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The Eurasian lynx in Continental Europe



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For joining the Friends of the Cat Group please contact Christine Breitenmoser at ch.breitenmoser@kora.ch

Original contributions and short notes about wild cats are welcome

Send contributions and observations to ch.breitenmoser@kora.ch.

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Editors: Christine & Urs Breitenmoser
Co-chairs IUCN/SSC
Cat Specialist Group
KORA, Thunstrasse 31, 3074 Muri,
Switzerland
Tel ++41(31) 951 70 40
<u.breitenmoser@kora.ch>
<ch.breitenmoser@kora.ch>

Cover Photo: Camera trap picture of two Eurasian lynx kittens in north-eastern Switzerland. 11 December 2014 (Photo KORA).

MANUELA VON ARX^{1*}, PETRA KACZENSKY², JOHN LINNELL^{2,3}, TABEA LANZ⁴, CHRISTINE BREITENMOSE-WÜRSTEN⁴, LUIGI BOITANI⁵ AND URS BREITENMOSE⁴

Conservation status of the Eurasian lynx in West and Central Europe

With a total of 17,000–18,000 individuals including European Russia, the Eurasian lynx *Lynx lynx* is listed Least Concern at the European level in the IUCN Red List. However, some of the larger autochthonous populations in Scandinavia and the Baltics have shown declining trends in the past decade, and the Balkan lynx subspecies was assessed as Critically Endangered. The reintroduced populations in West and Central Europe remain small and are classified as Endangered (Alpine, Jura, Dinaric) or Critically Endangered (Vosges-Palatinian, Bohemian-Bavarian-Austrian, Harz). We present each of the populations regarding population numbers, range and threats and provide the justification for the respective Red List classifications.

The first Pan-European reports on the conservation of the Eurasian lynx were commissioned by the Council of Europe and provided information on the status in the 1980s (Breitenmoser & Breitenmoser-Würsten 1990) and early 1990s (Breitenmoser et al. 2000). Subsequently, the status of lynx was compiled and assessed not only at country level, but also for each population; 10 of the 11 lynx populations in Europe are transboundary (von Arx et al. 2004). The IUCN SSC Large Carnivore Initiative for Europe (LCIE) has initiated periodic reviews of the status of large carnivores in Europe and the results were published in Linnell et al. (2008), Kaczensky et al. (2013) and Chapron et al. (2014), respectively. A Regional Red List assessment for *Lynx lynx* for Europe was published in 2006 by von Arx et al. (no longer online available) in the frame of the assessment of all European mammals compiled by Temple & Terry (2007). The following information bases on a LCIE inquiry for the years 2012–2016, used for an updated Red List assessment (von Arx 2020).

Methods

In 2017/2018, a questionnaire survey was conducted for Eurasian lynx, brown bear *Ursus arctos*, wolf *Canis lupus*, wolverine *Gulo gulo*, and golden jackal *Canis aureus* among all LCIE members and additional species experts covering all Europe except Russia and Belarus. The questionnaire inquired information on abundance and distribution range, conflicts and management, as well as on threats and conservation measures for the period 2012–2016 at population and country level, respectively. The information was used to perform the European Red List assessment

for the five species according to the IUCN Guidelines for the application of the Red List Criteria at regional level (IUCN 2012). In principle, a regional assessment is done like a global assessment, but if the regional population is considered to be not isolated (hence individuals are regularly immigrating), the Category is lowered by one level (e.g. Vulnerable instead of Endangered).

The distribution of the species was mapped based on their presence and frequency in each cell of the 10x10 km ETRS89-LAEA Europe grid. A cell was defined as permanently occupied if the presence of the species was confirmed in ≥ 3 years in the 5 years from 2012–2016 or in $>50\%$ of the time or if reproduction was confirmed within the last 3 years of the period. It was defined as sporadic (highly fluctuating presence) if the presence was confirmed in <3 years or in $<50\%$ of the time. For more information on the procedure applied for the lynx distribution mapping and area calculations see Kaczensky (2018).

Results

Status of the Eurasian lynx in Europe

The Eurasian lynx remained abundant in the northern and eastern part of its range (Fig. 1, Tab. 1). 8,000–9,000 lynx were estimated in Europe excluding Russia and Belarus. This number has been stable since the last regional assessment (von Arx et al. 2006; no longer online available). Including numbers from Russia west of the Ural Mountains according to the last global Red List assessment (Breitenmoser et al. 2015), the European population can be estimated to be 17,000–18,000 lynx, and hence the species is classified as Least Concern at the European level.

The lynx population within the Member States of the European Union remained small. With an estimated total of 7,000–8,000 individuals it is below the population size threshold for Vulnerable under Criterion C, but does currently not meet the relevant subcriteria, though. However, some of the larger subpopulations (Scandinavian and Baltic) have shown declining trends in the past decade and if this trend persists, the lynx population within the EU could meet Criterion C1 in the near future. Consequently, it is assessed as Near Threatened at the EU level.

Status of the autochthonous lynx populations

The larger autochthonous populations (Karelian, Baltic and Carpathian; Fig. 1) are still Least Concern. The Scandinavian population, however, had to be up-listed to Vulnerable due to its negative trend. The Balkan lynx *L. l. balcanicus* is Critically Endangered.

Scandinavian – Although it covers a large range (AOO over 450,000 km²), it dropped drastically in numbers to c. 1,300–1,800 individuals compared to c. 1,800–2,300 in 2011. The decline was mainly a consequence of a management decision to reduce conflicts related to sheep and semi-domestic reindeer depredation. The population would classify as Endangered under Criterion C1 (less than 2,500 mature individuals and a 20% decline over two generations). However, in 2015 and 2016, the decline stopped and there is some connectivity with the Karelian population so that single individuals are likely to disperse. The Category is therefore altered to Vulnerable. Legal hunting and illegal killing are potential threats to the Scandinavian population.

Karelian – The subpopulation in Finland further increased and was estimated c. 2,500 individuals (compared to 1,100 animals in 2004). Although there was no up-to-date information from Russian Karelia, the numbers were thought to be stable there. The Karelian population is connected to the large neighbouring population in Russia, from where a potential rescue effect is to be expected. Therefore, it was assessed as Least Concern. Potential threats: Intentional legal hunting, conflicts with hunters, lack of capacity and funding of/for management authorities.

Baltic – Counted 1,200–1,500 individuals, without considering Russia and Belarus, from where no current information was available. Although there was a slight decrease – particularly in Estonia – this population is connected both to the Karelian and the larger

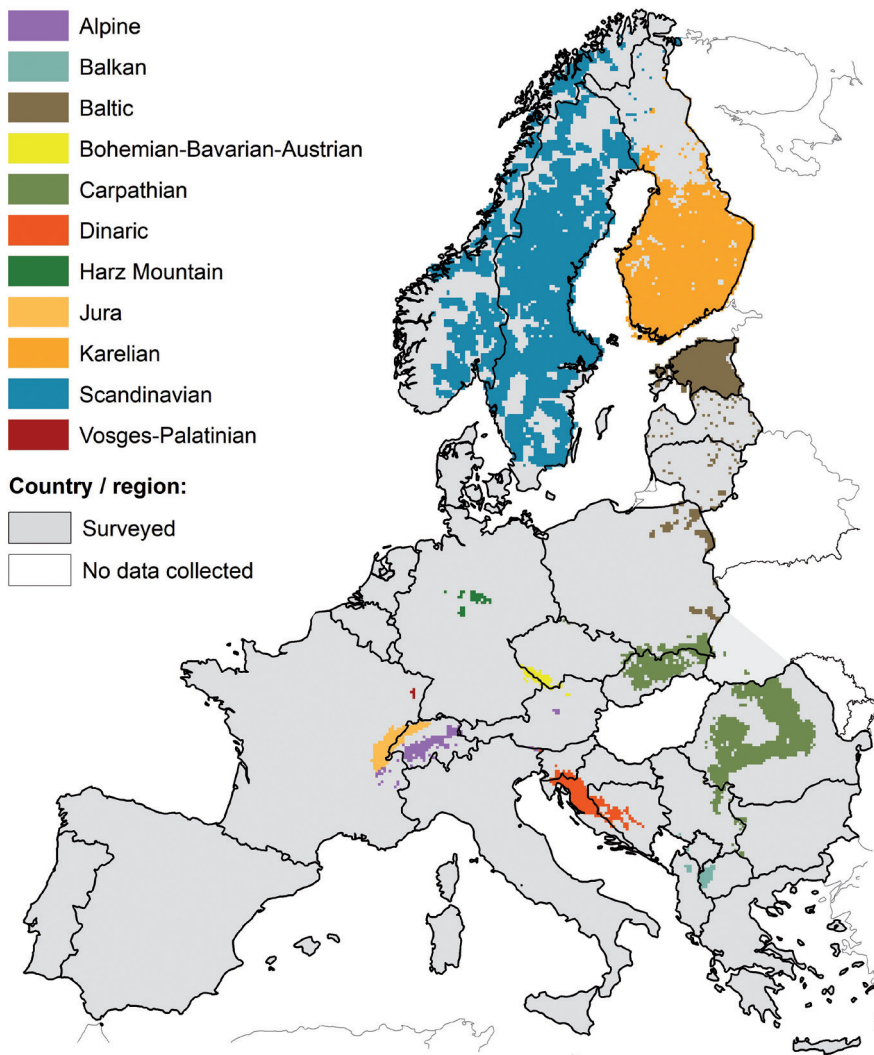


Fig. 1. Distribution of the Eurasian lynx in Europe 2012–2016. The map is showing only permanent presence. © Large Carnivore Initiative for Europe

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Russian population. It is therefore assessed as Least Concern. Developments in the southern Baltic States and NE Poland need to be carefully surveyed as the distribution area in this part of the range is strongly fragmented (Fig. 1). A further reduction in Estonia has to be prevented. Potential threats: Roads and railroads, poor dialogue with stakeholders, low prey base, lack of knowledge about species numbers and trends, and lack of capacity and funding in management structures.

Carpathian – The overall number was about 2,100–2,400 individuals. It appeared to be rather stable, although in certain regions numbers have decreased, either reflecting a real trend (e.g. Ukraine, Bulgaria) or due to better monitoring systems in place, which indicate that previous numbers were overestimated (e.g. Slovakia). The population was assessed as Least Concern (Table 1), but when considering the number of mature individuals, the threshold for Near Threatened

under Criterion D is almost met. A careful monitoring of the situation (which requires the implementation of better monitoring systems in many of the range countries) and a re-assessment within a few years are recommended. Potential threats: Poor integration of science into decision-making, traffic mortalities, conflicts with hunters, and lack of knowledge about species numbers and trends.

Balkan – Consists of only 20–39 mature individuals. The subspecies *L. l. balcanicus* has been assessed as Critically Endangered in 2015 (Melovski et al. 2015). Number and distribution have not changed since, and the population is isolated. Therefore, Critically Endangered under Criterion D is still valid. Major threats: Poor enforcement of legislation, lack of capacity and funding in management structures, poor integration of science into decision making, corruption, accidental illegal killing and poorly regulated large-scale forestry. In 2017, the Balkan lynx

has been included in Annex II of the Bern Convention.

Status of the reintroduced lynx populations

The reintroduced populations in West and Central Europe remain small and are all classified as Endangered or Critically Endangered.

Dinaric – Numbers around 130 individuals and has decreased in the northern part of its range. Besides a high level of human caused mortality, problems of inbreeding have been noticed as a consequence of the very few founder individuals. The population is isolated and no rescue effect can be expected. It is assessed as Endangered under Criterion D. Efforts for reinforcement are on the way. Major threats: Poor enforcement of legislation (illegal killing), traffic mortalities, prey base depletion and inbreeding depression.

Bohemian-Bavarian-Austrian – Its distribution has stagnated since the late 1990s and the population decreased from c.75 individuals in 2005 to c.50 individuals in 2006–2011. There was a slight recovery to 60–80 independent individuals in 2015 and numbers seem to stabilize. 60–80 independent individuals are around 45–60 mature individuals, which is just around the threshold (50 mature individuals) for Endangered under Criterion D. Considering the previous long-term negative trend and that limiting factors have not yet been reversed, suggests however a precautionary approach and classification as Critically Endangered. Immigration from the Carpathians is unlikely as there are barriers to dispersal. Consequently, no rescue effect can be expected. Major threats: Intentional illegal killing, conflicts with hunters, and poor enforcement of legislation.

Alpine – Has slightly increased to c.163 individuals, which is however still a small number and the subpopulation remains Endangered. The increase was partly man-made due to the foundation of stepping stone subpopulations through translocations of lynx. The population lacks relevant immigration from neighbouring subpopulations which are all small or (e.g. the Carpathian population) separated through strong barriers. The Alpine population itself is fragmented into four smaller subpopulations in the Western and Eastern Alps. Consequently, the population is considered isolated and the Red List Category is not adjusted. Major threats: Illegal killing, infrastructure development (especially road constructions), vehicle and train collisions, limited dispersal, narrow genetic base (few founder animals).

Table 1. Eurasian lynx populations in Europe according to the regional Red List assessment (von Arx 2020). Label in italic indicate reintroduced populations. Trends: ↗ = increasing, → = stable, ↘ = decreasing, ↓ = strongly decreasing. RLA: IUCN Red List categories (LC = Least Concern, VU = Vulnerable, EN = Endangered, CR = Critically Endangered).

Population	Range countries	Size (ind.)	Trend	RLA
<i>Alpine</i>	Switzerland, Slovenia, Italy, Austria, France	163	↗	EN
Balkan	North Macedonia, Albania, Kosovo	20-39	→	CR
Baltic	Estonia, Latvia, Lithuania, Poland, Ukraine, Belarus	1200-1500	↘	LC
<i>Bohemian-Bavarian-Austrian</i>	Czech Republic, Germany, Austria	60-80	→	CR
Carpathian	Romania, Slovakia, Poland, Ukraine, Czech Republic, Hungary, Serbia, Bulgaria	2100-2400	→	LC
<i>Dinaric</i>	Slovenia, Croatia, Bosnia-Herzegovina	130	→/↘	EN
<i>Harz</i>	Germany	46	↗	CR
<i>Jura</i>	France, Switzerland	140	↗	EN
Karelian	Finland	2500	↗	LC
Scandinavian	Norway, Sweden	1300-1800	↓	VU
<i>Vosges-Palatinian</i>	France, Germany	1-3 ^a	↓ [↗]	CR

^aThis number refers to the Vosges part only. There is an ongoing reintroduction programme in the Palatinate Forest (Idelberger et al. 2021), which was however not yet considered in the Red List assessment.

Jura – Has increased to c.140 independent individuals and the range has expanded. It however still qualifies as Endangered under Criterion D because the population size is below 250 mature individuals. In recent years, male lynx from the Jura Mts. have occasionally dispersed to neighbouring regions (e.g. Black Forest). However, there is no substantial immigration from neighbouring subpopulations, e.g. the Alps, to provide a sufficient demographic rescue effect, and the Red List Category is hence not adjusted. Major threats: Traffic accidents, illegal killing, conflicts with hunters and lack of knowledge about conflict mitigation.

Vosges-Palatinian – Numbers had dropped from 30–40 lynx in 2005 to 1–3 ten years later which is a reduction of 91% (CR Criterion C1 – 25% reduction in 4 years – in addition to Criterion D for the very small population size). There was so far too limited immigration from the Jura Mts. to provide a demographic rescue effect. Major threats were identified to be illegal killing due to conflicts with hunters, habitat fragmentation and the small population size. In the frame of the EU LIFE project "Reintroduction of lynx in the biosphere reserve Palatinian Forest" lynx have since been released into the Palatinian Forest in Germany (Idelberger et al. 2021). However,

as the reintroduction only started in 2016 and there was a continuing decline throughout the years before, Critically Endangered under Criteria C and D was still considered valid by von Arx (2020).

Harz – This population was reintroduced through the release of 24 lynx between 2000 and 2006. It was estimated at 46 independent individuals, is isolated, and qualifies for Critically Endangered under Criterion D. Road fatalities and diseases are the most relevant mortality factors for lynx in the Harz Mountains so far.

Discussion

Although the Eurasian lynx is not threatened as a species globally, continued conservation measures are required to ensure the recovery of the populations in Europe: Only 3 out of 11 populations are considered Least Concern (Tab.1). Some key conservation actions were defined by Boitani et al. (2015). Conservation efforts are particularly needed for the Critically Endangered Balkan lynx subspecies, but also for the reintroduced populations in Western and Central Europe (Alpine, Vosges-Palatinian, Jura, Bohemian-Bavarian-Austrian, Dinaric) which are still small and are classified as Endangered or Critically Endangered. These reintroductions all relied

upon the Carpathians as a source population. The Carpathian population, although listed as Least Concern, seems increasingly fragmented and needs to be observed in order to not risk its capacity as parent population for the recovery of lynx in West and Central Europe. Additionally, recent negative trends in some of the larger autochthonous subpopulations (Scandinavian and Baltic) are concerning and have to be addressed.

The assessment of the populations was mainly based on total population size (number of lynx individuals) or number of independent individuals (adults and subadults, based on capture-recapture estimates by means of camera trap surveys and extrapolated to the distribution area). These are the estimates usually available from the range countries. Even within a population, the quality of information can vary greatly between different range countries. This complicates an assessment at the population level. The number of mature individuals – the unit required for a Red List assessment – is considerably lower than the total number, but also less than the numbers of independent individuals. This was considered when assessing the Red List Category. However, genetic population size was not taken into account at all, and considering the critical genetic status of some of

the isolated reintroduced populations in West and Central Europe (Stiftung KORA 2021), the total size of these populations are of limited value to assess their conservation status. The disparity of data among the countries was particularly disturbing when compiling the distribution map (Kaczensky 2018). Particularly in some of the larger autochthonous transboundary populations like the Carpathian and Baltic, an improvement and harmonisation of the monitoring systems would considerably improve the picture. E.g. the SCALP Criteria (Molinari-Jobin et al. 2003, Molinari-Jobin et al. 2021) are a means to validate data from different range countries and assess the distribution and status on population level. The data provided in the subsequent chapters of this Special Issue might differ from those presented here. The European survey and the Red List assessment base on information from 2012–2016. For some countries and populations newer data were available and considered in the following presentations.

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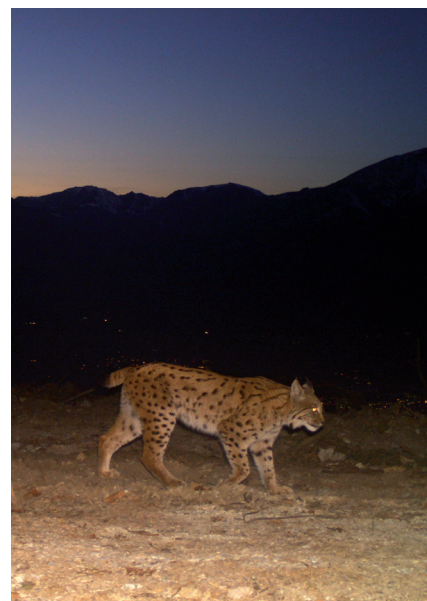
¹ KORA – Carnivore Ecology & Wildlife Management, Muri b. Bern, Switzerland
*m.vonarx@kora.ch

² Inland Norway University of Applied Sciences – INN, Department of Forestry and Wildlife Management, Campus Evenstad, Koppang, Norway

³ Norwegian Institute for Nature Research (NINA), Trondheim, Norway

⁴ IUCN SSC Cat Specialist Group, c/o KORA – Carnivore Ecology & Wildlife Management, Muri b. Bern, Switzerland

⁵ Dipartimento Biologia e Biotecnologie, Università di Roma Sapienza, Roma, Italy



Lynx in the Alps (Photo KORA).