Lynx lynx - (Linnaeus, 1758)

ANIMALIA - CHORDATA - MAMMALIA - CARNIVORA - FELIDAE - Lynx - lynx

Common Names: Lynx (French), Shiluus Mii (Mongolian), LINCE BOREAL (), Evroasiin Shiluus (), Lince Boreal (Spanish), Eurasian Lynx (English), Lince (Spanish; Castilian), Lynx Bor?al (French)
Synonyms: No Synonyms

Taxonomic Note:
Balkan lynx was for the first time described an own subspecies in 1941 by the Bulgarian zoologist Ivan Buresh (Buresh, 1941). The name that Buresh gave to the Balkan lynx was *Lyx lyx balcanicus.* Later on Serbian mammologist Gjorge Miric did much more thoroughly morphometric measurements on skulls of 29 lynx speciements from the Balkans and concluded differences in the size with the specimens from the neighboring Carpathian population, as well as with specimens from Scandinavia and Caucasus (Miric, 1978). Miric changed the subspecies name of the Balkan lynx into *Lynx lynx martinoi* with no further references to the previously given name by Buresh.The importance of conservation actions was underline by new and preliminary results from genetic research, indicating that the Balkan lynx is indeed different from the Carpathian lynx and should be accepted as a distinct subspecies (Gugolz *et al*., 2008; Breitenmoser *et al*. 2008).

Red List Assessment

Assessment Information

Assessor(s): Dime Melovski, Macedonian Ecological Society

Evaluator(s): (Not specified)

Contributor(s): (Not specified)

Assessment Rationale

Europe
The Eurasian lynx was driven extinct in much of western and central Europe over the last few centuries. However, over the past few decades, as a result of conservation action, the status of the species has improved. Reintroductions have restored it to some areas of its former range, although many of these reintroduced populations remain fragmented and extremely small. However, the lynx population within the EU remains small (below the population size threshold for Vulnerable under Criterion C, although it does not currently meet the subcriteria). If ongoing conservation action ceased, it is expected that the species would quickly start to decline again, and could meet Criterion C1 in the near future. Consequently it is assessed as Near Threatened. Continued protection is required to ensure the continuing recovery of this species.

Balkan
According to the IUCN Red List criteria, the Balkan lynx population is **Critically Endangered CR(C2a(i, ii) D)**. The total size of the population is estimated to be about 20-44 individuals at best, distributed over different patches, indicating a strong population fragmentation. Local experts indicated a decrease for both population size and

trend in 1990-1995 as well as 1996-2001.The latest assessment done in the frame of the Balkan Lynx Recovery Programme in Macedonia and Albania and taking into account the local ecological knowledge, revealed that in Albania due to the lack of knowledge the population trend cannot be assess, while in Macedonia the figures show decline. So far, there is only one known core area, where reproduction is confirmed.
Taxonomic status of the Balkan lynx is still not officially recognized. However, its morphometric distinctness was previously acknowledged by two authors who described it as a different subspecies (Bures, 1941; Miric, 1978). Also, genetic analysis taken from the museum specimens confirmed the differences of the Balkan lynx from the neighbouring Carpathian subspecies.

Reasons for Change

(Not Specified):

Distribution

Geographic Range

The Balkan lynx is distributed in the south-west Balkans. Albania, Macedonia, Kosovo, Montenegro and potentially Greece are countries that are sharing this scattered and fragmented population.
Albania: Lynx occurs in the Albanian Alps (north) and central-central east Albania,
Macedonia: western part, mainly in the areas in and between the national parks Mavrovo, Galicica and Pelister, but most probably also in the Shar Planina Mts. bordering with Kosovo. In December 2010, camera-trapping session revealed individual in central-north part of Macedonia (Jasen PA).
Kosovo: not confirmed observation from the southern border with Macedonia (Shar Planina Mts.) and Prokletije Mt. (Albanian Alps) western part, bordering with Albania and Montenegro.
Montenegro: not confirmed observation from the southern border with Albania and Kosovo - Prokletije Mt. (Albanian Alps).
Greece: From time to time single, unconfirmed observations are reported from the border regions of Greece with Macedonia and Albania. Uncertain origin is considered to be the lynx occurrence at the Nestos River delta, east Greece close to the Turkish border. (Panayatopoulu & Godes, 2004).

Elevation / Depth / Depth Zones

Elevation Lower Limit (in metres above sea level): 600

Elevation Upper Limit (in metres above sea level): 2000

Depth Lower Limit (in metres below sea level): (Not specified)

Depth Upper Limit (in metres below sea level): (Not specified)

Depth Zone: (Not Specified)

Map Status

Map Status: Done

Biogeographic Realms

Biogeographic Realm: Palearctic

Occurrence

Countries of Occurrence

Country	Presence	Origin	Formerly Bred	Seasonality
Albania	Extant	Native	-	Resident
Greece	Presence Uncertain	Vagrant	-	-
Macedonia	Extant	Native	-	Resident
Montenegro	Extant	Native	-	Resident
Serbia	Extant	Native	-	Resident

Large Marine Ecosystems (LME) Occurrence

LargeMarineEcosystems: (Not specified)

FAO Area Occurrence

FAOOccurrence: (Not specified)

Population

Lynx in Europe were widely extirpated within the past several hundred years, reaching a nadir in the 1950s. Populations were reintroduced from the late 1970s onward, and the total number of lynx in Europe (excluding European Russia) is c.8,000. Populations in central and southern Europe remain very small and fragmented, although there are larger populations in Fennoscandia, the Baltic states, and European Russia (Breitenmoser *et al*. 2000). The lynx's stronghold is a broad strip of southern Siberian woodland stretching through eastern Russia from the Ural mountains to the Pacific. There is little information on population status and trends from the lynx's wide Asian range (Nowell and Jackson 1996, Cat Specialist Group 2002). For the European populations, detailed status and trend information can be found on The Balkan population is the smallest and most threatened autochthonous lynx population in Eurasia. It experienced a severe bottleneck in 1935-1940 with an estimated number of only 15-20 individuals left. After World War II the population started to recover, especially in Kosovo and Macedonia (Miric 1981). In the 1960-70s, it also reappeared in Montenegro. The population estimation was some 280 lynx in 1974 (Miric 1981). Latest inquiry (ELOIS 2004) showed that the population estimate is between 80 and 105 mature individuals. Two intensive camera-trapping session in Mavrovo NP (study area 436 km^2) revealed minimum number of mature individuals is 7, with standard error 1,82, confidence interval 6 to 14 individuals and population density 0.84 ± 0.24 individuals per 100 km^2 (Melovski et al. 2008). The second session in 2010 showed an estimation of minimal number of individuals was 6 with standard error 2.35. Population density was calculated at 0.80 ± 0.31 individuals per 100 km2. The population density can be obtain taking into account the minimal and maximal range of the Area of Occupancy (4000-20.000) and then multiply it with the standard deviation of the population density and divide the number by 100 (population density is for mature individuals per 100 km^2). The results are 20 to 44 individuals taking only the minimal value of the AOO. The higher value is most likely an overestimate due to the fact that no results Category 1 and 2 data were found outside the core area of the Balkan lynx distribution.

Population Information

Continuing decline in mature individuals? Qualification: Justification:

Yes Projected -

Habitats and Ecology

Throughout Europe and Siberia, lynx are associated primarily with forested areas which have good ungulate populations (Nowell and Jackson 1996). In Central Asia they occur in more open, thinly wooded areas. Small ungulates are the lynx's primary prey (Nowell and Jackson 1996, Cat Specialist Group 2002). In Europe, the lynx's preferred diet includes roe deer and chamois. Lynx will also take larger ungulates such as red deer, moose, or wild boar occasionally. Where ungulates are not available, birds, hares and rodents form important prey. In Norway, Sweden and Finland, lynx also kill significant numbers of semi-domesticated reindeer. Depredation on sheep is also a problem in some countries.

Balkan lynx occupies mountainous terrains spreading mainly in the most southern parts of the Dinaric range and throughout most of the Scardo-Pindic range. Main habitats are: deciduous (beech, oak, horn beam, hop-horn beam), evergreen (fir and pine) and mixed forests (fir-beech). Uses the rocky and sunny sites for daily bed. Rarely in the summer period visits high-mountain pastures. It is using shrub lands and cultivated area (mountain meadows) primarily for hunting.
Balkan lynx's diet is so far confirmed with the preliminary results obtained from the radio-telemetry study conducted in Macedonia within the SCOPES project - Status, ecology and land-tenure system of the critically endangered Balkan lynx (*Lynx lynx martinoi*) in Macedonia and Albania (http://www.snf.ch/E/international/europe/scopes/Pages/default.aspx). Roe deer is consisted in 64% of its diet, chamois 24% and the rest belongs to the European brown hare (Melovski *et al.* 2010).

IUCN Habitats Classification Scheme

Habitat	Suitability	Major Importance?
Forest -> Forest - Boreal	Suitable	-
Forest -> Forest - Temperate	Suitable	-

Life History

Generation Length Justification:

4-5 -

Age at Maturity: Female

2 Years

Age at Maturity: Male

3 Years

Size at Maturity (in cms): Female

70-111

Size at Maturity (in cms): Male

72-130

Longevity

17 Years

Average Reproductive Age

7-8 Years

Maximum Size (in cms)

130

Size at Birth (in cms)

20

Gestation Time

67-74 Days

Reproductive Periodicity

yes

Average Annual Fecundity or Litter Size

2

Natural Mortality

-

Breeding Strategy

Does the species lay eggs?

False / No

Does the species give birth to live young

True / Yes

Does the species exhibit parthenogenesis

False / No

Does the species have a free-living larval stage?

False / No

Does the species require water for breeding?

False / No

Movement Patterns

Movement Patterns: Congregatory/dispersive

Systems

System: Terrestrial

Use and Trade

General Use and Trade Information

UseTradeDocumentation:
(Not specified)

Threats

Lynx are vulnerable to destruction of their ungulate prey base. Hunting pressure may also play a role in lynx population declines. Habitat destruction through clear-cutting can have a negative effect on lynx abundance. There is no information beyond harvest reports on which to base an assessment of the biological impact of commercial trapping for furs, and thus its significance as a threat is difficult to judge (Nowell and Jackson 1996, Cat Specialist Group 2002). The lynx's disappearance in lowland Europe was due to human persecution, deforestation, loss of prey species, expansion of agriculture and an increase in human populations. Although the lynx is not endangered, these threats still affect it today throughout Europe. Habitat loss, loss of prey due to logging and hunting, and human population pressures have serious negative impacts. Humans still present a major threat to the lynx, particularly to small or reintroduced populations.

General and most serious threats to the Balkan lynx population are the following: small population number; limited prey base; habitat degradation (especially in Albania and Kosovo) and poaching.
The fact that the population size is estimated to be 30-50 mature individuals is posing a great threat of extinction to the Balkan lynx. The metapopulation is most probably divided in several subpopulations in a fragmented landscape. Corridors are not yet known.
Poaching is posing threat in two ways: directly, through loss of individuals and indirectly, through loss of lynx's prey (roe deer, chamois, brown hare) (Ivanov *et al.* 2008).
Deterioration of habitat is generally an issue in Albania. Overly exploited forest throughout the 19th and 20th century have a hard time to recover. Moreover, the civil unrest in Albania in 1997 heisted the arm depositories which led to a massive over-hunting in the countryside. Similar situation followed in Macedonia and Kosovo during the conflict in 2001.
Tourist resorts and recreational activities have insignificant effect for the population. Still, sport-hunting and ski resorts can be considered disturbances for the area of the national parks, where most of the Balkan lynx population is existing.
Last but not least, the spreading Carpathian (through Eastern Serbia) and Dinaric (though Croatia, Bosnia and Herzegovina) populations which is a reintroduced population from the Carapthian Mountains (Carpathian subspecies), may pose a threat to the genetic uniqueness of the Balkan population.

Conservation

Included on CITES Appendix II, protected under the Bern Convention (Appendix III) and strictly protected under the EU Habitats & Species Directive (Annexes II and IV). Conservation measures in place and recommended for the European populations are as follows:

Balkan

The species is fully protected by law in all range countries. A recovery strategy and two (Macedonia and Albania) national action plans for the Balkan lynx f do exist, however they are not ratified by the relevant ministries.

A three year project named "Balkan Lynx Recovery Programme" started in Macedonia and Albania in 2006. Based on two principles, this project's aim was to combine the lynx protection in the sustainably managed protected area system in both countries. Balkan lynx was chosen as a flagship and umbrella species. The project's main goals were: survey and monitoring of the Balkan lynx; collecting baseline information on Balkan lynx's distribution, population trend, abundance, prey availability etc.; developing range wide Conservation Strategy and National Action Plans; define areas along the European Green Belt in the Balkan lynx distribution and lobby for their proclamation; and build professional partnership consisted of relevant stakeholders in the field of nature protection (Breitenmoser et al. 2008). The project was sponsored by the Swiss-based MAVA foundation.

In parallel with this activities a Human Dimension project commenced in both countries and was funded by the Research Council of Norway. Basic principle of the project was to build the capacities to meet the challenges of cross border cooperation in large carnivore conservation.

Second phase of the Balkan Lynx Recovery Programme begun in 2010 which basically is the continuation of the previously defined goals and activities. Novelty in the second phase of the project is the enlargement of the activities towards Montenegro and Kosovo and conducting baseline survey in the two countries.

The need for ground-truth data on Balkan lynx's biology and ecology led to the first scientific project called: Status, ecology and land-tenure system of the critically endangered Balkan lynx (*Lynx lynx martinoi*) in Macedonia and Albania. The project was supported by the Swiss National Scientific Foundation and was under the SCOPES programme (Scientific Cooperation between Eastern Europe and Switzerland). The project started in 2010 and will last until the end of 2012. So far, one individual was captured and fitted with a radio-collar. First data on lynx's home range size, diet and land-tenure system were gathered. More individuals are needed in order to find out the Balkan lynx's social organization.

Bibliography

Breitenmoser, U., Breitenmoser-Würsten, Ch., Okarma, H., Kaphegyi, T., Kaphegyi-Wallmann, U. and Müller, U.M. 2000. *Action Plan for the Conservation of the Eurasian Lynx (Lynx lynx) in Europe. Nature and environment No. 112, Council of Europe Publishing, Strasbourg: 1-70.*

Breitenmoser, U., von Arx, M., Bego, F., Ivanov, Gj., Keci, E., Melovski, D., Schwaderer, G., Stojanov, A., Spangenberg, A., Trajçe, A., Linnell, J. 2008. *Strategic planning for the conservation of the Balkan lynx*. Macedonian Ecological Society, Skopje.

Buresh, I. 1941. Risove v Makedonija. *Priroda* 42(3): 51-52.

Cat Specialist Group. 2002. *Lynx lynx. In: IUCN 2006. 2006 IUCN Red List of Threatened Species. . Downloaded on 03 November 2006.*.

D. Gugolz, M. V. Bernasconi, C. Breitenmoser-Würsten, P. Wandeler. 2008. Historical DNA reveals the phylogenetic position of the extinct Alpine lynx. *Journal of Zoology* 275(2): 201-208.

Fernandes, M., Castro, L. and Ceia, H. 2001. *Lince-iberico em Portugal.* Actividades da Direcção de Serviçios Conservação da Natureza 1995-2001. Relatorio IUCN.

Ivanov, Gj., Stojanov, A., Melovski, D., Avukatov, V., Keci, E., Trajçe, A., Shumka, S., Schwaderer, G., Spangenberg, A., Linnell, J., von Arx, M., Breitenmoser, U. 2008. *Conservation status of the critically endangered Balkan lynx in Albania and Macedonia*. Macedonian Ecological Society, Skopje.

MIric, D. 1978. Lynx lynx martinoi ssp. nova - neue Luchsunterart von der Balkanhalbinsel. *Bull. museum hist. nat.* 33: 29-36.

Melovski, D., Ivanov, Gj., Stojanov, A., Trajçe, A., Zimmermann, F., von Arx, M. 2008. *First camera-trap survey in the National Park Mavrovo, Macedonia*. University of Tirana, Faculty of Natural Sciences, Tirana.

Melovski, D., Stojanov, A., Ivanov, Gj. 2010. In: Radio-telemetry annual report (ed.), Status, ecology and land-tenure system of the crytically endangered Balkan lynx in Macedonia and Albania. Macedonian Ecological Society, Skopje.

Miric, D. 1981. *The lynx populations of the Balkan Peninsula*. Serbian Academy for Sciences and Art, Belgrade.

Molinari-Jobin, A., Molinari, P., Breitenmoser-Wursten, Ch., Woelfl, M., Stanisa, C., Fasel, M., Stahl, P., Vandel, J.-M., Rotelli, L., Kaczensky, P. Huber, T., Adamic, M., Koren, I. and Breitenmoser, U. 2003. *The Pan-Alpine Conservation Strategy for the lynx. Nature and environment No. 130, Council of Europe Publishing, Strasbourg: 1-20.*

Nowell, K. and Jackson, P. (compilers and editors). 1996. *Wild Cats. Status Survey and Conservation Action Plan. IUCN/SSC Cat Specialist Group. IUCN, Gland, Switzerland.*.

Panayatopoulu, M., Godes, C. 2004. Status and conservation of the Eurasian lynx (Lynx lynx) in Europe in 2001. In: von Arx, M., Breitenmoser-Wuersten, Ch., Zimmermann, F., Breitenmoser, U. (ed.).

Urs Breitenmoser. 2009. Status, ecology and land-tenure system of the crytically endangered Balkan lynx (Lynx lynx martinoi) in Macedonia and Albania. Available at: http://www.snf.ch/E/international/europe/scopes/Pages/default.aspx.

Zlatanova, D., Racheva, V., Peshev, D., Gavrilov, G. 2009. First hard evidence of lynx (Lynx lynx, L.) presence in Bulgaria. *Biotechnology and Biotechnological Equipmant* 23: 184-187.

von Arx M., Breitenmoser-Würsten Ch., Zimmermann F. and Breitenmoser U. (eds). 2004. Status and conservation of the Eurasian lynx (Lynx lynx) in Europe in 2001. KORA Bericht No. 19: 1-330. (ISSN 1422-5123) or Eurasian Lynx Online Information System for Europe ELOIS: http://www.kora.unibe.ch/en/proj/elois/online/index.html.