped in 19 main categories) for bears in Europe, based on 23 questionnaires over all bear populations, were identified as: habitat loss due to infrastructure development, disturbance, low acceptance, poor management structures, intrinsic factors, accidental mortality and persecution. Most threats were expected to become slightly more important in the future (Fig. 2).

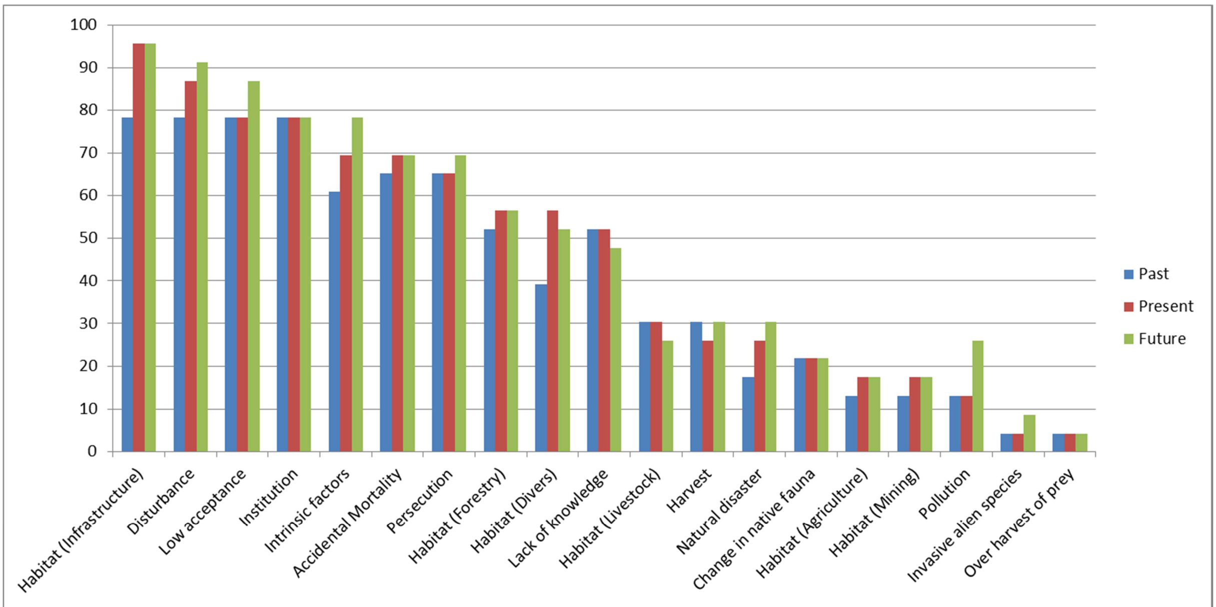


Fig. 2: Threat assessment relevant for bears over all populations in Europe.

7. Summary tables

7.1.1. Population size and trend:

[Please note numbers may contain double counts of border individuals]

Name	Last size estimate Bear Online Information System of 2005	Most recent size estimate (2010, 2011 or 2012)	Trend 2006-2011
Scandinavia	Norway: 46 Sweden: 2350-2900 **TOTAL: 2600**	Norway: 105 (minimum count) Sweden: 3300 (2968-3667 95% CI) **TOTAL: 3400**	**Strong increase**
Karelian (this time not including Russia west of 35°E)	Norway: 23 Finland: 810-860 **SubTOTAL: 850**	Norway: 46 (minimum count) Finland: 1600-1800 **SubTOTAL: 1700**	**Strong increase**
Baltic (this time not including Belarus and the Russian oblasts of Lenningrad, Novgorod, Pskov, Tver, Smolensk, Bryansk, Moscow, Kalinigrad, Kaluzh, Tula, Kursk, Belgorod & Ore)	Estonia: 515 Latvia: 10 **SubTOTAL: 525**	Estonia: ~700 Latvia: 10-15 **SubTOTAL: ~710**	**Increase**
Carpathian (this time not including Ukraine)	Romania: 6700 Poland: 117 Serbia North: ? Slovakia: 700-900 **SubTOTAL: 8100**	Romania: ~6000 Poland: ~80 (but official estimate is 119-164) Serbia North: ~6 Slovakia: 800-1100 (but official estimate is 1940) **SubTOTAL: ~7200**	**Stable**
Dinaric-Pindos	Slovenia: 300 Croatia: 600-1000 Bosnia & Herzegovina: 438 Montenegro: ~100 "The Former Yugoslav Republic of Macedonia": 160-200 Albania: 250 Serbia: 50-80 Greece: 190-260 **TOTAL: 2800**	Slovenia: 396-480 Croatia: 1000 Bosnia & Herzegovina: 550 Montenegro: 270 "The Former Yugoslav Republic of Macedonia": 160-200 Albania: 180-200 Serbia: 60±10 Greece: 350-400 **TOTAL: 3070**	**Increase**
Alpine	Italy (Trentino): 16-18 Italy (Friuli): <12 Switzerland: 0 Austrian: 12-20 Slovenia: 5-10 **TOTAL: 35-40**	Italia (Trentino): 33-36 (minimum count) Italy (Friuli): <12 Switzerland: 0-2 Austrian: ~5 Slovenia: 5-10 **TOTAL: 45-50**	**Stable**
Eastern Balkans	Bulgaria: 600-800 Greece: 25-35 Serbia: few **TOTAL: 720**	Bulgaria: 530-590 Greece: ~50? Serbia: ~2 **TOTAL: ~600**	**Stable or decrease?**
Central Apennine	**TOTAL: 40-80**	**TOTAL: 37-52**	**Stable**
Cantabrian	 **TOTAL: ~100**	28 females with COYs **TOTAL: 195-210**	**Increase**
Pyrenean	 **TOTAL: 14-18**	Spain: 22-27 France: 22 (minimum count including Spanish bears) **TOTAL: 22-27**	**Increase**

7.1.2. Monitoring methods:

POPULATION	Country	Monitoring methods	
		National / population	Regional
Scandinavian	Norway	Genetics CMR, collection of damage data and dead bears	
	Sweden	Genetic CMR, collection of damage data and dead bears, bear-observation index provided by moose hunters	Density extrapolation, telemetry
Karelian	Finland	Observations of females with COYs	CMR genetics
Baltic	Estonia	Unique females with COYs, bear tracks and observations	
	Latvia	Sum of hunting ground "counts"	
Carpathian	Poland	Questionnaires to state forest divisions & national parks	Telemetry
	Romania	Sum of hunting ground "counts"	Snow tracking, genetics, camera trapping, telemetry, confirmed reproduction
	Serbia - E	Genetics, camera trapping, density extraploration, guesstimate	
	Slovakia	Sum of hunting ground "counts"	Snow tracking, genetics, camera trapping, telemetry
Dinario-Pindus	Albania	Guesstimate	Snow tracking, camera trapping
	Bosnia-Herzegovina	Sum of hunting ground "counts"	
	Croatia	Sum of hunting ground "counts", density extrapolation	Genetics, coordinated feeding site counts
	Greece	Genetics	Genetics, camera trapping, spring survey of females with COYs
	Kosovo*	*no info*	*no info*
	"The Former Yugoslav Republic of Macedonia" - W	Sum of hunting ground "counts"	Snow tracking, genetics, camera trapping
	Montenegro	*no info*	*no info*
	Serbia - W	Genetics, camera trapping, density extraploration, guesstimate	
	Slovenia - Dinaric	Genetic CMR, coordinated feeding site counts, reconstruction from removal data	
Alps	Austria	Confirmed signs of bear presence (SCALP C1 & C2)	Genetic
	Italy - Alps	Genetics, camera trapping in female area	
	Slovenia - Alps	Genetic CMR, coordinated feeding site counts	
	Switzerland	Genetics, confirmed signs of bear presence	Telemetry
East Balkan	Bulgaria	Sum of hunting ground "counts", extrapolation & guesstimate	Genetics, individual track counts on transects
	Serbia - SE	Genetics, camera trapping, density extraploration, guesstimate	
	"The Former Yugoslav Republic of Macedonia" - E	Sum of hunting ground "counts"	Snow tracking, genetics, camera trapping
Central Apennine	Italy - Apennine	Genetics & mark-resight	
Cantabrian	Spain - NW	Unique females with COYs, genetics	
Pyrenees	France	Genetics, camera trapping, unique females with COYs	
	Spain - E	Genetics, camera trapping, unique females with COYs	

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

7.2.1. Range change and trend:

POPULATION	Range change / Trend
Scandinavia	**Increase** Sweden: increase Norway: stable
Karelian (this time not including Russia west of 35°E)	**Increase (?)** Finland: increase
Baltic (this time not including Belarus and the Russian oblasts of Lenningrad, Novgorod, Pskov, Tver, Smolensk, Bryansk, Moscow, Kalinigrad, Kaluzh, Tula, Kursk, Belgorod & Ore)	**Increase** Estonia: increase Latvia: stagnant
Carpathian (this time not including Ukraine)	**Stable** Romania: stable Poland: stable Serbia North: stagnant? Slovakia: increase?
Dinaric-Pindos	**Stable or slight increase** Slovenia: slight increase Croatia: stable / slight increase Bosnia & Herzegovina: stable? Montenegro: ? ”The Former Yugoslav Republic of Macedonia”: increase Albania: ? Serbia: stable / slight increase Greece: Rodopi: increase, Pindos: stable
Alpine	**Stable** Italia (Trentino): resident range stagnant, disperser range increase Italy (Friuli): stagnant Switzerland: only single dispersers Austrian: decline Slovenia: stagnant
Eastern Balkans	**Stable** Bulgaria: stable Greece: ? Serbia: ?
Central Apennine	**Likely stable**
Cantabrian	**Stable**
Pyrenean	No real comparison possible, likely slight increase

7.2.2. Occupied cells in the 10 x 10 km EEA grid:

POPULATION	Country	Time period	Definition of cells		N of occupied cells		
			Permanent	Sporadic	Permanent[1]	Sporadic[1]	All[1]
Scandinavian	Norway	2007-2011	Confirmed female presence buffered by 10 km	All other buffered by 10 km	1,691	2,986	4,677
	Sweden	2006-2011	Killed females buffered by 10 km	Kindberg et al. 2011 & expert assessment			
Karelian	Finland	2009-2011	Confirmed female presence buffered by 10 km	All other buffered by 10 km	801	3,014	3,815
Baltic	Estonia	2007-2010	Confirmed reproduction	All other buffered by 10 km	208	296	504
	Latvia	2006-2009	NA	Hunting ground counts and occurence monitoring in NATURA 2000 sites			
Carpathian	Poland	2008-2011	Confirmed reproduction or 50% occupation over last 3 years	All other	992	234	1,226
	Romania	2006-2011/12	≥66% of cell intersects hunting units with bears	≤33% of cell intersects hunting units with bears			
	Serbia - E	*No info*	*No info*	*No info*			
	Slovakia	last 20 years	No criteria provided	*No info*			
Dinario-Pindus	Albania	2006-2011	Expert assessment based on density of signs and habitat quality high	Expert assessment based on density of signs and habitat quality lower	787	354	1,141
	Bosnia-Herzegovina	2000-2012	Sign density & best quality habitat high	Sign density & best quality habitat lower			
	Croatia	2005-2011	≥50% of grid filled by extrapolated distribution map	≤50% of grid filled by extrapolated distribution map			
	Greece	2006-2012	Confirmed presence in all years	All other signs			
	Kosovo*	*No info*	*No info*	*No info*			
	"The Former Yugoslav Republic of Macedonia"	2006-2011	No criteria provided	No criteria provided			
	Montenegro	2008-2011	No criteria provided	No criteria provided			
	Serbia - W	*No info*	*No info*	*No info*			
	Slovenia	2007-2011	95% kernel of all bear data	All other signs, including expert assessment			
Alps	Austria	2007-2011	NA	Confirmed signs	14	108	122
	Italy - Alps	2011	Confirmed females for at least 3 years	All other signs			
	Slovenia	2007-2011	95% kernel of all bear data	All other signs, including expert assessment			
	Switzerland	2007-2011	NA	Confirmed signs			
East Balkan	Bulgaria	2000-2012	At least 3 subsequent years of confirmed signs of presence	All other confirmed signs	189	201	390
	Serbia - SE	*No info*	*No info*	*No info*			
	"The Former Yugoslav Republic of Macedonia"	2006-2011	No criteria provided	No criteria provided			
Central Apennine	Italy - Apennine	2004-2008 (Abruzzo)			23	41	64
Cantabrian	Spain	SPOIS 2007	SPOIS 2007 grid	*no info*	77	-	77
Pyrenees	France	2007-2011	At least 3 years occupied	All other confirmed signs	79	50	129
	Spain	2011	Confirmed presence signs	*no info*			
Total					**4,854**	**7,262**	**12,116**

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

[1]unduplicated – overlapping or border cells only counted once, in case of two cells getting different assessments from the different countries, the higher category was used

7.2.3. Connectivity with other populations

POPULATION	Connectivity
Scandinavia	The population is potentially connected with the Karelian population through dispersing males, but probably not by dispersing females.
Karelian (this time not including Russia west of 35°E) / **Baltic** (this time not including Belarus and the Russian oblasts of Lenningrad, Novgorod, Pskov, Tver, Smolensk, Bryansk, Moscow, Kalinigrad, Kaluzh, Tula, Kursk, Belgorod & Ore)	The Karelian population probably has some level of genetic exchange with the Scandinavian population to the south and west. Both the Karelian and Baltic populations are connected to the main distribution area of Russian bears to the east and thereby with each other. The separation between the two populations is made here only as an administrative decision to produce units of practical size and with more homogenous internal conditions.
Carpathian (this time not including Ukraine)	The closest population is in northern Bulgaria and southeastern Serbia, but the movement of individual bears may be very restricted due to the Danube which acts as a physical barrier. There are some questions concerning internal connectivity within the Carpathian population due to a lack of knowledge about the situation within Ukraine and the developments of bear distribution in eastern Slovakia.
Dinaric-Pindos	In Slovenia in the north this population is close to the one of the Alps and bears in Trentino and Slovenia are connected by single male dispersers. However, there is not a continuous distribution of female bears with the Alps. Historical connections with the Carpathian population through Serbia and with the Eastern Balkans through "the Former Yugoslav Republic of Macedonia" are now unlikely.
Alpine	The most important potential connection is with their source population, the Dinaric-Pindos. A few individual bears have been shown to move between these two populations in both directions.
Eastern Balkans	The Greek part of the Rila-Rhodope segment is near the Dinaric-Pindos population but there is no demonstrated connection between these two populations. To the north of the Stara-Planina segment there is a potential, but unproven, connection to the Carpathian population. Within the Eastern Balkans the main challenge is to maintain connections among the three segments of this population.
Central Apennine	It has been totally isolated for over a century. There is no possibility of reestablishing unassisted connectivity in the short term.
Cantabrian	It has been totally isolated for over a century. There is no possibility of reestablishing unassisted connectivity in the short term.
Pyrenean	It has been totally isolated for over a century. There is no possibility of reestablishing connectivity in the short term. Due to re-introductions, genetically the Pyrenean population now consists of bears from the Dinaric-Pindos population.

7.3. IUCN assessment:

POPULATION	IUCN assessment
Scandinavia	LC
Karelian	LC (in connection with Russia west of 35°E)
Baltic	LC (in connection with the Russian oblasts of Lenningrad, Novgorod, Pskov, Tver, Smolensk, Bryansk, Moscow, Kalinigrad, Kaluzh, Tula, Kursk, Belgorod & Ore)
Carpathian	NT (including and not including Ukraine)
Dinaric-Pindos	VU
Alps	CE
Eastern Balkans	VU
Central Apennine	CE
Cantabrian	CE
Pyrenean	CE

7.4. Legal status and removal options:

Country	EU habitat directive Annex	Bern convention	N bears killed under article 16 derogations in 2007-2008 combined[1]	Annual bear removals under Annex 5	Annual Non-EU legal bear removals	Management / action plan
Norway	NA	II	NA	NA	11 (mean 2006-2011)	Yes
Sweden	II, IV	II	366	NA	NA	Yes
Finland	IV	excluded	179	NA	NA	Yes
Estonia	IV	II	64	NA	NA	Yes
Latvia	IV	II	0	NA	NA	Yes
Poland	II, IV	II	0	NA	NA	Yes
Romania	II, IV	II	480	NA	NA	Yes
Slovakia	II, IV	excluded	56	NA	NA	No
Albania	NA	II	NA	NA	0	No information
Bosnia-Herzegovina	NA	II	NA	NA	17 (mean 2006-2011)	No
Croatia	II, IV	III	NA	NA	73 (mean 2006-2011)	Yes
Greece	II, IV	II	*no info*	NA	NA	Yes
Kosovo*	NA	NA	NA	NA	*no info*	*no info*
"The Former Yugoslav Republic of Macedonia"	NA	II	NA	NA	0	Only regional plan for Prespa Basin between MK, AL & GR
Montenegro	NA	II	NA	NA	*no info*	*no info*
Serbia	NA	II	NA	NA	0	Yes
Slovenia	II, IV	excluded	162	NA	NA	Yes
Austria	II, IV	II	0	NA	NA	Yes, but no legal or jurisdictional value
Italy	II, IV	II	1 [2]	NA	NA	Yes
Switzerland	NA	II	NA	NA	1 (in 2008; for 2006-2011)[3]	Yes
Bulgaria	II, IV	II	6	NA	NA	Yes
Spain	II, IV	II	0	NA	NA	Yes
France	II, IV	II	*no info*	NA	NA	Yes

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

[1]The N2K Group 2011, [2]Habituated bear captured and put in captivity (bear JURKA),[3]Food conditioned and habituated bear JJ3

7.5. Conflict type and costs:

[*Mostly by country rather than population, country attributed to the population it has the largest share with*]

POPULATION	Conflict type and costs / years
Scandinavia	Norway (2006-2011 range): up to 2 M € for sheep (3800-7000) and recently up to 35'000 € for semi-domestic reindeer (4-75) Sweden (2006-2011): 37'000 € sheep (50-100 sheep & few other livestock). In addition comes the bear's share of the economic incentive paid to reindeer herders for the presence of large carnivores. In 2009 this was ~187'000 €.
Karelian population (this time not included Russia west of 35°E)	Finland (2007-2011 mean): 750'000 € for 681 reindeer & 172'700 € other depredation (30-100 sheep, 0-5 other livestock (cattle, horses), 0-4 dogs, 150-250 beehives, hundeds packages of silage some damage in oatfields (not quantifiable from records)
Baltic (this time not included Belarus and the Russian oblasts of Lenningrad, Novgorod, Pskov, Tver, Smolensk, Bryansk, Moscow, Kalinigrad, Kaluzh, Tula, Kursk, Belgorod & Ore)	Estonia (2007-2011): almost no livestock depredation, most damages on beehives 12'500 € (105 hives) Latvia (2006-2011): no damages and no damage compensation system for bears
Carpathian (this time not included Ukraine)	Romania: no information available Poland (2010): 61,555 € (556 beehives), strongly increasing trend since 2007, only very occasionally livestock Serbia-E: no information available Slovakia (2006-2010): 5500 € (160 sheep/goat), 1200-2900 € (0-15 cattle), 12'000 € (200 beehives)
Dinaric-Pindos	Slovenia (2010): 252'497 € (number of attacks: 650 sheep/goat, 15 cattle/horses/pigs, 425 other like bee hives, agriculture, orchards, animal feed, car accidents, feeders), increasing trend since 2007 Croatia (2007-2010): 6000 € (2-20 sheep/goats, 0-33 beehives, crop and fruit tree damage, very occasional cattle / horses or poultry) Bosnia & Herzegovina (2007-2011): 42 sheep, 20 cattle/horse/pig, 23 beehives, 5 orchards Montenegro: no information "The Former Yugoslav Republic of Macedonia" (including East Balkan part) (2007): 53 sheep/goat, 167 cattle/horse/donkey/pig, 152 beehives Albania: no data and no compensation system Serbia-SW: no information Greece: (2006-2010): 19'000 € (200 sheep/goat), 98'000 € (215 cattle/horse), 24'000 € (530 beehives/swarms)
Alpine	Italy (Trentino, 2006-2011 mean): 17'000 € for sheep/goats, 4000 for rabbits/ chickens, 27'000 for beehives Austria (2008-2011): highly variable but ~10-100 sheep, ~0-2 other livestock (e.g. cattle, rabbits),~10-30 beehives,~0-25 canisters with rape-seed oil Switzerland: attacks mainly on sheep and beehives. Amount varies between years.
Eastern Balkans	Bulgaria (2007-2011): ~81,850 € for ~ 249 sheep; 18 goats; 27 cattle; 6 horses/donkeys; 12 pigs; 3 dogs; 533 beehives; 58 fruit trees; others - black chokeberry (Aronia melanocarpa) - 325 kg (increasing tendency due to better informed locals for the opportunity for compensation) Serbia -SE: no information
Central Apennine	(2006-2011 mean): 22'000 € (136 sheep/goats), 29'000 € (47 other livestock), (2011): 45,188 € for other damages
Cantabrian	(2010): 321'000 mainly for beehives and livestock
Pyrenean	France (2006-2011 mean): 103'000 € for 200 sheep / goats, 31 beehives Spain (2010): 20'500 € for 70 sheep and 29 beehives

7.6. Critical management issues

<table>
<tr><th>POPULATION</th><th>Conflict type and costs / years</th></tr>
<tr><td>Scandinavia</td><td>The major pressure in Norway remains to the issue of damages to unguarded free-ranging sheep. This chronic conflict has led to parliament setting very low population goals for bear recovery. The goals from 2003 have been slightly downgraded in 2011. Although conflicts have been low in Sweden, new conflicts are appearing as bears expand into more densely populated areas. However, generally the bear is well accepted and managed in Sweden.</td></tr>
<tr><td>Karelian population</td><td rowspan="2">In connection with bears in Belaruss and Russia these populations are large and occupy a large area safeguarding their favorable conservation status. However, the lack of reliable and regular information from Belaruss or Russia makes it difficult to assess population or range changes.</td></tr>
<tr><td>Baltic</td></tr>
<tr><td>Carpathian
(this time not includeding Ukraine)</td><td>The distribution map for Slovakia is based on data pooled over the last 20 years and the accuracy of monitoring methods have been questioned. The lack of recent information from Ukraine makes an overall assessment difficult.</td></tr>
<tr><td>Dinaric-Pindos</td><td>In Slovenia increasing damages and an increase in nuisance bears are making it a challenge to maintain bear numbers at the present level, let alone allow for the spreading of the population into the Alps. With Croatia entering the EU, the status of the bear was changed from “game species” to “fully protected”. Hunting is now labelled culling and has to happen under the EU derogation regulation which weakens the hunters’ stake and support for bear management. This population is shared by many countries and subject to widely varying monitoring methods and standards. There is a general lack of accessible and robust data from Bosnia & Herzegovina, Montenegro, Albania and “the Former Yugoslav Republic of Macedonia”.</td></tr>
<tr><td>Alpine</td><td>Initiatives to coordinate and harmonize bear management between Italy, Switzerland, Austria and Germany are currently under way. However, the occurrence of food conditioned and/or habituated bears remain a management challenge.</td></tr>
<tr><td>Eastern Balkans</td><td>Bulgaria has developed a new bear management plan and controversies seem to have calmed down. In Greece habitat fragmentation remains a conservation concern.</td></tr>
<tr><td>Central Apennine</td><td>Occasional losses due to poaching or other human related accidents still occur and the population remains stagnant despite regular reproduction events.</td></tr>
<tr><td>Cantabrian</td><td>The western population segment shows an obvious increase (from 3 females with cubs of the year (COYs) recorded in 1994 to 25 in 2010), while the eastern one seems stagnant with very few females with COYs.</td></tr>
<tr><td>Pyrenees</td><td>Acceptance for the re-introduced bears seems still a problem and losses due to poaching or other human related accidents still occur.</td></tr>
</table>

7.8. Most relevant threats per population:

The main threats considered relevant vary quite widely among populations and within populations - with small populations not surprisingly being more at risk from intrinsic factors and populations covering many political borders facing a wider variety of threats than those mainly contained in one or a few countries (number of questionnaires by population given in brackets).

	Issue ticked off as a threat for bear (for present time only)									
Threat category (sorted by overall threat assessment for the species)	**Abruzzo (N=1)**	**Alpine (N=2)**	**Baltic (N=2)**	**Cantabrian (N=1)**	**Carpathian (N=4)**	**Dinaric-Pindos (N=7)**	**East-Balkan (N=1)**	**Karelian (N=1)**	**Pyrenean (N=2)**	**Scandinavian (N=2)**
Habitat (Infrastructure)	1	2	2	1	4	7	1	0	2	2
Disturbance	1	1	2	1	4	7	1	0	1	2
Low acceptance	0	1	2	0	4	6	1	1	2	1
Poor management structures	1	1	2	1	4	6	1	0	2	0
Intrinsic factors	1	2	2	1	4	3	1	0	2	0
Accidental Mortality	1	1	2	1	3	6	1	0	1	0
Persecution	1	2	0	0	3	4	1	0	2	2
Habitat (Forestry)	1	0	0	1	3	6	1	0	1	0
Habitat (Divers)	1	0	1	1	3	5	1	0	1	0
Lack of knowledge	1	0	2	0	3	5	1	0	0	0
Habitat Livestock	1	0	0	0	1	3	1	0	0	1
Harvest	0	0	2	0	1	2	1	0	0	0
Natural disaster	0	0	0	0	1	4	1	0	0	0
Change in native fauna	1	0	0	0	2	0	1	0	1	0
Habitat (Agriculture)	1	0	0	0	1	1	1	0	0	0
Habitat (Mining)	0	0	0	1	0	3	0	0	0	0
Pollution (incl. Chlimate change)	0	0	0	0	1	1	1	0	0	0
Invasive alien Species	1	0	0	0	0	0	0	0	0	0
Prey over harvest	0	0	0	0	1	0	0	0	0	0

Lynx – Europe summary

Compiled by Manuela von Arx

***Fig. 1: Eurasian lynx distribution in Europe 2006-2011.** Dark cells: permanent occurrence, Grey cells: sporadic occurrence. Red borders mark countries for which information was available.*

[Please note: neighboring countries can have different criteria and time periods for the definition of cells with permanent and sporadic presence. Data from Belarus, Ukraine and Russia are not included.]

1. Distribution
Eurasian lynx are distributed in northern and eastern Europe (Scandinavian and Baltic states) and along forested mountain ranges in southeastern and central Europe (Carpathian, Balkans, Dinarics, Alps, Jura, Vosges). Lynx are found in 23 countries and based on a range of criteria, including distribution and other geographic, ecological, political and social factors can be grouped into 10 populations (Fig. 1). Five of these ten populations are autochthonous (Scandinavian, Karelian, Baltic, Carpathian and Balkan), the other populations – based in central and western Europe – stem from re-introductions in the 1970s and 1980s (Dinaric, Alpine, Jura, Vosges-Palatinian and Bohemian-Bavarian populations). In addition, there are a number of other occurrences of lynx stemming from more recent reintroductions, such as in the Harz mountains of central Germany.

2. Population estimates & monitoring
The total number of lynx in Europe is 9000-10’000 individuals (excluding Russia & Belarus). The largest populations are the autochthonous ones in the north and east which have around 2000 individuals each: Scandinavian (~1800-2300), Karelian (Finish part ~2500), Baltic (~1600), Carpathian (~2300). All the re-introduced populations are of smaller size as they were formed only 40 years ago and with small numbers of founders. The current population sizes are as follows: Alpine 130-160, Bohemian-Bavarian ~50, Dinaric 120-130, Jura >100, Vosges-Palatinian ~19. The population of greatest conservation concern is the fifth autochthonous one, the Balkan lynx population, which numbers only 40-50 individuals according to recent research.

Most populations have generally been stable in the last decade. For the Carpathian and Balkan populations smaller numbers are indicated as compared to the last status report of the Eurasian Lynx Online Information System from 2001 (ELOIS, von Arx et al. 2004), however, the current estimates are assumed to be more realistic due to improvements in monitoring and scientific research, whereas the former numbers have most probably been overestimates. The Karelian and Jura populations have both increased. The Vosges-Palatinian population denotes a slight decrease; the occurrence in the Palatinian forest has vanished. For the Alpine and Dinaric populations the trend is not consistent throughout the range which is mainly due to a drop of lynx numbers in Slovenia, which forms part of both of these populations.

Monitoring in the Scandinavian population is based on snow-tracking, genetics and collection of livestock depredation cases, supported by telemetry and camera-trapping. In Finland (Karelian population), snow-tracking and telemetry are used. In Estonia, Latvia and Poland estimates are based on snow-tracking, supported by analysis of harvest bag data in Estonia and Latvia. In the Carpathians, monitoring and population number estimates are based mainly on hunting ground counts, snow-tracking and guesstimates. For the Alpine, Jura and Vosges populations, camera-trapping (including capture-mark-recapture (CMR) in reference areas and density extrapolation) is combined with the collection of different data sets validated using the criteria developed by the Status and Conservation of the Alpine Lynx Population (SCALP) project (Molinary-Jobin et al. 2012). The same is true for the Balkan population. The basic monitoring methods concerning the Dinaric population are snow-tracking (all three countries), genetic sampling and guesstimates (Slovenia and Croatia). In the Bohemian-Bavarian region a variety of the methods is used including collection of sightings of signs and camera-trap pictures.

3. Legal status and relevant management agency
Most of the lynx populations are strictly protected. The parts of populations that fall within EU countries, with the exception of Estonia, are strictly protected under pan-European legislation (the Habitats Directive). Sweden, Latvia and Finland currently use derogations under article 16 of the directive to allow a limited cull of lynx by hunters. Norway manages lynx as a game species with annual quotas as they are only limited by the Bern Convention in this respect. Management plans for lynx exist in only about half the range countries, with several more having come up with a draft.

4. Conflicts and conflict management

Livestock depredation and thus conflict levels are low for most of the populations. There are some damages in the Alpine and Jura populations, however usually less than 100 domestic animals are killed per year in total. The only two populations with major depredation problems are the Nordic ones. About 7000-10'000 sheep and 7000-8000 semi-domestic reindeer are attributed to lynx and compensated in Norway every year, summing up to ~5 M€ per year. In 2009 Sweden paid ~17'500 € for depredation on sheep and an additional ~3'500'000 € as an economic incentive to reindeer herders for the presence of lynx. In 2011 Finland paid 15'600 € for 25 domestic animals and ~827'000 € for 554 reindeer.

Considering the most relevant threats to the Eurasian lynx (see below), the major conflicts are not with livestock husbandry, but with ungulate hunting. This conflict has long been neglected. While a range of prevention measures exist to counteract livestock depredation, fruitful ways of conflict management with hunting are yet to be found. Awareness has however increased and in many regions participatory processes for a better collaboration and dialogue between different interest groups have been initiated.

5. Population goals & population level cooperation

For most of the populations there is at least some form of cooperation between scientists of the different range countries. On the level of the management authorities, cooperation is rare and exists only for the Scandinavian and Alpine populations. A range-wide conservation strategy was developed for the Alpine and Balkan populations, however this has not been implemented in action. In 2009 the Alpine countries signed a transboundary political arrangement under the Alpine Convention called the WISO platform (Wildlife and Society). The platform aims to develop a common strategy for the management of the Alpine populations of lynx, wolf and bear.

6. Threats

The most relevant threats to Eurasian lynx in Europe are low acceptance largely due to conflicts with hunters, persecution (i.e. illegal killings which is probably interlinked with the first) and habitat loss due to infrastructure development, poor management structures and accidental mortality.

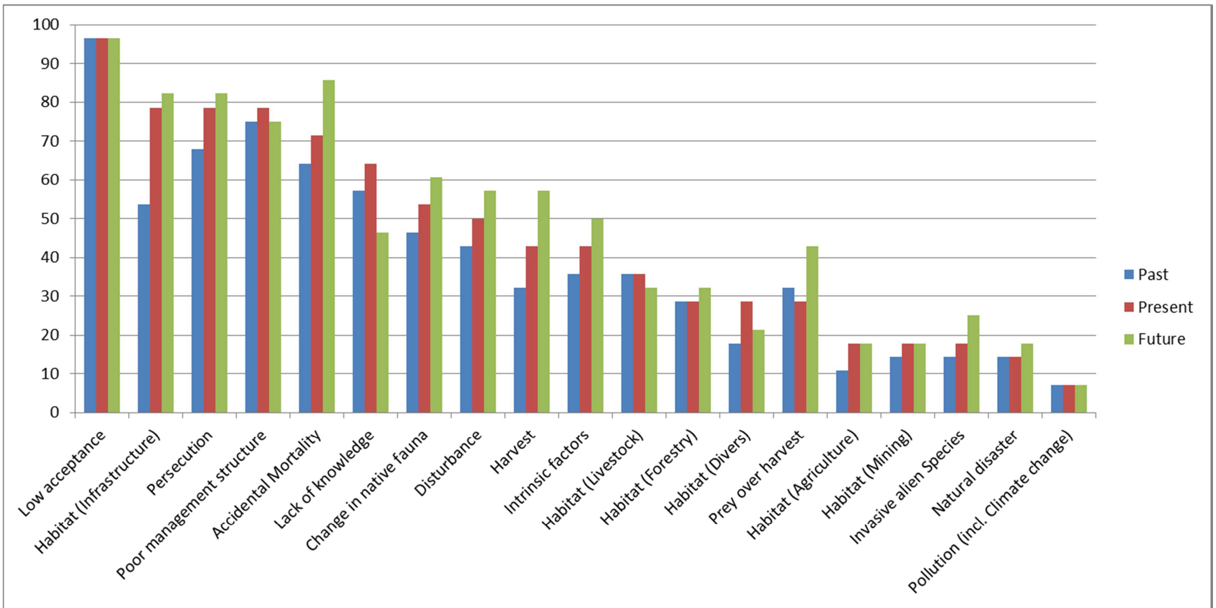


Fig. 2: Threat assessment relevant for lynx over all populations in Europe based on 22 questionnaires with threats grouped in 19 main categories.

7. Summary tables

7.1.1. Population size and trend:

[Please note numbers may contain double counts of border individuals]

POPULATION	Last size estimate Eurasian Lynx Online Information System of 2001	Most recent size estimate (2009, 2010 or 2011)	Trend 2006-2011
Alpine	Switzerland: 70 Slovenia: 10 Italy-E: 10 Italy-W: 3 Austria: 20 France: few **TOTAL: ~120**	Switzerland: 96-107 Slovenia: few Italy: 10-15 Austria: 3-5 France: 13 (extrapolated) **TOTAL: ~130**	**Stable** West: slight increase East: decrease
Balkan	"The former Yugoslav Republic of Macedonia": 35 Albania: 15-25 Kosovo*:? Serbia & Montenegro: 30 **TOTAL: ~80-105**	"The former Yugoslav Republic of Macedonia": 23 Albania: <5-10 Serbia (incl. Kosovo*): 15-25 Montenegro: ? **TOTAL: 40-50**	**Decrease?** Improvements in monitoring/scientific research revealed much better information and more realistic estimates
Baltic (this time not included: Belarus and the Russian oblasts of Leningrad, Novgorod, Pskov, Tver and Smolensk. Kaliningrad)	Estonia: 900 Latvia: 648 Lithuania: 103 Poland-NE: 60 Ukraine: 27 **SubTOTAL: ~1700**	Estonia: 790 Latvia: <600 Lithuania: 40-60 Poland-NE: 96 Ukraine: 80-90[1] **SubTOTAL: ~1600**	**Stable** North: increasing South: stable to decreasing Partly change in monitoring methods.
Bohemian-Bavarian	Czech Republic: 60 Germany: 12 Austria: 4 **TOTAL: ~75**	Czech Republic: 30-45 Germany: 12 Austria: 5-10 **TOTAL: ~50** (taking into account double counting)	**Stable or decrease**
Carpathian	Romania: 2050 Slovakia: 400 Poland: 97 Ukraine: 230 Czech Republic: 40 Hungary: 1-5 Serbia & Montenegro: 45 Bulgaria: few **TOTAL: ~2800**	Romania: 1200-1500 Slovakia: 300-400 (but official estimates much higher) Poland: ~200 Ukraine: 350-400[1] Czech Republic: 13 Hungary: 1-3 Serbia: 50 Bulgaria:≥11 **TOTAL: ~2300-2400**	**Stable** South: expanding Improvements in monitoring/scientific research revealed much better information and more realistic estimates
Dinaric	Slovenia: 40 Croatia: 40-60 Bosnia-Herzegovina: 40 **TOTAL: ~130**	Slovenia: 10-15 Croatia: ~50 Bosnia-Herzegovina: 70 (may be overestimated) **TOTAL: 120-130**	**Stable or decrease** South: increase North: decrease
Jura	France: 54 Switzerland: 20-25 **TOTAL: ~80**	France: 76 (minimum count) Switzerland: 28-36 **TOTAL: >100**	**Increase**
Karelian[2] (this time not	**Finland: 870**	**Finland: 2430-2610**	**Strong increase**

included: the Russian oblasts of Murmansk and Karelia)			
Scandinavian	Norway: 327 Sweden: 1400-1800 **TOTAL: ~2000**	Norway: 65-69 family groups (384-408 individuals) Sweden: 277 lynx family groups (1400-1900 individuals) **TOTAL: ~1800-2300**	**Stable**
Vosges-Palatinian	France: 18 Germany: 3-4 **TOTAL: ~20**	France: ~19 (extrapolated) Germany: 0 **TOTAL: ~19**	**Stable or slight decrease**

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

[1]Councel of Europe 2012. National Reports of the Status of Large Carnivores. Meeting of the Group of Experts on the Conservation of Large Carnivores in Europe, 24-26 May 2012, Gstaad/Saanen, Switzerland. T-PVS/Inf (2012) 7. https://wcd.coe.int/com.instranet.InstraServlet?command=com.instranet.CmdBlobGet&InstranetImage=2161432&SecMode=1&DocId=1924342&Usage=2

[2]In the ELOIS 2001 Finland belonged with Sweden and Norway to the Nordic population which has subsequently been split into two populations (Scandinavian with Sweden and Norway and Karelian with Finland and Russian Karelia).

7.1.2. Monitoring methods:

POPULATION	Country	Monitoring methods	
		National / population	Regional
Alpine	Austria - Alps	Confirmed presence signs (SCALP C1 & C2)	Camera trapping, telemetry
	France - Alps	Confirmed presence signs (SCALP C1 & C2 and selected C3)	CMR camera trapping in reference area
	Italy	Confirmed presence signs (SCALP C1 & C2)	Camera trapping, telemetry
	Slovenia - Alps	Expert opinion, guesstimate	Snow tracking, genetics
	Switzerland - Alps	Confirmed presence signs (SCALP C1 & C2)	CMR camera trapping in reference area, telemetry, genetic
Balkan	Albania	Questionnaires, collection of chance observations	Snow tracking, camera trapping
	Kosovo*		Questionaires
	"The Former Yugoslav Republic of Macedonia"	Density extrapolation, confirmed presence signs (SCALP C1 & C2)	Snow tracking, genetics, camera trapping, telemetry
Baltic	Estonia	Snow tracking, identify unique reproductions, track and direct observations	Telemetry
	Latvia	Sum of hunting ground "count", guesstimate, long term trend in harvest composition & efficiency	Telemetry
	Lithuania	Snow tracking, sum of hunting ground "count", guesstimate	Snow tracking
	Poland - NE	Confirmed presence signs, snow tracking, guesstimate	Snow tracking, genetics, telemetry
Bavarian-Bohemian	Austria - Bohemia	Confirmed presence signs (SCALP C1 & C2 and selected C3)	Camera trapping
	Czech Republic	Sum of hunting ground "counts" through questionnaires every 2 years	Snow tracking, genetics, CMR camera trapping, telemetry
	Germany - Bavaria	Confirmed presence signs (SCALP C1 & C2), camera trapping	Telemetry, CMR camera trapping, systematic snow tracking
Carpathian	Bulgaria	Questionnaires and follow up field investigations to confirm presence	Camera trapping, snow tracking
	Czech Republic	Sum of hunting ground "counts" through questionnaires every 2 years	Snow tracking, genetics, CMR camera trapping, telemetry
	Hungary	Questionnaires and follow up field investigations to confirm presence, camera trapping, estimate	
	Poland	Confirmed presence signs, guesstimate	Snow tracking, genetics, telemetry
	Romania	Sum of hunting ground "counts"	Snow tracking, genetics, camera trapping, telemetry, confirmed reproduction
	Slovakia	Sum of hunting ground "counts"	Snow tracking, genetics, camera trapping
	Serbia		Camera trapping
Dinaric	Croatia	Snow tracking, genetics, camera trapping	Telemetry
	Slovenia - Dinaric	Expert opinion, guesstimate	Snow tracking, genetics
	Bosnia-Herzegovina	Snow tracking	Camera trapping
Jura	Switzerland - Jura	Confirmed presence signs (SCALP C1 & C2)	CMR camera trapping in reference area, telemetry, genetic
	France - Jura	Confirmed presence signs (SCALP C1 & C2 and selected C3)	CMR camera trapping in reference area
Karelian	Finland	Systematic snow tracking	Telemetry
Scandinavian	Norway	Systematic snow tracking (single lynx & confirmed family groups), lynx harvest data, lynx damage reports, set of index lines	Camera trapping, telemetry
	Sweden	Systematic snow tracking (single lynx & confirmed family groups), lynx harvest data, lynx damage reports	Genetics, telemetry
Vosges-Palatinian	France - Vosges	Confirmed presence signs (SCALP C1 & C2 and selected C3)	CMR camera trapping in reference area
	Germany - Palatinian	Confirmed presence signs (SCALP C1 & C2), camera trapping	
Harz occurence	Germany - Harz	Confirmed presence signs (SCALP C1 & C2), camera trapping	Telemetry

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

7.2.1. Range change and trend:

POPULATION	Range change / Trend
Alpine	**Mixed trend** Switzerland: stable / increase Slovenia: stagnant Italy: stagnant Austria: stagnant France: stagnant
Balkan	**Decrease** However, also due to much better information. Range might be restricted for already some time. "The former Yugoslav Republic of Macedonia": decrease Albania: unknown Serbia (incl. Kosovo*): slight increase? Montenegro: ?
Baltic (this time not included: the Russian oblasts of Leningrad, Novgorod, Pskov, Tver and Smolensk. Kaliningrad)	**Stable** Estonia: stable Latvia: stable Lithuania: increase Poland-NE: stable Ukraine: stable?
Bohemian-Bavarian	**Stable** Czech Republic: stable Germany: stagnant Austria: stagnant
Carpathian	**Stable** (Expanding in the south) Romania: stable Slovakia: stable ? Poland: stable Ukraine: stable? Czech Republic: stagnant? Hungary: stagnant Serbia: slight increase Bulgaria: unclear, but likely expanding
Dinaric	**Mixed trend** Slovenia: Decrease Croatia: stable Bosnia-Herzegovina: increase
Jura	**Increase**
Karelian (this time not included: the Russian oblasts of Murmansk and Karelia)	**Stable** Finland: In spite of the strong increase in numbers, the range has not changed.
Scandinavian	**Increase** Sweden: lynx are expanding southwards and have established in the southern 1/3 of the country. Norway: stable
Vosges-Palatinian	**Decrease** France: stagnant Germany: decrease Since 1999, a single photo is the only evidence of lynx presence in the Palatinian Forest and an establishment of lynx territories is not expected anytime soon.

7.2.2. Occupied cells in the 10 x 10 km EEA grid:

Population	Country	Time period	Permanent	Sporadic	Permanent[1]	Sporadic[1]	All[1]
Alpine	Austria - Alps	2006-2010	Confirmed reproduction	All other signs	93	150	243
	France - Alps	2008-2010	Confirmed reproduction or presence 3 out of 5 years	All other signs			
	Italy	2008-2010	Presence in all 3 years	Presence 1-2 years			
	Slovenia - Alps	2008-2011	Reproduction or evidence over several years	All other			
	Switzerland - Alps	2006-2010	Confirmed reproduction or presence 3 out of 5 years	All other signs			
Balkan	Albania	2006-2011	Expert assessment based on density of signs and habitat quality high	Expert assessment based on density of signs and habitat quality lower	45	141	186
	Kosovo*	*no info*	*no info*	*no info*			
	"The Former Yugoslav Republic of Macedonia"	2006-2011	No criteria provided	No criteria provided			
	Montenegro	*no info*	*no info*	*no info*			
Baltic (this time not included: Belarus, the Russian oblasts of Leningrad, Novgorod, Pskov, Tver and Smolensk.	Estonia	2008-2010	Confirmed reproduction	All other signs	823	447	1,270
	Latvia	2006-2012	Confirmed reproduction	All other signs			
	Lithuania	2006-2011	No criteria provided	No criteria provided			
	Poland - NE	2008-2011	Confirmed reproduction or 50% occupation over last 3 years	All other signs			
Bavarian-Bohemian	Austria - Bohemia	2008-2011/12	Frequency / density of signs highest	Frequency / density of signs lower	56	101	157
	Czech Republic	2009-2012	Confirmed reproduction or presence each year	All other signs			
	Germany	2010/2011	Confirmed reproduction	All other, but also frequency or quality criteria (C1 or ≥2 C2 for a sporadic cell)			
Carpathian (this time not included: Ukraine)	Bulgaria	2000-2012	Reproduction or eveidence over several years	All other signs	1,126	347	1,473
	Hungary	2002-2006	Probability of occurence highest	Probability of occurence low			
	Poland - S	2008-2011	Confirmed reproduction or 50% occupation over last 3 years	All other signs			
	Romania	2006-2011/12	≥66% of cell intersects hunting units with lynx	≤33% of cell intersects hunting units with lynx			
	Slovakia	2006-2009	No criteria provided	*No info*			
	Serbia	*no info*	*no info*	*no info*			
Dinaric	Croatia	2005-2011	≥50% of grid filled by extrapolated distribution map	≤50% of grid filled by extrapolated distribution map	202	98	300
	Slovenia - Dinaric	2008-2011	Reproduction or evidence over several years	All other			
	Bosnia-Herzegovina	2000-2012	Sign density & best quality habitat high	Sign density & best quality habitat lower			
Jura	Switzerland - Jura	2006-2010	Confirmed reproduction or presence 3 out of 5 years	All other	94	84	178
	France - Jura	2008-2010	Confirmed reproduction or presence 3 out of 5 years	All other signs			
Karelian (this time not included: the Russian oblasts of Murmansk and Karelia)	Finland	2009-2011	Confirmed family groups buffered by 10 km	All other signs buffered by 10 km	920	2,538	3,458
Scandinavian	Norway	2007-2011	Confirmed family groups buffered by 10 km	All other signs buffered by 10 km	4,761	2,404	7,165
	Sweden	2006-2011	Confirmed family groups buffered by 10 km	All other signs buffered by 10 km			
Vosges-Palatinian	France - Vosges	2008-2010	Confirmed reproduction or presence 3 out of 5 years	All other	14	46	56
Harz occurence	Germany	2010/2011	Confirmed reproduction	All other, but also frequency or quality criteria (C1 or ≥2 C2 for a sporadic cell)	3	21	24
Total					**8,134**	**6,328**	**14,462**

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

[1]unduplicated – overlapping or border cells only counted once, in case of two cells getting different assessments from the different countries, the higher category was used

7.2.3. Connectivity with other populations

POPULATION	Connectivity with other populations
Alpine	The observed rate of development will most likely not allow for a natural fusion of the western and eastern Alpine populations within the next decades. Nevertheless, the Alps are the area in Western and Central Europe, which can potentially host the largest lynx population – habitat models predict a potential capacity of 960-1,800 lynx, depending on the density assumed. There is potential connection between the western Alpine population and the Jura population, which in turn has potential connections with the Vosges population. There is potential connectivity between the lynx in the eastern Alpine population and the Dinaric population - however, lynx in this area have markedly decreased in the past decade.
Balkan	The Dinaric population in Bosnia-Herzegovina has recently spread south as has the Carpathian population in Serbia and Bulgaria, respectively. These could both potentially lead to a merging with the Balkan population. This would, on one hand, be welcome as a support for this Critically Endangered population; on the other hand, the assumed unique taxonomic status of the Balkan lynx might be corrupted through immigrating lynx from the north and/or west. Both of these potential connections are with lynx that are genetically of Carpathian origin (the Dinaric population was reintroduced with animals of Carpathian origins).
Baltic	To the east the Baltic population connects to the continuous western Russian population, and to the north there is good connection to the Karelian population, with which it shares genetic similarity. The population is very fragmented in its southern and western part. It is very unlikely that any connection remains with the Carpathian population to the south.
Bohemian-Bavarian	The occurrences between the Bohemian-Bavarian and the Carpathian populations – Laberiver Sandstone Mts. and Jeseniky Mts. – seem to have vanished and so have the stepping stones for potential connection. To the south, there is no confirmed evidence of movements between the Bohemian-Bavarian and the Alpine populations. In Austria, occupied areas are actually quite close, but the Danube River and a motorway separate them. On the German side, several motorways in the plain between the Bavarian forest and the Alps make it very unlikely for the lynx to expand to the south and south-west. To the west (towards the Black Forest) the infrastructure barriers are even stronger.
Carpathian	Although very large, the Carpathian population appears to be isolated from other populations. To the north the connection to the Baltic population appears to have been broken as lynx are absent from the lowlands of western Ukraine and in eastern Poland lynx occurrences are exceptionally fragmented.
Dinaric	The connection to the Slovenian part of the Alpine population seems to have weakened as the lynx numbers and range in this area have markedly decreased in the past few years. There is a potential connection with the Balkan population to the south, however, there are no confirmed signs of lynx presence in Montenegro.
Jura	Potential corridors to neighbouring populations (Alpine and Vosges-Palatinian) exist, but there are some barriers like highways and rivers that need to be crossed. Connections to the Chartreuse (French Alps) are the easiest and may indeed have been used, as indicated by signs of lynx presence.
Karelian	The Karelian population is genetically close to the Baltic population and their distributions are more or less continuous, connected via western Russia. Connection to the Scandinavian population is likely to be limited although dispersers have been documented using genetical methods. To the east the Karelian population connects to the continuous Siberian population.
Scandinavian	Although there is some connection to the Karelian population this is probably quite restricted because there are few lynx in the reindeer husbandry area of northern Finland. Genetic data confirm this pattern with Finnish lynx being more closely related to Baltic lynx than to Scandinavian lynx.
Vosges-Palatinian	The connection from the Vosges Mts to the Palatinian Forest is apparently not well established: There is no firm evidence of lynx presence in the later area for some time. An expansion to the east across the Rhine valley is unlikely, and to the west probably also limited due to lack of forest habitats. Along the left shore of the Rhine River, however, a chain of secondary mountain ranges offers the potential for a larger meta-population. There is an obvious connection to the Jura Mts., however with some barriers not easy to overcome.

7.3. IUCN assessment (not included Russia, however assessment does not change with or without Russia):

POPULATION	IUCN assessment
Alpine	EN (D)
Balkan	CR (C2a(i, ii) D)
Baltic	LC
Bohemian-Bavarian	CR (D)
Carpathian	LC
Dinaric	EN (D)
Jura	EN (D)
Karelian	LC
Scandinavian	LC
Vosges-Palatinian	CR (C2a(i, ii) D)

7.4. Legal status and removal options:

Country	EU habitat directive Annex	Bern convention	N Animals killed under article 16 derogation 2007-2008 combined[1]	Annual removals under annex 5	Annual Non-EU legal lynx removals	Management / action plan
Austria	II, IV	II	0	NA	NA	no
Italy	II, IV	II	0	NA	NA	no
Switzerland	NA	II	NA	NA	1 (in 2007; for 2006-2011)	yes
Albania	NA	II	NA	NA	0	draft version
Kosovo*	NA	NA	NA	NA	no info	no info
Greece	II, IV	II	0	NA	NA	only first evidence of potential presence
"The Former Yugoslav Republic of Macedonia"	NA	II	NA	NA	0	draft version
Montenegro	NA	II	NA	NA	no info	no info
Estonia	V	II	NA	130 (mean 2006-2011)	NA	yes
Latvia	IV	II	211	NA	NA	yes
Lithuania	II, IV	II	0	NA	NA	no
Czech Republic	II, IV	II	0	NA	NA	draft only
Germany	II, IV	II	0	NA	NA	yes
Bulgaria	II, IV	II	0	NA	NA	no
Hungary	II, IV	II	0	NA	NA	yes
Poland	II, IV	II	0	NA	NA	draft version
Romania	II, IV	II	50	NA	NA	yes
Serbia	NA	II	NA	NA	0	draft version waiting for approval since 2008
Slovakia	II, IV	II	0	NA	NA	yes
Bosnia-Herzegovina	NA	II	NA	NA	0	no
Croatia	NA	II	NA	NA	0	yes
Slovenia	II, IV	II	0	NA	NA	no
France	II, IV	II	no info	NA	NA	no
Finland	IV	II	304	NA	NA	yes
Norway	NA	II	NA	NA	139 (2011; increasing trend)	yes
Sweden	II, IV	II	86	NA	NA	yes

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

[1]The N2K Group 2011

7.5. Conflict type and costs:

POPULATION	Conflict type and costs (average) / year
Alpine	Switzerland: 12'000 € (for 7-47 small livestock) in the Swiss Alps [range 2006-2011]. In addition, two cantons (ZH, SG) pay compensation to hunting associations for lynx presence.
Balkan	No central information on livestock depredation exists, although interviews and other surveys indicate that conflict levels are low.
Baltic	Only few cases of livestock depredation are reported annually.
Bohemian-Bavarian	Livestock depredation is rare.
Carpathian	Hardly any livestock depredation cases.
Dinaric	Damages are marginal: Bosnia-Herzegovina: sheep and goats, however, no data available. Croatia: No cases of confirmed damages. Slovenia (Alps & Dinaric): 975 € for 9 sheep [2011]
Jura	France: 18'360 € for 92 sheep [mean 2000-2011] Switzerland: between 3-20 sheep/goats per year [range 2006-2011]. The canton of Solothurn pays compensation to hunting associations for lynx presence.
Karelian	Finland [2011]: Reindeer husbandry area: 827'122 € for 554 reindeer. Rest of Finland (outside reindeer husbandry area): 15'600 € for 25 domestic animals.
Scandinavian	Norway: 2.1-2.9 M€ for 7000-10'000 sheep & 1.1-3.4 M€ for 3000-8000 semi-domestic reindeer. Sweden: ~17'500 € (90 sheep). In addition comes the lynx's share of the economic incentive paid to reindeer herders for the presence of large carnivores. In 2009 this was ~3'500'000 € for reindeer.
Vosges-Palatinian	Hardly any livestock depredation cases.

7.7. Critical management issues:

POPULATION	Critical management / conservation issues
Alpine	As with all reintroduced populations the Alpine lynx population was based on a very limited number of founders. The genetic diversity is low and the population is inbred. Low acceptance by some of the interest groups.
Balkan	Illegal killings, loss of prey base and habitat degradation seem to be the main factors that have led to the drastic decrease and almost-extinction of the Balkan lynx. Except for Mavrovo NP in MK there are no signs of reproduction. Plans for infrastructure development in Mavrovo NP pose a potential threat for the remaining core population. The lack of political interest for nature conservation, and non-sustainable wildlife management practices in the range countries are adding up towards the long-term extinction of the lynx.
Baltic	Limited and fragmented distribution of lynx in the southern part of the population range. Translocation of lynx (3 individuals in spring 2012) from Estonia to Poland is ongoing as a conservation measure.
Bohemian-Bavarian	Illegal killing is assumed to occur regularly but there are few confirmed cases.
Carpathian	Lynx could be potentially threatened by infrastructure development projects that threaten to fragment the habitat.
Dinaric	The population has only 3+2 founders and is heavily inbred. Adding new individuals in the northern part of the population is the main conservation action needed.
Jura	The population has to be genetically monitored as it is inbred. There is a severe conflict with hunters (canton of VD).
Karelian	FI: Public attitudes are becoming increasingly negative, genetic diversity has decreased.
Scandinavian	The issues concern conflicts with Sami reindeer herders over lynx depredation on reindeer in both Norway and Sweden, the massive losses of domestic sheep in Norway, and conflict with roe deer hunters in both countries.
Vosges-Palatinian	Small population size. Connections to other populations should be enhanced.

7.8. Most relevant threats per population:

POPULATION	Most relevant threats
Alpine	1. Persecution, 2. Low acceptance due to conflicts with hunters, 3. Infrastructure development due to Transport (roads/railways), 4. Inbreeding
Balkan	1. Persecution, 2. Over-harvesting of wild prey populations, 3. Poor management structures, 4. Infrastructure development
Baltic	1. Persecution, 2. Low acceptance due to conflicts with hunters, 3. Vehicle collision
Bohemian-Bavarian	1. Persecution, 2. Low acceptance due to conflicts with hunters, 3. Vehicle collision
Carpathian	1. Infrastructure development due to transport (roads/railways), 2. Infrastructure development due to tourism/recreation, 3. Persecution
Dinaric	1. Inbreeding, 2. Persecution
Jura	1. Low acceptance due to conflict with hunters, 2. Vehicle collision, 3. Persecution, 4. Inbreeding
Karelian	NA
Scandinavian	1. Persecution, 2. Low acceptance (conflict with livestock; conflict with hunters; as form of political opposition to national/EU intervention; due to fundamental conflict of values about species presence)
Vosges-Palatinian	Low acceptance due to conflict with hunters

The main threats considered relevant vary among populations and within populations - with small populations not surprisingly being more at risk from intrinsic factors and populations covering many political borders facing a wider variety of threats than those mainly contained in one or a few countries (number of questionnaires by population given in brackets).

	Issue ticked off as a threat for lynx (for present time only)							
Threat category (sorted by overall threat assessment for the species)	**Balkan (N=2)**	**Baltic (N=4)**	**Bohemian-Bavarian (N=2)**	**Carpathian (N=7)**	**Dinaric (N=2)**	**Karelian (N=1)**	**Scandinavian (N=2)**	**Vosges-Alps-Jura (N=2)**
Low acceptance	1	4	2	6	2	1	2	2
Persecution	2	2	2	5	2	0	2	2
Poor management structures	2	4	2	5	2	0	1	0
Habitat (Infrastructure)	1	3	2	6	2	0	0	2
Accidental Mortality	2	2	2	5	2	0	1	2
Lack of knowledge	2	4	1	6	2	0	0	0
Intrinsic factors	1	2	2	5	2	0	0	2
Change in native fauna	1	4	0	5	2	0	1	0
Disturbance	2	2	2	5	1	0	0	0
Habitat (Forestry)	2	1	1	4	1	0	0	0
Prey over harvest	2	2	0	5	0	0	0	0
Habitat (Livestock)	0	0	1	2	1	0	1	0
Habitat (Divers)	1	0	0	3	1	0	0	0
Natural disaster	0	0	0	3	1	0	0	0
Harvest	0	2	0	1	0	0	1	0
Pollution (incl. Chlimate change)	0	0	1	1	0	0	0	0
Invasive alien Species	0	1	0	1	0	0	0	0
Habitat (Mining)	0	1	0	1	0	0	0	0
Habitat (Agriculture)	0	0	1	1	0	0	0	0

Wolf – Europe summary

Compiled by Guillaume Chapron

Fig. 1: Wolf distribution in Europe 2006-2011. *Dark cells: permanent occurrence, Grey cells: sporadic occurrence. Red borders mark countries for which information was available.*

[Please note: neighboring countries can have different criteria and time periods for the definition of cells with permanent and sporadic presences. Data from Belarus, Ukraine and Russia are not shown.]

1. Distribution
In Europe, wolves occur in all countries except in the Benelux countries, Denmark, Hungary and the island states (Ireland, Iceland, United Kingdom, Cyprus, Malta). Based on a combination of distribution and social, ecological and political factors we have categorized these into 10 populations: North Western Iberian, Sierra Morena, Alpine, Italian Peninsula, Carpathian, Dinaric-Balkan, Baltic, Karelian, Scandinavian and Central European Lowlands (Fig. 1).

2. Population estimates & monitoring
The estimated total number of wolves in Europe seems to be larger than 10,000 individuals. Based on reported and updated census data, the largest populations are the Carpathian population and the Dinaric-Balkan population (> 3,000 wolves), followed by the Baltic population (>1,000 wolves). Other populations are an order of magnitude smaller (Italian Peninsula ~600 wolves, Scandinavian ~ 300 wolves, Central European Lowlands ~ 200 wolves, Alpine ~ 280 wolves, Karelian > 165 wolves). The Sierra Morena population in southern Spain is the only one on the brink of extinction with only one pack detected in 2012. For the North Western Iberian population, there is no updated data but the population is believed to have remained stable (~ 2,200-2,500 wolves).

Most populations have been increasing or stable since the Wolf Online Information System (WOIS) was released in 2005. A few countries (the unit of reporting for trends) have seen their population estimates decreasing either because of an improvement of census methodology (in Czech Republic, Slovenia, Bulgaria) or because of a real decline in abundance (in Albania, Finland, Macedonia, Portugal, Sierra Morena). Trends in population range are correlated with trends in abundance (and are actually often inferred from trends in abundance). All population ranges have been either increasing or stable except the Finnish part of the Karelian population and the Sierra Morena population in southern Spain.

Monitoring in Scandinavia is based on intensive snow tracking complemented with genetics and telemetry allowing for precise estimates of annual number of reproductions, the total number of individuals, and even information on the inbreeding coefficient of individual pack members. In the Finnish part of the Karelian population monitoring is based on intensive snow tracking and telemetry. In the Baltics harvest data, snow tracking and damage statistics are used for monitoring. The Central European Lowlands population is monitored by using sign surveys (Poland & Germany) in combination with genetics, camera trapping and telemetry (Germany). In the Carpathian population monitoring is largely based on harvest and damage statistics and the collection of wolf signs by various interest groups, however the main method remains an interpretation of assessments made by the various hunting grounds where the methodology is somewhat unclear. The Dinaric-Balkan population spans the most national borders and thus is subject to the most diverse monitoring ranging from interviews with local people and expert assessments based on harvest data, damage reports, sign surveys, camera trapping, telemetry and genetics. The Italian Peninsula population is also monitored through a mix of signs collected over varying time periods by various interest groups, damage reports and expert assessment. The Alpine wolf population is monitored by genetics, confirmed damages, camera trapping, intensive snow tracking and sign surveys. The NW Iberian and Sierra Morena populations are monitored by rendez-vous site mapping in combination with provoked howling censuses to confirm reproduction.

Overall, the small populations are subject to more intense and costly monitoring methods aimed at accurately counting individual packs (Scandinavian, Alpine, Central European Lowlands) than the larger populations where monitoring largely attempts to document wolf presence or relative densities. In hunted populations harvest data is used to identify areas with reproduction based on pups or pregnant / lactating females in the harvest bag and various interpretations based on age / sex structure of the bag.

3. Legal status and management

The legal status of wolves in the European Union countries is directly specified in the Habitats Directive (92/43/EEC). By default wolf populations are listed under Annexes II and IV. Annex II requires the establishment of Natura 2000 sites for the species while annex IV requires strict protection, prohibiting any destruction or damage to the population (but with derogations still possible under Article 16). However, there are some notable exceptions (Bulgaria (Annex V), Estonia (only in Annex V, not in II or IV), Finland (not in Annex II; wolves in reindeer husbandry zones in Annex V instead of IV), Greece (wolves north of 39th parallel only in Annex V, not in II or IV), Latvia (wolf only in Annex V, not in II or IV), Lithuania (wolf only in Annex V, not in II or IV), Poland and Slovakia (wolf in Annex V instead of IV), Spain (wolf north of river Duero in Annex V instead of IV). As non-EU members, Norway and Switzerland are only signatories of the Bern Convention. A growing number of countries have a management plan or are in the process of endorsing one. Management can be centralized (e.g. France, Sweden) or decentralized (e.g. Spain, Germany) leading to the same population facing different management regimes within a country as well as among countries.

4. Conflicts and conflict management

Wolves and livestock are associated with conflicts over the whole species range. The rough economic cost (based on reported compensation only, i.e. excluding countries where no data where available) can be estimated at reaching >8 M€ per year resulting from at least 20,000 domestic animals being predated. Sheep account for the vast majority of livestock deaths, but some populations have particular depredation issues (e.g. reindeer in the Scandinavian and Karelian populations). However, in countries where the absence of wolves has resulted in extensive sheep grazing with minimal supervision, re-establishing former mitigation measures (e.g. shepherding, livestock guarding dogs) or establishing new measures (e.g. electric fences) can cost many times the amount spend on compensation, e.g in France compensation in 2011 amounted for ~1 M€, whereas mitigation amounted for ~7 M€.

The acuteness of the resulting social conflict is not necessarily always directly proportional to the number of animals lost as illustrated by the Scandinavian case, where an annual loss of ~20 hunting dogs is a major driver of a low acceptance of the wolf in rural communities. An increasing number of countries offer a compensation system (with the exception of Albania, “The former Yugoslav Republic of Macedonia” and Lithuania), although who pays the compensation, and under what conditions, varies greatly.

5. Population goals & population level cooperation

Quite a few advances in population level management have been reported in many transboundary populations. Agreements between countries include some degree of coordinated management (Slovenia-Croatia), sharing information (e.g. Italy-France-Switzerland, Germany-Poland, Sweden-Norway-Finland), or most commonly working groups between scientists or managers. For some populations however, little or no progress has been made, either between countries (Karelian, Carpathian) or within the same country (North Western Iberian). In no cases are there as yet any formally binding population management plans between different countries.

6. Threats

The most relevant threats (grouped in 19 main categories) for wolves in Europe, based on 28 questionnaires over all wolf populations, were identified as: low acceptance, habitat loss due to infrastructure development, persecution, poor management structures and accidental mortality. Most threats were expected to become slightly more important in the future (Fig. 2).

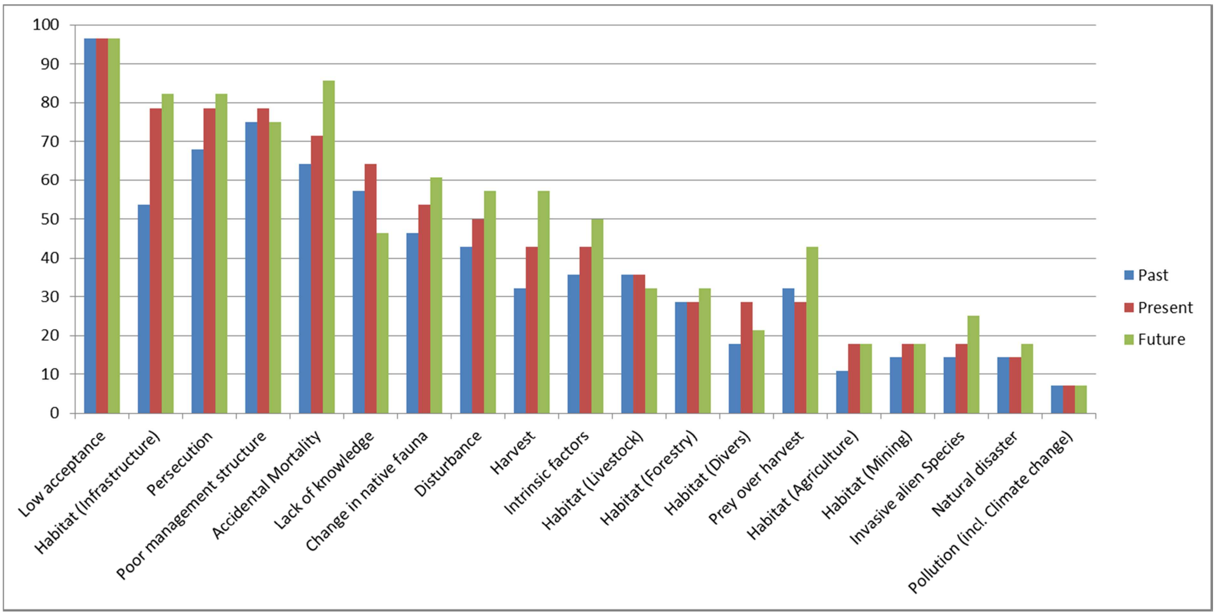


Fig. 2: Threat assessment relevant for wolves over all populations in Europe.

7. Summary tables

7.1.1. Population size and trend:

[Please note numbers may contain double counts of border individuals.]

POPULATION	Last size estimate Wolf Online Information System (2005)	Most recent population estimate	Trend 2006-2011
Scandinavian	Sweden: 102-119 (+24 cross-border) Norway: 21 (excluding border packs) **TOTAL: 147-164**	Sweden: 29 packs + 25 scent marking pairs (including cross border individuals) [2012] Norway: 3 packs + 2 scent marking pairs (23-24 wolves) (excluding border individuals) [2012] **TOTAL: 32 packs + 27 scent marking pairs** **260-330 individuals**	**Increase**
Karelian (not including: Russian oblasts of Karelia and Murmansk)	**Finland: 205-215**	**Finland: 150-165** [2012]	**Decrease**
Baltic (not including: Belarus, northern Ukraine and the Russian oblasts of Kaliningrad, Lenningrad, Novgorod, Pskov, Tver, Smolensk, Bryansk, Moscow, Kursk, Belgorod and Orel)	Estonia: 110 Latvia: ~300 Lithuania: 355 Poland: 200 **SubTOTAL:~1000**	Estonia: 230±30 [2010] Latvia: 300±100 [2010] Lithuania: ~300 [2011] Poland: 267-359 (67-77 packs) [2009] **SubTOTAL: 870-1400**	**Stable to increasing** Estonia: increase (partly due to change in methodology Latvia: stable. Lithuania: stable Poland: increase
Central European Lowlands	Germany: 6 Poland: 13 **TOTAL: 19 individuals**	Germany: 14 packs + 3 scent marking pairs + single residents (43 adult wolves) [2012] Poland: 22 packs + 2 pairs (100-110 wolves) [2012] **TOTAL: 36 packs + 5 pairs**	**Increase**
Carpathian (this time not including: south-western Ukraine)	Slovakia: 400-600 Romania: 2500 Poland: 290 Czech Republic: ~10 Hungary: 10-25 **SubTOTAL: 3300**	Slovakia: ~200-400 (but official estimate is 1823 [2010]) Romania: 2300-2700 [most recent but undated] Poland: minimum estimate 47-51 packs (209-254 wolves) [2009] Czech Republic: 1 wolf [2012] Hungary: single individuals **SubTOTAL: 3000**	**Likely stable, but trend assessment hindered by methodological problems** Slovakia: Possible double counting since number of hunting grounds has increased (their size has decreased) Romania: stable Poland: fluctuating Czech Republic: decrease (possibly due to methodology change).
Dinaric-Balkan	Slovenia: 70-100 Croatia: 150-210 Bosnia: 600 Bulgaria: 2000-3000	Slovenia: 32-43 [2010] Croatia: 168-219 (50 packs) [2011] Bosnia: 650 [2010] Bulgaria: ~1000 [2011] (but	**Likely stable, but trend assessment hindered by methodological problems** Slovenia: decrease, probably due

	"The former Yugoslav Republic of Macedonia": 600-800 Serbia: 750-1000 Greece: 650 Albania: 900-1200 **TOTAL: 5000**	official estimate is 2200-2500 [2006-2005]) "The former Yugoslav Republic of Macedonia": 267 [2010] Serbia: 800±50 [2011] Greece: no updated data, 700 minimum [1999] Albania: 200-250 [2010] (but official estimate is 2370 [2009]) **TOTAL: 3900**	to better monitoring methods implemented since 2010. Croatia: slight increase. Bulgaria: decrease due to earlier improper estimate. "The former Yugoslav Republic of Macedonia": decrease. Serbia: stable. Greece: no updated data. Albania: decrease but likely due to different monitoring methods
Italian Peninsula	**TOTAL: 500-800**	**TOTAL: 600-800**	**Stable**
Alpine	France: 61-130 Italy: no info Switzerland: 3 **TOTAL: ~100-120**	France: ~250 (19 packs, incl. 4-6 transboundary packs) [2012] Italy: 70 (15 packs) [2010/11] Switzerland: 8 [2011], first reproduction in 2012 Austria: 2-8 [2009-2011] Slovenia: occasional dispersers **TOTAL: ~280** (less than sum to avoid double counting)	**Increase**
NW Iberian	Spain: ~2000 Portugal: ~220-435 **TOTAL: ~2200-2500**	No recent estimates of total population size. Only for some regions: Basque Country, Catalonia, Castilla-La-Mancha, Madrid. **TOTAL: no recent update**	**Possible decrease, but trend assessment hindered by lack of updated population estimates.** Spain: recent estimates only from small part of range Portugal: decrease of breeding packs from recent surveys conducted in specific areas (Trásos-Montes area, South Douro river area)
Sierra Morena	**TOTAL: 63-77**	1 pack [2012] **TOTAL: 1 pack**	**Decrease and population close to extinction**

7.1.2. Monitoring methods:

Population	Country	Monitoring methods	
		National	**Regional**
Scandinavian	Norway	Snow tracking, genetics (individual recognition & inbreeding coefficients), dead wolves, wolf damage reports	
	Sweden	Snow tracking, genetics (individual recognition & inbreeding coefficients), telemetry, dead wolves, wolf damage reports	
Karelian	Finland	Snow tracking, genetics, telemetry (50% of packs)	Howling, genetics
Baltic	Estonia	Snow tracking, unique reproductive packs, observations & tracks	Howling, genetics
	Latvia	Sum of hunting ground "counts", guesstimate, long term trend in harvest composition & efficiency	
	Lithuania	Snow tracking, sum of hunting ground "count", guesstimate	Genetics
	Poland - NE	Collection of wolf presence signs to confirm packs	Snow tracking, genetics, howling, telemetry
Central European Lowlands	Germany	Snow & sand tracking, camera trapping, genetics, collection of confirmed C1 and C2 signs	Telemetry
	Poland - W	Collection of wolf presence signs to confirm packs	Snow tracking, genetics, howling, telemetry
Carpathian	Czech Republic	*No info*	Confirmed & documented tracks and scats from winter
	Poland - SE	Collection of wolf presence signs to confirm packs	Snow tracking, genetics, howling, telemetry
	Romania	Sum of hunting ground "counts"	Snow tracking, howling, genetics, camera trapping, telemetry, confirmed packs
	Slovakia	Sum of hunting ground "counts"	Snow tracking, genetics, camera trapping
Dinaric-Balkan	Albania	Guesstimate	Snow tracking, camera trapping, sign identification, questionnaires
	Bosnia-Herzegovina	Snow tracking, howling, sum of hunting ground "count"	
	Bulgaria	Sum of hunting ground "count", guesstimate	Snow tracking, telemetry, howling, density extrapolation
	Croatia	Combined estimate	Snow tracking, analysis of spatio-temporal occurence of wolf damages in areas where wolves feed predominantly on livestock, telemetry
	Greece	Howling to confirm information from locals, wolf damage reports, interviews with locals	Snow tracking, howling, genetics,camera trapping
	Kosovo*	*No info*	*No info*
	"The Former Yugoslav Republic of Macedonia"	Sum of hunting ground "counts"	Guestimates
	Montenegro	*No info*	*No info*
	Serbia	*No info*	*No info*
	Slovenia	Snow tracking, howling, genetics	Genetic CMR
Italian Peninsula	Italy - Peninsula	Density extrapolation, guesstimate	Snow tracking, howling, genetics, telemetry
Alpine	Austria	Genetics, camera traps	
	France	Snow tracking, howling to confirm reproduction, confirmed presence signs, genetics	
	Italy - Alps	Snow tracking, CMR genetics, confirmed presence signs	
	Switzerland	Genetics, camera traps, confirmed signs	
NW Iberia	Portugal	Rendevouz site investigation & howling	
	Spain - NW	Rendevouz site investigation & howling	Snow tracking, genetics
Sierra Morena	Spain - S	Rendevouz site investigation & howling, damage levels	

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

7.2.1. Range change and trend:

POPULATION	**Range change since last assessment / Trend 2006-2011**
Scandinavian	**Increase** Sweden: increase Norway: more or less unchanged – established wolves are confined to the management zone along the Swedish border
Karelian (not including: Russian oblasts of Karelia and Murmansk)	**More or less stable** Finland: no change but likely less wolves in Eastern Finland
Baltic (not including: Belarus, northern Ukraine and the Russian oblasts of Kaliningrad, Leningrad, Novgorod, Pskov, Tver, Smolensk, Bryansk, Moscow, Kursk, Belgorod and Orel)	**Increase** Estonia: stable Latvia: stable Lithuania: stable or increasing Poland: increase
Central European Lowlands	**Increase**
Carpathians (this time not including: south-western Ukraine)	**Likely stable** Slovakia: no information provided Czech Republic: decrease (possibly due to methodology change) Romania: stable Poland: generally stable
Dinaric-Balkan	**Increase** Slovenia: increase Bulgaria: decrease due to earlier improper estimate. A recent field survey revealed wolves do not permanently inhabit some of the areas pointed out by foresters in 2008 as areas with permanent wolf presence Croatia: increased range of occurrences of dispersers "The former Yugoslav Republic of Macedonia": stable Serbia: slight increase to the north in central part of the country Greece: increase in South of the country Albania: stable
Italian Peninsula	**Stable**
Alpine	**Increase**
NW Iberian	**No recent update from most Iberian areas** Spain: apparently stable Portugal: slight decrease in some areas
Sierra Morena	**Decrease / extinct**

7.2.2. Occupied cells in the 10 x 10 km EEA grid:

POPULATION	Country	Time period	Definition of cells		N of occupied cells		
			Permanent	Sporadic	Permanent[1]	Sporadic[1]	All[1]
Scandinavian	Norway	2007-2011	Confirmed packs buffered by 10 km	All other signs buffered by 10 km	556	1,705	2,261
	Sweden	2009-2012	Confirmed packs	All other signs			
Karelian	Finland	2009-2011	Confirmed packs	All other signs	253	1,124	1,377
Baltic	Estonia	2008-2010	Confirmed packs	All other signs	942	492	1,434
	Latvia	2006-2012	Harvest data confirming reproduction	All other signs			
	Lithuania	2006-2011	Wolves presence in ≥50% of all counts	Wolf presence ≤50% of all counts			
	Poland-NE	2008-2011	Confirmed reproduction or 50% occupation over last 3 years	All other signs			
Central European Lowlands	Germany	2011/12	Confirmed packs/pairs	All other signs, but also frequency and quality criteria (1 C1 or ≥3 C2)	157	84	241
	Poland-W	2008-2011	Confirmed reproduction or 50% occupation over last 3 years	All other signs			
Carpathian	Czech Republic	2006-2010	NA	All other signs	1,442	270	1,712
	Poland-SE	2008-2011	Confirmed reproduction or 50% occupation over last 3 years	All other signs			
	Romania	2006-2011/12	≥66% of cell intersects hunting units with bears	≤33% of cell intersects hunting units with bears			
	Slovakia	last 20 years	No criteria provided	*No info*			
Dinaric-Balkan	Albania	2006-2011	Expert assessment based on density of signs and habitat quality high	Expert assessment based on density of signs and habitat quality lower	2,565	749	3,314
	Bosnia-Herzegovina	2000-2012	Sign density & best quality habitat high	Sign density & best quality habitat lower			
	Bulgaria	2000-2012	Confirmed signs based on questionnaires to local forestry units and signs from original field work	*No info yet*			
	Croatia	2005-2008	≥50% of grid filled by extrapolated distribution map	≤50% of grid filled by extrapolated distribution map			
	Greece	2006-2010	Confirmed packs or livestock depredation every year	All other signs			
	Kosovo*	*No info*	*No info*	*No info*			
	"The Former Yugoslav Republic of Macedonia"	2006-2011	No criteria provided	No criteria provided			
	Montenegro	2008-2011	No criteria provided	No criteria provided			
	Serbia	*No info*	*No info*	*No info*			
	Slovenia	2009-2011/12	Confirmed packs	All other			
Italian Peninsula	Italy - Peninsula	~ last 5 years	Confirmed packs & expert assessment of pack territories	All other signs	550	24	574
Alpine	Austria	2007-2011	Confirmed packs	All other signs	332	268	600
	France	2006-2010	3 out of 5 years	All other signs			
	Italy - Alps	2010-2011	Confirmed packs	All other signs			
	Switzerland	2005-2011	3 out of 5 years	All other signs			
NW Iberia	Portugal	2007 SPOIS	Confirmed packs	*No info*	1,166	37	1,203
	Spain - NW	2000/01, 2003 & 2011, since 2000 depending on region	Confirmed packs	only information for Pyrenees included			
Sierra Morena	Spain - S	2010/2011	Confirmed packs	*No info*	8	0	8
Total					**7,983**	**4,818**	**12,801**

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

[1]unduplicated – overlapping or border cells only counted once, in case of two cells getting different assessments from the different countries, the higher category was used

7.2.3. Connectivity with other populations

POPULATION	Connectivity
Scandinavian	There is very limited genetic exchange with the Karelian wolf population. Immigration from the Karelian population is the only possible natural mechanism to increase the genetic variability of the Scandinavian population. With the exception of an occasional route across the Baltic ice, all immigrants must pass through the reindeer herding areas of northern Finland, Sweden and Norway where wolves are rarely tolerated. Translocations as a possibility to increase genetic variability are being discussed.
Karelian	The Karelian population is the western most extension of the much larger Russian population and there is a possibility for connection with the Baltic population in the south. However, there is some new genetic evidence from Finland that implies much less genetic exchange than was previously assumed. Some occasional exchange with the Scandinavian population occurs.
Baltic	The Baltic population is also the westernmost portion of the much larger population in Russia and Belarus, and it also potentially connects with the Karelian population. However, there is much uncertainty about the status of wolves in the southern part of their distribution range in Russia and Belarus has announced plans to reduce its population. In Poland, although the distribution is not continuous, dispersal might be still possible between the Baltic and Carpathian populations.
Central European Lowlands	This population has been expanding. The source population is the Baltic population. However, recent genetic results show that genetic exchange between both populations is low. In 2009 a young radio-marked wolf from Germany dispersed through northern Poland all the way to Lithuania and Belarus.
Carpathians	It is likely that some level of genetic exchange occurs with the Dinaric-Balkan population in western Bulgaria, and with the Baltic population through eastern Poland, although this connection is fragmented.
Dinaric-Balkan	To the north, the population has no contact with the nearest population in the Alps, although dispersing animals (from the Dinaric-Balkan population) have been recently reported in Austria and eastern Italy. To the east, the population may exchange individuals with the large wolf population of the Carpathians which extends into northern Bulgaria. The extent of internal connectivity and degree of sub-structuring is in great need of clarification.
Italian Peninsula	The nearest population (apart that in the Western Alps, see below) is in Slovenia (Dinaric-Balkan population).
Alpine	The genetic continuity with the Italian Peninsula population has been assessed at 2.5 individuals per generation, all of them moving from the Apennines to the Alpine population. In 2005, a young radio-marked wolf dispersed more than 1,000 km from Parma (in the Italian Peninsula population) to Nice (in The French part of the Alpine population). Recent genetic evidence from the Austrian Alps has confirmed wolves of Italian origin, and suggested others of likely Dinaric-Balkan and “Eastern European” (no differentiation on population level possible) origin. In 2012 a young radio-marked wolf dispersed from the Slovenian/Croatian border through Austria to the Italian Alps near Lago die Garda.
NW Iberia	The nearest wolf population is in the Western Alps and connections between the two do not exist. However, wolves from the Alps have been reaching the Pyrenees, although breeding has not been confirmed yet.
Sierra Morena	The population is isolated from the NW Iberian population by 270 kilometers, but seems to have gone extinct.

7.3. IUCN assessment

POPULATION	IUCN assessment
Scandinavian	EN
Karelian	EN
Baltic	LC
Central European Lowlands	EN
Carpathians	LC
Dinaric-Balkan	LC
Italian Peninsula	VU
Alpine	EN
NW Iberia	NT
Sierra Morena	CR

7.4. Legal status and removal options

Country	EU habitat directive Annex	Bern convention	N wolves killed under derogations of article 16 in 2007-2008 combined[1]	Annual wolf removals under annex 5	Annual Non-EU legal wolf removals	Management / Action plan?
Norway	NA	II	NA	NA	6 (2011; increasing trend)	yes
Sweden	II & IV	II	10	NA	NA	yes
Finland	IV / V2	excluded	63	26 (mean 2006-2011)	NA	yes
Estonia	V	II	NA	150 (2011; increasing trend)	NA	yes
Latvia	V	excluded	NA	163 (mean 2006-2011)	NA	yes
Lithuania	V	III	NA	40 (2011; increasing trend)	NA	presented in 2011, still not final
Germany	II & IV	II	0	NA	NA	yes
Czech Republic	II & IV	excluded	0	NA	NA	unapproved concept since 7 years
Hungary	II & IV	II	0	NA	NA	*no info*
Poland	II & V	excluded	2	0	NA	under discussion
Romania	II & IV	II	312	NA	NA	yes
Slovakia	II & V	excluded	NA	149 (2011; increasing trend)	NA	no
Albania	NA	II	NA	NA	0	no
Bosnia-Herzegovina	NA	II	NA	NA	272 (mean 2007-2011)	no
Bulgaria	II & V	excluded	NA	380 (mean 2006-2009)	NA	in the final stage
Croatia	NA	II	NA	NA	23 (2011; increasing trend)	yes
Greece	II & IV / V[3]	II	*no info*	0	NA	no
Kosovo*	NA	*no info*	NA	NA	*no info*	*no info*
"The Former Yugoslav Republic of Macedonia"	NA	excluded	NA	NA	144 (mean 2008-2010)	no
Montenegro	NA	II	NA	NA	*no info*	*no info*
Serbia	NA	II	NA	NA	25-35 (estimated mean for 2006-2011)	unapproved draft since 2007
Slovenia	II & IV	excluded	10	NA	NA	yes
Italy	II & IV	II	0	NA	NA	yes (but Alps no)
Austria	II & IV	II	0	NA	NA	yes
France	II & IV	II	*no info*	NA	NA	yes
Switzerland	NA	II	NA	NA	0-2 (range 2006-2011)	yes
Portugal	II & IV	II	0	NA	NA	no
Spain	IV / V[4]	III	3	~200 (estimated mean 2006-2011)	NA	yes

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

[1] The N2K Group 2011, [2]on annex V in the reindeer [3]excluded from II and on annex V north of 39th areas parallel,[4]on annex V north of river Duero

7.5. Conflict type and compensation costs:

[*Mostly by country rather than population, country attributed to the population it has the largest share with, costs do not include expenses for mitigation measures*]

POPULATION	Conflict type and compensation costs
Scandinavian	Sweden: 100'000 € (~200-500 small livestock), ~20 hunting dogs. In addition comes the wolf's share of the economic incentive paid to reindeer herders for the presence of large carnivores ~82'000 € [2009] Norway: 120'000-430'000 € for 400-2300 sheep, 0 -70'000 € for 0-239 reindeer [2011]
Karelian	Finland: 500'000 - 1'350'000 € (650-1001 reindeer), 32'688 - 154'302 € (30-120 sheep, 2-6 other livestock (cattle, horses), 25-35 dogs) [range 2007-2011]
Baltic	Estonia: 95'000 € (209 cases in 2011) Latvia: 50-239 livestock, not compensated (range 2008-2011) Lithuania: no data and no compensation Poland (whole country): 95'000 € (~1000 livestock per year)
Central European Lowlands	Germany: 26'584 € (~225 small livestock in 2011) Poland (whole country): 95'000 € (~1000 livestock per year)
Carpathians	Slovakia: ~ 16'000 € ~500 livestock in 2010 Romania: no recent information Poland (whole country): 95'000 € (~1000 livestock per year) Czech Republic: ~1800 € (~10 livestock) in 2006-2010
Dinaric-Balkan	Slovenia: 269'000 € (453 animals) [2007-2011 average] Bosnia: ~400 livestock in 2011 Bulgaria: no data, no compensation Croatia: 194'000 € in 2010 (~1500 livestock) "The former Yugoslav Republic of Macedonia": no data Serbia: governmental compensation only in the Province of Vojvodina where wolf is strictly protected Greece: ~800'000 – 1'500'000 € (~20'000 sheep, ~12'000 goat, ~2000 cattle, ~2000 horses/mules/donkeys; probably only 25% gets reported [2006-2009 average]) Albania: no compensation system and no prevention or mitigation measures
Italian Peninsula	No data available for livestock compensation at national level, data are available only for some protected areas
Alpine	France: ~1 M€ (4618 livestock in 2011) (note: prevention measures cost 7 M€) Italy (Piemonte Region): ~72'953 € direct & 19'703 € indirect losses (383 mostly sheep/goats) in 2011 Switzerland: 40'000-120'000 € (88-358 livestock) [range 2006-2011] Austria: no central database for actual payments (15-70 livestock in 2009-2011)
NW Iberia	Spain: ~2 M€ (guesstimate) Portugal: 763,858 € (~ 2497 attacks) [2010]
Sierra Morena	No damages any more in the last 3 years

7.6. Critical management issues:

Scandinavian	The Scandinavian population was founded in the late 1970s by three individuals coming from Finland. Further emigration has been very low (there are currently genes from only 5 founders in the population) and the population remains inbred, which has rendered management problematic. In 2010-2011, Sweden opened for a licensed wolf hunt (28 in 2009/10, 19 wolves in 2010/11), which attracted criticism from the EU commission. This hunt was part of a broader plan to improve the wolf conservation status to increase acceptance and to bring non-inbred wolves in the population, but this has not yet taken place. The recently proposed population cap at 180 wolves complemented with active translocations would not increase the short-term chance of the population to reach demographic FCS, but would improve their long-term genetic status. In Norway, the main conservation issue is the low goal which has been set by parliament – 3 packs totally inside Norway plus packs on the border with Sweden.
Karelian	The positive trend which the Finnish portion of the Karelian population had in the last decade appears to have been reversed as the number of packs reported is now declining. There is also uncertainty about the exact size and the degree of effective connectivity with the Russian oblast of Karelia.
Baltic	The Baltic population of wolves is facing a potential threat from plans by neighbouring Belarus to reduce its wolf population. As Belarus are outside the EU and the Council of Europe there are few relevant international conventions that can be used to stimulate cooperation. However, as of 20 August 2012 the import of wolf hunting trophies from Belarus has been banned (EU declaration 757/2012[1]). Based on recent studies, wolves from the Roztocze region (together with wolves from northern Ukraine and areas eastward) appear genetically different from wolves belonging to the Baltic population, there will therefore be a need for the revision of the population structure of wolves in this region.
Central European Lowlands	Survival and genetic variability is very dependent on dispersal of individuals from NE Poland. Thus factors limiting dispersal (vehicle collisions, poaching, infrastructure barriers) influences the recovery process.
Carpathians	In the Carpathians, there is regular and intensive exploitation of wolves from transboundry populations in Slovakia and Ukraine. Poland shares about 21 transborder packs with Slovakia and every year at least 18% of 150 harvested wolves in Slovakia are estimated to include individuals from these packs. Altogether about 60% of the Slovakian wolf harvest is made within a 20 km zone along the Polish border, potentially causing a source-sink effect. Similarly, there is a general lack of data on the impact of wolf hunting in Ukraine on the number of wolves in neighbouring Poland, Slovakia and Romania.
Dinaric-Balkan	Bulgaria: Recent genetic studies have found hybridization of wolves with domestic dogs or even with golden jackals. Killed animals which are classified as wolves may actually be pure dogs or golden jackals, therefore official numbers of killed wolves per year may not be accurate. In general there is a need to clarify status and distribution within this vast population, with a special view to identify eventual sub-structuring.
Italian Peninsula	In the Italian Peninsula population, hybridization with dogs appears to be a very important threat. A new LIFE NATURA project has just started in Tuscany to raise the level of awareness on this threat and experiment a removal policy. A lack of institutional engagement from many of the regions makes it impossible to organize any population wide monitoring scheme of population size/distribution and of compensation costs.
Alpine	In Italy, political changes in some regions are threatening to remove funding and dismantle the organisation of some highly successful and well organised conservation and conflict mitigation activities.
NW Iberia	Lack of coordination between authorities in the various autonomous regions and a separation between science and management are critical issues. The lack of updated population figures for the entire population is a major source of concern given the fact that they are exposed to hunting.
Sierra Morena	The Sierra Morena wolf population in southern Spain is facing extinction due to an ongoing decline. The latest data from 2012 only documents the presence of one breeding pack.

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:223:0031:0050:EN:PDF

7.8. Most relevant threats per population:

Scandinavian	poaching (half the total mortality), inbreeding, geographic isolation, acceptance by society, practical implementation of management
Karelian	persecution, low acceptance
Baltic	low acceptance, poaching, poor management structure, pathogens (Estonia), infrastructure development
Central European Lowlands	infrastructure development, human disturbance, low acceptance, poor management structure
Carpathians	habitat fragmentation, persecution, human disturbance, low acceptance, transport, infrastructure development
Dinaric-Balkan	low acceptance due to conflicts with livestock, poor dialogue with stakeholders, poor management structures, human disturbance, poaching, transport, hybrids, poaching, low legislation enforcement, infrastructure development.
Italian Peninsula	hybrids, poisoning, low acceptance, poor management structure
Alpine	low acceptance, selective logging, poaching, poor management structures
NW Iberia	low acceptance due to conflicts with livestock, (hybridization), (pest control), poaching, fragmentation of management authorities, habitat fragmentation
Sierra Morena	population facing an extinction vortex with low densities and inbreeding. Ultimate threats are conflicts with livestock and hunters

The main threats considered relevant vary quite widely among populations and within populations - with small populations not surprisingly being more at risk from intrinsic factors and populations covering many political borders facing a wider variety of threats than those mainly contained in one or a few countries (number of questionnaires by population given in brackets).

	Issue ticked off as a threat for wolves (for present time only)									
Threat category (sorted by overall threat assessment for the species)	**Alpine (N=3)**	**Baltic (N=4)**	**Carpathian (N=5)**	**Central European Lowlands (N=2)**	**Dinaric-Balkan (N=7)**	**Ilalian Penninsula (N=1)**	**Karelian (N=1)**	**NW Iberia (N=2)**	**Scandinavian (N=2)**	**Sierra Morena (N=1)**
Low acceptance	3	4	4	2	7	1	1	2	2	1
Habitat (Infrastructure)	3	3	5	2	6	1	0	2	0	0
Persecution	3	2	4	2	4	1	1	2	2	1
Poor management structure	1	4	4	2	7	1	1	2	0	0
Accidental Mortality	2	1	5	2	7	1	0	1	1	0
Lack of knowledge	2	3	3	0	6	1	1	1	0	1
Change in native fauna	0	4	2	1	5	1	0	2	0	0
Disturbance	1	1	3	2	5	1	0	1	0	0
Harvest	0	3	3	0	4	0	0	1	1	0
Intrinsic factors	1	2	3	2	0	0	0	1	1	1
Habitat (Livestock)	1	0	1	0	6	0	1	0	1	0
Habitat (Forestry)	1	1	2	1	3	0	0	1	0	0
Habitat (Divers)	1	0	2	0	4	0	0	1	0	0
Prey over harvest	0	0	2	0	5	0	0	1	0	0
Habitat (Agriculture)	0	1	1	0	2	0	0	1	0	0
Habitat (Mining)	1	1	0	1	1	0	0	1	0	0
Invasive alien Species	0	0	0	0	4	1	0	0	0	0
Natural disaster	1	0	1	0	2	0	0	0	0	0
Pollution (incl. Climate change)	0	0	1	0	0	0	0	1	0	0

Wolverine – Country & Europe summary

Compiled by Henrik Andrén, with input from John Linnell

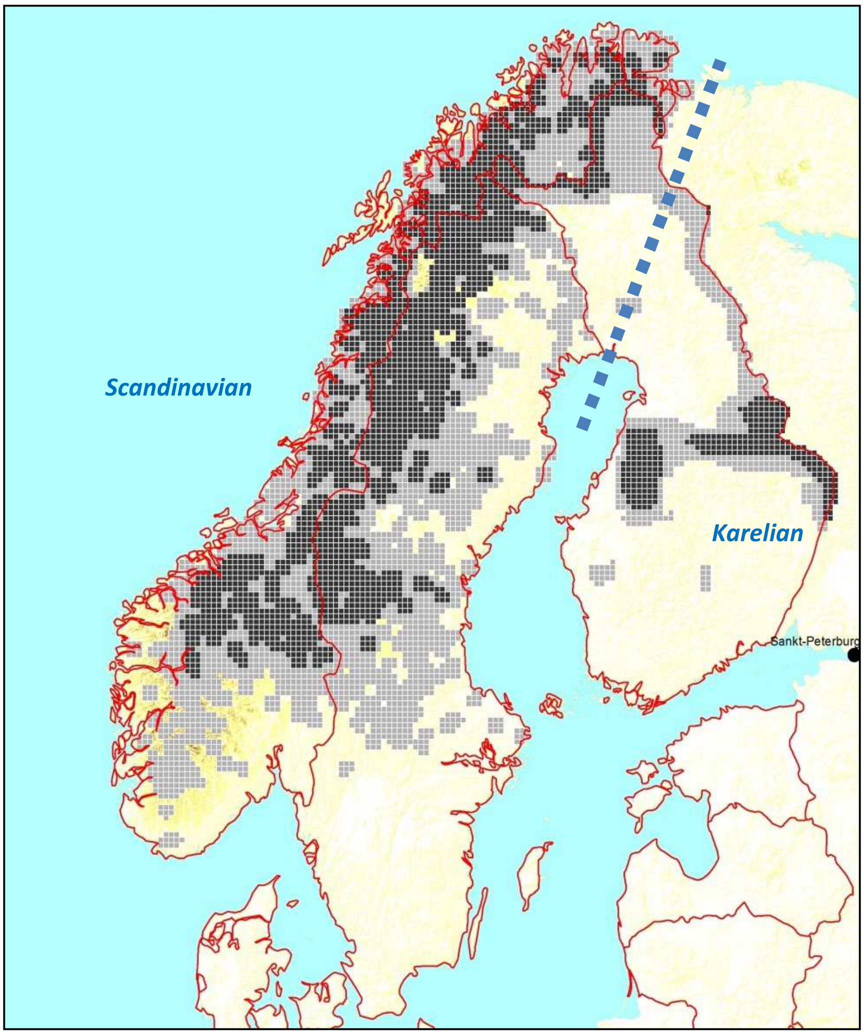


Fig. 1: Wolverine distribution in Europe 2006-2011. Distribution areas in neighbouring Russia are not shown.

Dark cells: reproduction
Grey cells: sporadic occurrence

1. Distribution

Wolverines are found in four European counties in Europe: Sweden, Norway, Finland and Russia. The distribution is divided into 2 populations; the Scandinavian population (common to Norway and Sweden, and the extreme north of Finland) and the Karelian population (Finland and Russia), but there is probably some connection between the two populations. For this assessment there are data on population trends and distribution from Sweden, Norway and Finland, but no recent data are available from Russia.

2. Population estimates & monitoring

The Scandinavian population consists of about 1,100 individuals and is increasing in Sweden (2011: 680 (±100 SE) individuals), but is stable in Norway (2011: 385 (±46 SE) individuals). The range is also increasing in Sweden, but is more or less stable in Norway. The different developments in Sweden and Norway can be explained by the much higher legal harvest rate in Norway (yearly harvest 15-20% of the population) which aims to stabilise the population as compared to Sweden (only a few individuals per year, i.e. < 1%). The population in Finland is increasing both in numbers (2011: 150-170 individuals) and distribution.

The annual surveys in Norway are performed by the rangers from the State Nature Inspectorate (SNO) and evaluated and compiled by a section at the Norwegian Institute for Nature Research

(Rovdata). Chance observations by the public are also followed up and verified. The annual surveys in Sweden are performed by rangers from the county wildlife management authorities together with reindeer herders and other volunteers. The county boards evaluate the surveys and the Swedish Wildlife Damage Center compiles the data.

In both Sweden and Norway the wolverines are surveyed annually in March-May by snow tracking and identification of natal dens which represent reproductions. All former known denning sites are revisited and tracks are followed in an attempt to identify new sites. These surveys aim to cover the entire wolverine range every winter. Reproductions are registered based on observations of cub-tracks or visual observation of cubs, or other documentation of den site characteristics that can separate cache sites from den sites. In both Norway and Sweden many of the sites are revisited during summer after snow melt to collect further evidence of reproduction. Norway and Sweden have just completed a process to standardise their field data collection and interpretation protocols which will facilitate the publication of population wide status reports. Norway also have an annual collection of scats based on snow-tracking using snow-scooters. Each winter in recent years over 100’000 km of scooter based tracking has been conducted. This survey aims to cover the entire wolverine range each year. Genetical methods are used to conduct Capture-Mark-Recapture estimates of population size.

The survey in Finland is based on snow-tracking and line-transects performed in winter which aims to estimate the total number of individuals in the population.

Distribution maps for Sweden & Norway are based on verified natal dens for permanent presence and snow tracking, DNA, verified depredation, and shot animals for sporadic occurrence. All signs were buffered by a 10 km radius and intersected with the 10 x 10 km EEA grid. The Finnish distribution is based on all tracks and signs.

3. Legal status and relevant management agencies

The part of the wolverine populations that falls within the two EU countries, Sweden and Finland, are strictly protected under pan-European legislation (the Habitats Directive). Sweden uses derogations under article 16 of the directive to allow a limited cull of wolverines by game wardens. Finland presently does not remove wolverines at all. Norway manages wolverine as a de facto game species with annual quotas as they are only limited by the Bern Convention in this respect. Because the management objective (set by parliament) is to maintain the population at a stable level lower than which it has at present wardens from the State Nature Inspectorate also kill wolverines outside the normal hunting season using helicopters and den removals.

The Swedish Environmental Protection Agency is working on a new management plan to replace an old action plan from 2000. In Sweden the management decisions (like harvest quotas) are mainly taken by the Swedish Environmental Protection Agency (at a national level). However, the aim is to increasingly delegate management authority to the County Board Administrations. The County Board Administrations are responsible for the annual wolverine surveys in Sweden.

In Norway the management decisions (like harvest quotas) are delegated to Regional Management Committees composed of county level politicians that are appointed to the committee by the Ministry of the Environment. These committees have management authority only if the population is above the regional goal that has been set by parliament. Otherwise the decisions are taken by the Directorate for Nature Management (national level).

In Finland the Ministry of Agriculture and Forestry and Finnish Wildlife Agency is in charge of wolverine management. A management plan was drafted, but has been under revision for the last four years and still has not been finalized.

4. Conflicts and conflict management

The main human-wolverine conflict is similar in Sweden, Norway and Finland, i.e. wolverine depredation on semi-domestic reindeer. In Norway, there is additional conflict because of depredation on domestic sheep. In all three countries the government pays compensation for wolverine killed domestic animals. In Sweden the costs are between 2 - 2.5 M€ per year for reindeer and in Norway between 1.8 - 2.2 M€ per year for reindeer and between 2.7 - 3.8 M€ per year for sheep. The Swedish system is based on a risk based system where compensation is paid a priori based on the presence of reproductive wolverines whereas in Norway the compensation is paid ex post facto based on both documented losses and estimated losses. Because of the difficulty of finding freshly killed animals under extensive grazing conditions only a small proportion of the losses compensated are based on documented kills. Finland pay for a combination of documented losses and estimated losses.

An important management issue in Sweden is the high level of poaching that lowers the growth rate in the wolverine population, although the population is still increasing. An important management issue in Norway is that the current wolverine population is above the management goal and therefore the harvest quotas are set quite high in order to reduce the population.

There is a long-term research project on wolverines in northern Sweden and new wolverine projects in central and northern Norway. These research projects have a tight cooperation and focus on collecting basic ecological data on wolverines, studying the impact of wolverines on semi-domestic reindeer, and exploring the potential interactions between wolverines and Eurasian lynx.

5. Population goal and population level cooperation

The Swedish management goal is an interim target of 90 annual reproductions (approximately 580 individuals). This interim target has been evaluated and there is a suggested management goal of increasing this to a minimum of 133 yearly reproduction (approximately 850 individuals) in Sweden. In Norway management is actually trying to lower the population to its national goals of 39 annual reproductions (approximately 250 individuals). There are no concrete population goals for wolverine in Finland, other than keeping the population at a sustainable level.

There is no formal common population level management plan for Sweden and Norway. But the national agencies (the Swedish EPA and the Directorate for Nature Management) have regular meetings. The new Swedish carnivore policy has acknowledged the idea of population management and civil servants at the national political level meet on a regular to discuss large carnivore management questions. At the moment there is a working group led by the national agencies to develop a common survey methodology and common status reports for Sweden and Norway. Some reindeer management units have migration routes that cross the border, in which case the compensation for losses is paid by the country in which the predation occurs. There is little coordination between both Norway and Sweden with Finland on wolverine issues.

6. Threats

In the past the main threats were over-harvest and poaching. The disappearance of the other large carnivores in the past might also have had a negative impact on the wolverine, as carrion provided by the kills of other predators is important for wolverines.

Today the threats are still over-harvest (harvest for population regulation in Norway) and poaching. But the threat because of over-harvest is lower today, as the harvest quotas are set in relation to management goals and the effects are evaluated by the results from annual surveys. The management system is coming closer to an adaptive management approach which means that any undesired reductions in population size can be addressed by reducing harvest quotas.

An emerging threat is climate change as wolverines are dependent on good snow conditions (deep snow that lasts long into spring time) for their natal dens.

A chronic threat is the low population goals set by both Norway and Sweden because of conflict with semi-domestic reindeer herding in both countries and sheep farming in Norway. The reindeer husbandry system has advocated certain tolerance levels for the total losses of reindeer to all predators, based on economically acceptable losses. These "acceptable" losses are much lower than the estimated losses today. Thus, if the politicians decide to follow these tolerance levels, then the management goals for all predators, including wolverines, would have to be lower than today.

7. Summary tables

7.1.1. Population size and trend:

[Please note numbers may contain double counts of border individuals]

Name	**Last size estimate Wolverine Information System of 2005**	**Most recent size estimate (2010, 2011 or 2012)**	**Trend 2006-2011**
Scandinavian	Norway: 200 Sweden: 400 **TOTAL: 600**	Norway: 58 reproductions (~385 (±46 SE)) [2011] Sweden: 118 reproductions (~680 (±100 SE)) [2011] **TOTAL: 1065 (±150 SE)**	**Increase**
Karelian (this time not including Russian oblasts of Murmansk and Karelia)	Finland: 75	Finland: 165-175	**Increase**

7.1.2. Monitoring methods:

POPULATION	**Country**	**Monitoring methods**	
		National / population	**Regional**
Scandinavian	Norway	Intensive snow tracking & natal den mapping. CMR based on faecal DNA.	
	Sweden	Intensive snow tracking & natal den mapping	
Karelian	Finland	Intensive snow tracking – line transects	

7.2.1. Range changes and trend:

POPULATION	**Range change / Trend**
Scandinavian	**Increase** Sweden: expanding south-eastwards (into the forest landscape) Norway: stable
Karelian (this time not including Russian oblasts of Murmansk and Karelia)	**Increase** Finland: increase

7.2.2. Occupied cells in the 10 x 10 km EEA grid:

POPULATION	Country	Time period	Definition of cells		N of occupied cells		
			Permanent	Sporadic	Permanent[1]	Sporadic[1]	All[1]
Scandinavian	Norway	2007-2011	Confirmed natal dens buffered by 10 km	All other buffered by 10 km	2,202	1,635	2,837
	Sweden	2006-2011	Confirmed natal dens buffered by 10 km	All other buffered by 10 km			
	Finland NW	2009-2011	Confirmed female presence (den & family tracks) buffered by 10 km	All other buffered by 10 km			
Karelian (this time not including Russian oblasts of Murmansk and Karelia)	Finland	2009-2011	Confirmed reproduction (den & family tracks)	All others & expert assessment	277	439	716

[1]unduplicated – overlapping or border cells only counted once

7.2.3. Connectivity with other populations

POPULATION	Connectivity with other populations
Scandinavian	There is probably a connection to the Karelian population to the east, although better mapping is needed in northwestern Russia to clarify the connectivity through Murmansk and Karelia oblasts.
Karelian	There is potential connectivity with both the Scandinavian population and the continuous northern Russian population of wolverines that extends eastwards, although better mapping is needed in northwestern Russia.

7.3. IUCN assessment:

POPULATION	IUCN assessment
Scandinavian	VU (Vulnerable) - Criterium D1 (small population)
Karelian	*No information*

7.4. Legal status and removal options:

Country	EU habitat directive Annex	Bern convention	N Animals killed under article 16 derogation 2007-2008 combined[1]	Annual removals under annex 5	Annual Non-EU legal lynx removals	Management / action plan
Norway	NA	II	NA	NA	77 (2011; increasing trend)	yes
Sweden	II & IV	II	8	NA	NA	yes
Finland	II & IV	II	0	NA	NA	no yet

[1]The N2K Group 2011

7.5. Progress in population level management:

POPULATION	Population level management?
Scandinavian	Norway and Sweden have a close dialogue on large carnivore management issue at the level of the national wildlife management authorities. In addition, research is coordinated across the borders. Monitoring is becoming standardised. Reciprocative compensation issues are formalised for reindeer units that migrate across the border. But there is no "common" management plan that really takes into account the joint wolverine population.
Karelian	*No information*

7.6. Conflict type and costs:

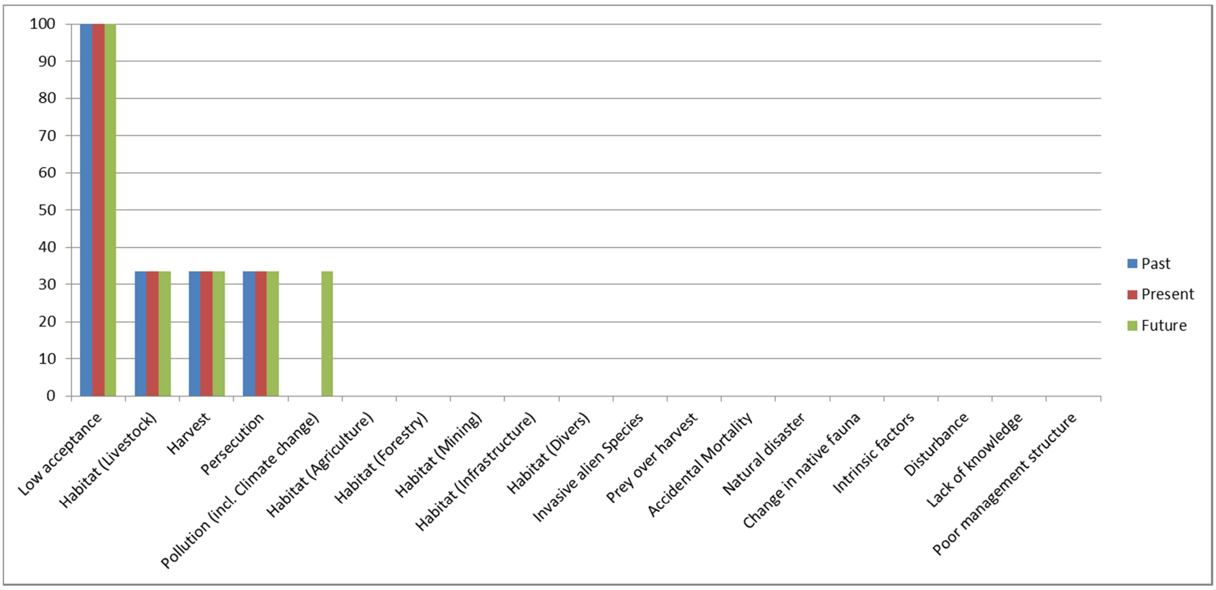
POPULATION	Conflict type and costs per year
Scandinavian	Sweden: for reindeer 2.0-2.5 M€ Norway: for reindeer 1.8-2.2 M€, for sheep 2.7-3.8 M€
Karelian	Finland: 1,300-2,500 reindeer per year are compensated *Russia: No information*

7.7. Critical management issues:

POPULATION	Critical management / conservation issues (in decreasing order of importance)
Scandinavian	Sweden: poaching, tolerance levels due to conflicts with reindeer husbandry Norway: harvest levels, population regulation, tolerance levels due to conflicts with reindeer and sheep husbandry
Karelian	*No information*

7.8. Most relevant threats per population:

The most relevant threats (grouped in 19 main categories) for wolverine based on 3 questionnaires over all wolverine populations, were identified as: low acceptance, habitat loss due to livestock (mainly concerning reindeer herding areas), harvest (low population goals), and persecution. Other threats did not play any role for this species. However, climate change was identified as a potential future threat, as the availability of suitable denning habitat (snow caves) may decrease with increasing temperatures.



IV. Appendix

Appendix 1: Population names used in this report and names formerly used[1].

Bear	Lynx	Wolf	Wolverine
Cantabrian	**Cantabrian**	**North Western Iberian** (formerly also refered to as Iberian or NW Iberia population)	**Scandinavian** (formerly divided into Scandinavian, southern Norwegian & Swedish forest population)
Central Apennine (formerly: Abruzzo, Apennine, or Apennine Mountains)	**Bohemian-Bavarian** (formerly als refered to as Bavarian-Bohemian)	**Sierra Morena**	**Karelian** (formerly also refered to as Finish-Russian population or subdivided into Finnish-Western Russian and Finnish Western wolverine population)
Alpine (formerly also refered to as Alps)	**Alpine** (formerly also refered to as Eastern Alps & Western Alps)	**Alpine** (formerly als refered to as Alps or Western-Central Alps)	
Eastern Balkan	**Balkan**	**Italian Peninsula** (formerly also refered to as Italian)	
Carpathian (formerly also refered to as Carpathian Mountains)	**Carpathian**	**Carpathian**	
Dinaric-Pindos	**Dinaric**	**Dinaric-Balkan**	
Baltic	**Baltic**	**Baltic**	
Karelian	**Karelian** (formerly included in Nordic population together with Norway & Sweden)	**Karelian**	
Scandinavian	**Scandinavian** (formerly included in Nordic population together with Finland)	**Scandinavian**	
Pyrenean (formerly also refered to as Pyrenees)	**Vosges-Palatinian** (formerly also refered to as Vosges)	**Central European Lowlands** (formerly: Germany / West Poland)	

[1]Formerly used population names as found in:

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).

Bear Online Information System for Europe (BOIS), http://www.kora.ch/sp-ois/bear-ois/index.htm

Eurasian Lynx Online Information System for Europe (ELOIS), http://www.kora.ch/en/proj/elois/online/index.html

Eurasian Lynx Online Information System for Europe (ELOIS), http://www.kora.ch/en/proj/elois/online/index.html

Wolf Online Information System for Europe (WOIS), http://www.kora.ch/sp-ois/wolf-ois/index.htm

Wolverine Information System for Europe (WISE), http://www.kora.ch/sp-ois/wise%20alpha%200.1/index.htm

Maps of species distribution and population designations:

Bear: http://www.lcie.org/Docs/LCIE%20IUCN/bear_pop_map.jpg

Lynx: http://www.lcie.org/Docs/LCIE%20IUCN/lynx_pop_map.jpg

Wolf: http://www.lcie.org/Docs/LCIE%20IUCN/wolf_pop_map.jpg

Wolverine: http://www.lcie.org/Docs/LCIE%20IUCN/wolverine_pop_map.jpg

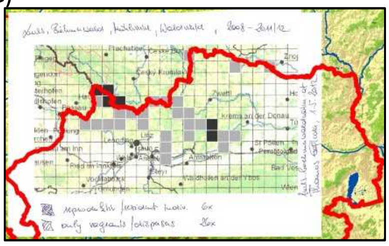
Appendix 2: Some examples of the diversity of data formats that were provided for the mapping large carnivore distribution in Europe.

Example 1: Distribution is provided in a different grid format, the challenge was how to transfer the old grid to the new grid. The example is for lynx distribution in northern Austria. A) Grid provided by expert (7 cells reproduction, 27 cells sporadic); B) First interpretation by trying to come up with a matching symmetry and number of cells – however, geographic representation is wrong; C) Expert went back to his point data and intersected it with the EEA grid - now the geographic representation is correct, but the number of cells has changed to 6 cells reproduction, 26 cells sporadic.

A)

B)

C)



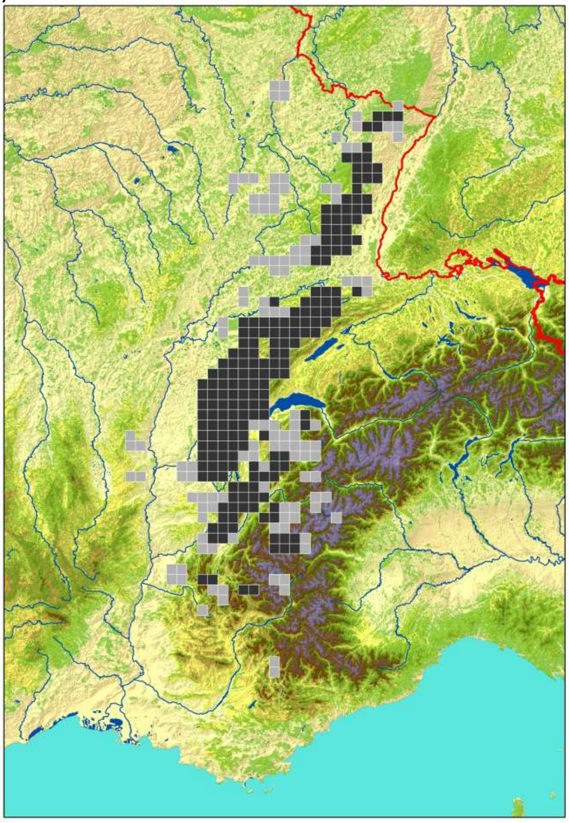
Example 2: A distribution map is provided. The example is for lynx in Croatia. A) Distribution map of lynx in Croatia based on a combination of hard fact point data and expert assessment to fill the gap. B) Conversion to a grid based on the % of area of the EEA grid cell covered by the distribution map – in this case >50% was the criteria to define a cell as occupied resulting in 109 cells permanent, 28 cells sporadic.

A)

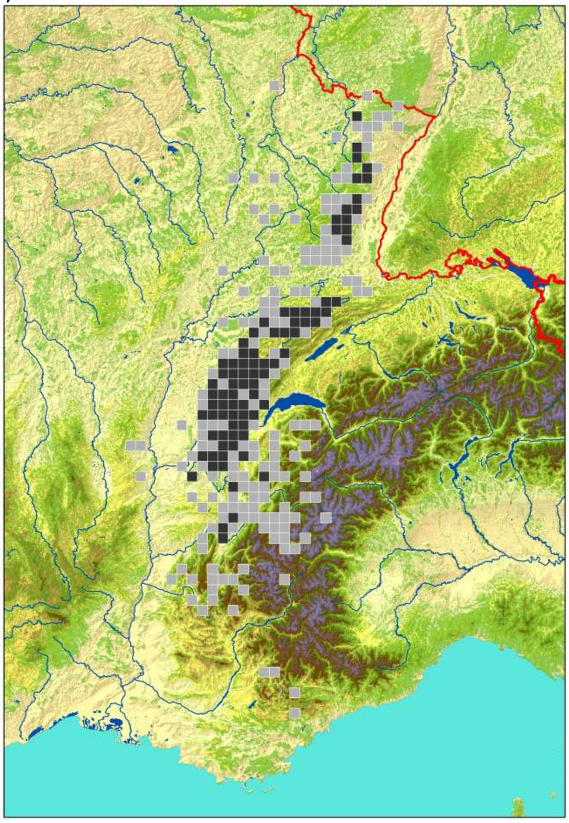
B)

Example 3: Different criteria are used. The example is for lynx in France. A) French criteria developed by Vandel et al. 2007 uses a buffer and results in 193 cells reproduction, 123 cells sporadic; B) Swiss criteria (no buffer & permanent = 3 out of 5 years present) results in 83 cells reproduction, 171 cells sporadic.

A)

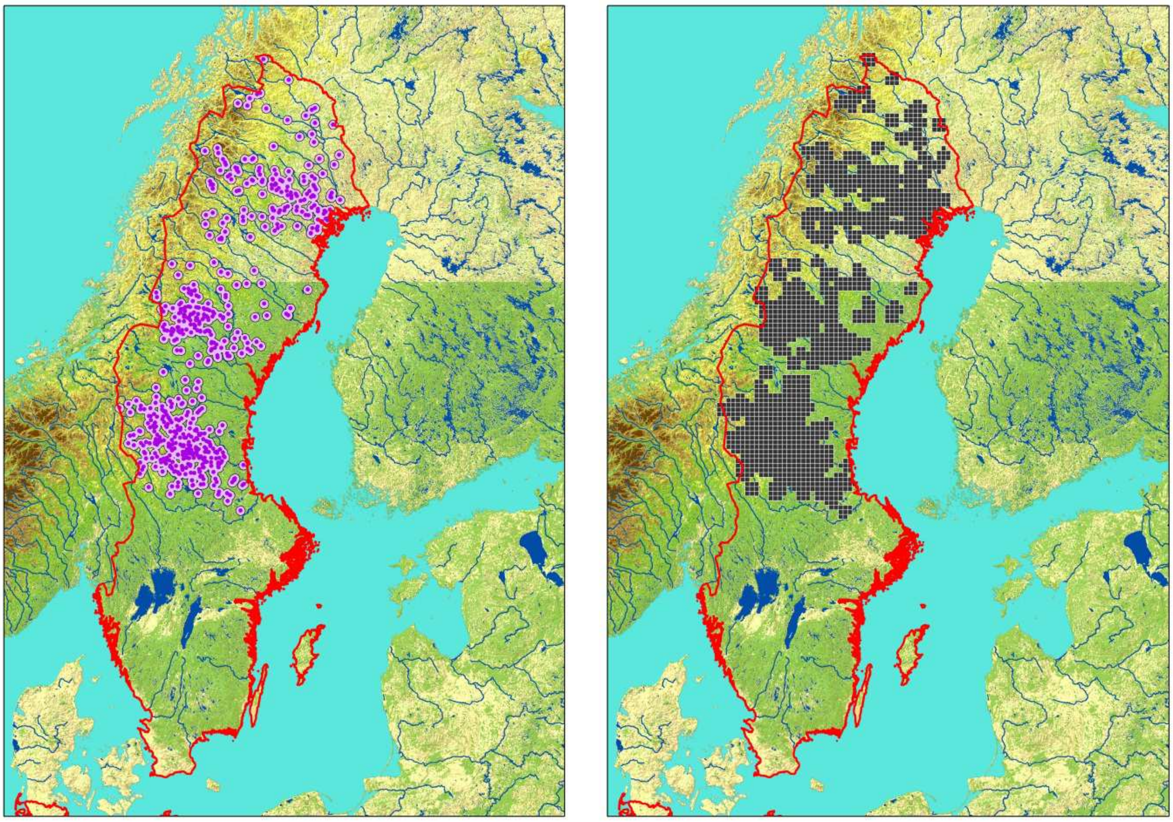


B)



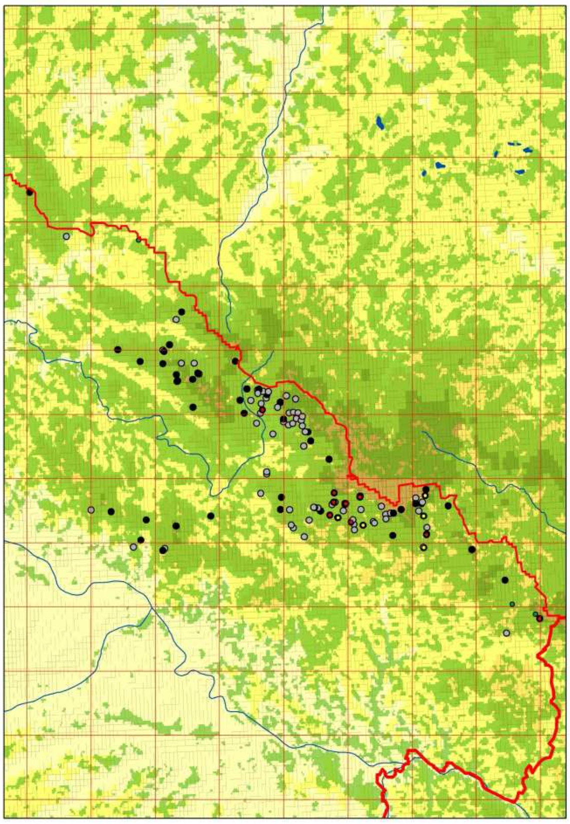
Example 4: Point data is buffered. The example is for bears in Sweden. A) Female bears shot in Sweden 2006-2011 as a proof for reproduction / permanent range. Because female bear have large home ranges of 200-1,000 km² (median 250 km²), every killed female was buffered with a 10 km radius (buffered area 314km²). Even this is a conservative estimate of permanent presence, as each females home range will be associated with male home ranges that are even larger. The buffered area was intersected with the EEA grid and resulted in 1,498 cells with reproduction. Without the buffer only 640 cells would have been identified as cells with reproduction.

A) B)

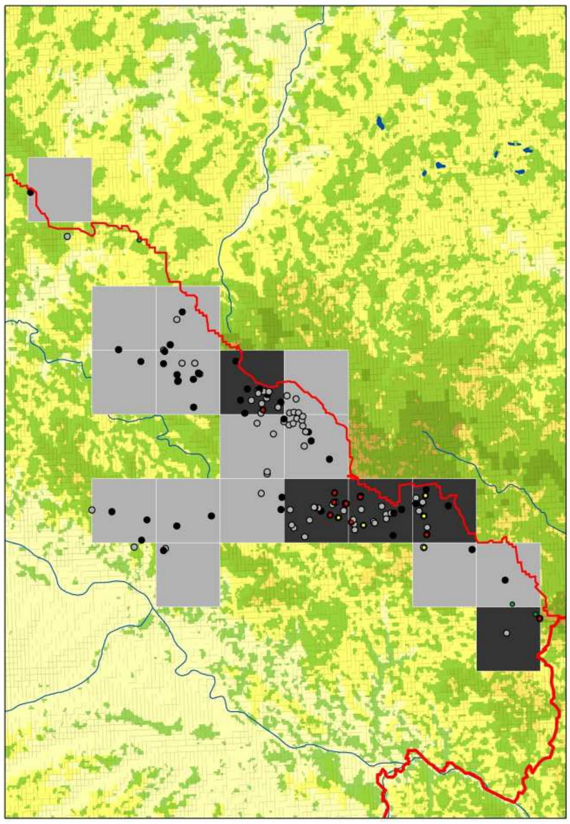


Example 5: Only point data with a certain quality and a threshold number is used. The example is for lynx in Germany in the Bavarian population. A) SCALP C1 & C2 signs collected in 2010/11 (only one year) – black (C1) grey (C2) but no evidence of reproduction, red (C1) & yellow (C2) plus evidence of reproduction. B) Cells are only accepted as occupied if they contain at least 1 C1 or 2 C2 signs for both categories resulting in 5 cells with reproduction and 14 cells with sporadic occurrence.

A)



B)



Appendix 3: Questionnaire on the status and management of large carnivores in Europe.

LCIE – 2012 Knowledge Update

IMPORTANT :

A) All data refer to 2010 if not otherwise specified

B) This form should be filled for each country AND, if you have the data, also for each portion of the LCIE-defined populations inside the country. We will later compile together the data to produce a (LCIE)-population based report.

C) The following questions request a level of detail that may not be applicable or possible for many respondents. Please fill in as much as you can and where it is applicable.

D) For answers that contain numbers, please try to attach the original report (in any language) where they come from so that we can track the numbers we will present.

SPECIES:
COUNTRY:
POPULATION:
COMPILER:

---

1. ABUNDANCE

1.1 How is population size estimated?

	Entire country / known distrib. range	Part of country/ known distrib. range	Reference area
1.1.1. aerial survey: Y/N			
1.1.2. snow-tracking: Y/N			
1.1.3. wolf howling: Y/N			
1.1.4. genetic sampling: Y/N			
1.1.5. density extrapolation: Y/N			
1.1.6. guesstimate: Y/N			
1.1.7. CMR camera-trapping: Y/N			
1.1.8. sum of hunting ground “counts”: Y/N			
1.1.9. other:…………………………… …………………………………………………			

1.2. Who does it ?

1.2.1. governmental agencies: Y/N
1.2.2. academic/research centers: Y/N
1.2.3. NGOs (conserv. or hunting): Y/N
1.2.4. independent individuals: Y/N
1.2.5. other:……………………….

1.3. What is the latest media/mean value (or ranges) of population size:……………. (Date:………..)

1.3.1 and error around the mean? ………………..

1.4. Are these values revealing an increase or a decrease since the previous population estimate published in the SPOIS?..........

1.4.1. Give a table with estimates per years if possible:
2006…….2007………...2008……….2009………..

1.4.2. Are changes a consequence of changed methodology: Y/N

1.4.3. Are changes a consequence of planned management action: Y/N

1.5. If both official estimations and diverging scientific/expert estimates are available give both.: official………………. (Date:…………) expert……………….. (Date:………..)

1.6. Present density numbers if such are available from (1) specific areas (scientific robust methodology (e.g. CMR) or (2) official density estimates were published:

Area/name	Area size	Popul. Size	Density	Method used	Date

Comments:………

2. RANGE

2.1. Please attach a map to this update, separating between range of reproductive / resident individuals and areas only used by vagrants / dispersers. (Use 10 x 10 km raster map for update – follow instructions in separate attachment). Please provide data of the map.

2.2. Has the range increased or decreased since the last (SPOIS 2007) range estimate?..

Comments:………..

………

3. MANAGEMENT AND HARVEST

3.1. Is there a formal management plan or action plan? Y/N

If yes please send a copy as pdf

3.2. Which is the formal department / ministry responsible for management?

……..

3.3. To what extent is management decentralized to sub-national authorities?

……..

3.4. To what extent are the public / stakeholders involved in management planning and management decisions ?

……..

……….

3.5. Is there an official goal for the size and distribution of the population? Y/N

If so what are the goals? ………………………………………………………………

3.6. Are there any specific zoning policies with different management systems in different regions?

…………………………………………………………………….

3.7. What is the legal status of the species in the country:…………………………………….

……

3.8. Are there any formal (Y/N) __________ or informal (Y/N) ___________ transboundary arrangements concerning cooperation in large carnivore management? If so, please elaborate…………………………………………………………………

………..

3.9 Number of respective LS species individual killed	2006	2007	2008	2009	2010	2011
How many are known to be killed each year (Σ)						
- by hunters as part of a hunting season						
- by hunters / farmers as part of a targeted damage limitation action						
- by state game wardens / employees						
- confirmed cases of illegal killing						
- traffic mortality						
- disease						
- other (specify)						

Comments:………..

………

4. LIVESTOCK DEPREDATION and COMPENSATION SYSTEM

4.1 Depredation claims	2006	2007	2008	2009	2010	2011
How many of the following livestock species are **claimed** as being killed each year by the relevant large carnivore species (give number if possible, otherwise Y/N)						
- sheep						
- goats						
- cattle						
- horses						
- pigs						
- reindeer						
- dog						
- other						

4.2. Is there a compensation system in place in your country for the below listed livestock species? (if the answer varies per province / region please copy the table and give separate answers for each region with a different system) Y/N

- sheep ……….
- goats…………
- cattle.............
- horses...........
- pigs................
- reindeer.................
- dogs…………………
- other…………………

4.2.1. If yes, who pays the compensation?

a) The government? Y/N If yes from which department or ministry are funds drawn?

……………………………………………………………………………………………………

b) Hunters? Y/N

c) Environmental NGO? Y/N

d) Other? (please mention)……………………………………

4.2.2. Does the system compensate only documented losses ? Y/N

or does it also pay for animals that are simply lost? (Y/N)

if so are there any conditions about compensating lost animals?..

4.2.3. Are killed livestock examined by anybody to confirm the cause of death? Y/N,

if so who examines the kills? ....

4.2.4. What proportion of the livestock that are compensated are confirmed as being killed?..

4.2.5. What percentage of the value of the killed / lost livestock is paid? _________

4.2.6. Is compensation paid in real time (continuously or in regular time steps) or at the end of each year?..................................

4.3 Livestock compensated	2006	2007	2008	2009	2010	2011
How many of the following livestock species are **compensated** as being killed each year by the relevant large carnivore species						
- sheep						
- goats						
- cattle						
- horses						
- pigs						
- reindeer						
- dogs						
- other						

4.4. Compensation costs	2006	2007	2008	2009	2010	2011
How much is **spent** on paying for compensation for the following livestock each year?						
- sheep						
- goats						
- cattle						
- horses						
- pigs						
- reindeer						
- dogs						
- other						

4.5. Is funding available for adopting mitigation (to prevent depredation) measures? Y/N

If yes, who pays? (name the agency or department)…………………………………………………

4.6. Which of the following measures are supported?

4.6.1. Electric fencing? Y/N

4.6.2. Livestock guarding dogs Y/N

4.6.3. Salary for shepherds? Y/N

4.6.4. Other logistical support for shepherds? Y/N

If yes, please mention which:………………………………………………………………

4.6.5 Conversion to alternative forms of agriculture? Y/N

Comments:……..
………
……..

5. THREATS TO SURVIVAL (adapted from the new IUCN authority lists)
Fill in: x= moderately important
xx= very important

Threat	Past <2005	Present 2006-2011	Future >2012
1. Habitat loss/degradation (human induced)			
1.1. Agriculture			
1.1.1. Crops			
1.1.1.1. Shifting agriculture			
1.1.1.2. Small-holder farming			
1.1.1.3. Agro-industry farming			
1.1.2. Wood plantations			
1.1.2.1. Small-scale			
1.1.2.2. Large-scale			
1.1.3. Non-timberplantations			
1.1.3.1. Small-scale			
1.1.3.2. Large-scale			
1.1.4. Livestock			
1.1.4.1. Nomadic			
1.1.4.2. Small-holder			
1.1.4.3. Agro-industry			
1.1.5. Abandonment			
1.1.8. Other			
1.1.9. Unknown			
1.2. Land management of non-agricultural areas			
1.2.1. Abandonment			
1.2.2. Change of management regime			
1.2.3. Other			
1.2.4. Unknown			
1.3. Extraction			
1.3.1. Mining			
1.3.3. Wood [forestry practices]			
1.3.3.1. Small-scale subsistence			
1.3.3.2. Selective logging			
1.3.3.3. Clear-cutting			
1.3.4. Non-woody vegetation collection			
1.3.7. Other			
1.3.8. Unknown			
1.4. Infrastructure development			
1.4.1. Industry			
1.4.2. Human settlement			
1.4.3. Tourism/recreation			
1.4.4. Transport – land [roads / railways]			
1.4.5. Transport – water			
1.4.6. Dams			
1.4.7. Telecommunications			
1.4.8. Power lines			
1.4.9. [Wind power development]			
1.4.10. Unknown			

1.5. Invasive alien species (directly impacting habitat)			
1.6. Change in native species dynamics (directly impacting habitat)			
1.7. Fires			
1.8. Other causes			
1.9. Unknown causes			
2. Invasive alien species (directly affecting the species)			
2.1. Competitors			
2.2. Predators			
2.3. Hybridizers			
2.4. Pathogens/parasites			
2.5. Other			
2.6. Unknown			
3. Harvesting [hunting/gathering]			
3.1. Food [killing carnivores for food]			
3.1.1. Subsistence use/local trade			
3.1.2. Sub-national/national trade			
3.1.3. Regional/international trade			
3.2. Medicine [killing for medicine]			
3.2.1. Subsistence use/local trade			
3.2.2. Sub-national/national trade			
3.2.3. Regional/international trade			
3.5. Cultural/scientific/leisure activities [i.e. recreational hunting]			
3.5.1. Subsistence use/local trade			
3.5.2. Sub-national/national trade			
3.5.3. Regional/international trade			
3.6. [Population regulation]			
3.7. [Over-harvesting of wild prey populations]			
4. Accidental mortality			
4.1.2.1.Trapping/snaring			
4.1.2.2. Shooting			
4.1.2.3. Poisoning			
4.1.3. Other			
4.1.4. Unknown			
4.2. Collisions			
4.2.2. Vehicle collision			
4.3. Other			
4.4. Unknown			
5. Persecution [illegal killing / poaching]			
5.1. Pest control			
5.2. Other			
5.3. Unknown			
6. Pollution (affecting habitat and/or species)			
6.1. Atmospheric pollution			
6.1.1. Global warming/oceanic warming			
6.1.2. Acid precipitation			
6.1.3. Ozone hole effects			
6.1.4. Smog			
6.1.5. Other			
6.1.6. Unknown			
6.2. Land pollution			
6.2.1. Agricultural			
6.2.2. Domestic			
6.2.3. Commercial/Industrial			
6.2.4. Other non-agricultural			

6.2.5. Light pollution			
6.2.6. Other			
6.2.7. Unknown			
6.3. Water pollution			
6.3.1. Agricultural			
6.3.2. Domestic			
6.3.3. Commercial/Industrial			
6.3.4. Other non-agricultural			
6.3.5. Thermal pollution			
6.3.6. Oil slicks			
6.3.7. Sediment			
6.3.8. Sewage			
6.3.9. Solid waste			
6.3.10. Noise pollution			
6.3.11. Other			
6.3.12. Unknown			
6.4. Other			
6.5. Unknown			
7. Natural disasters			
7.1. Drought			
7.2. Storms/flooding			
7.3. Temperature extremes			
7.4. Wildfire			
7.5. Volcanoes			
7.6. Avalanches/landslides			
7.7. Other			
7.8. Unknown			
8. Changes in native species dynamics			
8.1. Competitors			
8.2. Predators			
8.3. Prey/food base			
8.4. Hybridizers			
8.5. Pathogens/parasites			
8.6. Mutualisms			
8.7. Other			
8.8. Unknown			
9. IntrinsicFactors			
9.1. Limited dispersal			
9.2. Poor recruitment/reproduction/regeneration			
9.3. High juvenile mortality			
9.4. Inbreeding			
9.5. Low densities			
9.6. Skewed sex ratios			
9.7. Slow growth rates			
9.8. Population fluctuations			
9.9. Restricted range			
9.10. Other			
9.11. Unknown			
10. Human disturbance			
10.1. Recreation/tourism			
10.2. Research			
10.4. Transport			
10.5. Fire			
10.6. Other			

10.7. Unknown			
11.1Lack of public acceptance for their presence			
11.1.1. Low acceptance due to conflicts with livestock			
11.1.2. Low acceptance due to conflicts with hunters			
11.1.3. Low acceptance due to overprotection / legal constraints on allowing harvest			
11.1.4. Low acceptance due to symbolic and wider social-economic issues			
11.1.5. Low acceptance as form of political opposition to national / European intervention			
11.1.6. Low acceptance due to fear for personal safety			
11.1.7. Low acceptance due to fundamental conflict of values about the species presence in modern landscapes			
11.2 Lack of knowledge			
11.2.1. Lack of knowledge about species numbers and trends			
11.2.2. Lack of knowledge about species ecology			
11.2.3. Lack of knowledge about conflict mitigation			
11.3 Poor management structures			
11.3.1. Poor enforcement of legislation			
11.3.2 . Poor dialogue with stakeholders			
11.3.3 . Poor communication and lack of public awareness			
11.3.4 . Lack of capacity in management structures			
11.3.5 . Fragmentation of management authority			
11.3.6 .Poor integration of science into decision making			
11.4 Other			

6. CONSERVATION MEASURES

6.1. Which conservation measures have been implemented to address the threats outlined above? Use list at http://www.kora.ch/sp-ois/. *Cross out (but do not delete) measures no longer valid and highlight measures newly added to the list.*

7. ISSUES OF PARTICULAR INTEREST

7.1 Anything particular issue you believe is worth mentioning (e.g. for wolves in Scandinavia, it would be inbreeding). List per country, but indicate population concerned for countries with >1 population

……
……

8. ONGOING OR RECENTLY TERMINATED CONSERVATION / RESEARCH PROJECT

8.1 Provide a brief list of projects with title, purpose, institution responsible, funders and budgets. Indicate population for countries >1 population.

Comments:……..
……
……

THANK YOU !!!