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The Balkan Lynx Population
History, Recent Knowledge on its Status and Conservation Needs

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The Balkan Lynx Population - History, Recent Knowledge on its Status and Conservation Needs

Bearbeitung
Adaptation
Editorial

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Titelzeichnung
Frontispice
Cover picture

Balkan lynx
Velizar Simeonovski, Bulgaria

The Balkan Lynx Population - History, Recent Knowledge on its Status and Conservation Needs

Edited by Christine Breitenmoser-Würsten and Urs Breitenmoser

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The Balkan Lynx Population - History, Recent Knowledge on its Status and Conservation Needs

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Introduction

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The smallest and at the same time least known autochthonous lynx (*Lynx lynx*) population in Europe is that of the southern Dinaric mountain range, in the region of ancient Macedonia, called the Balkan Population by Breitenmoser *et al*. (2000). It is the only surviving population of the Eurasian lynx in southern Europe, isolated from the nearest occurrence of conspecifics in the Carpathian Mountains, probably since the second half of the 19th century (Mirić 1974). Mirić (1974, 1981) has carefully compiled and analyzed all available information on the Balkan lynx up to the 1970s. Since then, all status reports on the lynx in Europe have identified the Balkan lynx as a small, threatened population in need of conservation actions, but no further data have been collected. The lack of information was mainly a consequence of the geographical distribution of the Balkan lynx. For several decades, it has occurred only in the southern provinces of former Yugoslavia and mainly in Albania, from where absolutely no information was available during the communist era.

In the late 1980s, the political situation in the region changed completely. The Peoples Republic of Yugoslavia split into five independent countries. Most of them, together with Albania, recently signed the *Convention for the Conservation of European Wildlife and Natural Habitats* (Bern Convention). In the contemporary *Action Plan for Conservation of the Eurasian Lynx in Europe* (Breitenmoser *et al.* 2000), compiled on behalf of the Large Carnivore Initiative for Europe and of the Council of Europe / Bern Convention, newer data indicate that the population is now restricted to the border area of Albania and the Former Yugoslav Republic (FYR) of Macedonia, and the Kosovo and Montenegro regions of the Federal Republic (FR) of Yugoslavia. Compared to the estimates from the 1970s, the population seems to have suffered a considerable decrease .

In the late 1990s, the time seemed to be ready to start an initiative for the recovery of the Balkan lynx population. However, the war in Kosovo impeded all conservation actions in this region. Now, the conflict in Macedonia has broken out, obviously in an area important for lynx. Nevertheless, actions seem to be more urgent than ever; most colleagues from the region believe that wildlife has generally suffered from the recent turmoils.

It is clear that we do not have all the information required to design a conservation strategy. Basic data on the ecology of the Balkan lynx are lacking, and both distribution and population size are qualified guesses at best. We therefore advocate an approach in several steps: (1) contact potential professional partners in the countries concerned and compile all readily available data; (2) identify lack of information and perform a systematic inquiry in the area of potential distribution of the Balkan lynx; and (3) design a conservation action plan and put it into effect.

In March 2000, specialists from Albania, Bosnia-Herzegovina, Bulgaria, FR of Yugoslavia, FYR of Macedonia, and Greece, together with other European carnivore experts met in Plitvice National Park, Croatia, in order to put together the current knowledge on the status and distribution of the Balkan lynx population, which is now compiled in the papers of this volume. At the end of this report, we summarize the present information and identify the lack of knowledge. The purpose of this report is to promote the funding of the next steps towards the recovery of the Balkan lynx. If we do not succeed in saving the autochthonous lynx in the southwestern Balkans, it would be the first case of the extinction of a large carnivore population under the operation of the Bern Convention.

The lynx in Bosnia and Herzegovina

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1. Lynx

1.1. Present situation and distribution

The last individuals of the autochthonous lynx population in Bosnia and Herzegovina (B&H) were exterminated in 1911. In 1980, or 69 years later, the first lynx tracks were observed on the Plješevica Mountains northwest of Bihač by the Croatian border, as well as on the Grmeč Mountains northeast of Bihač. Animals from the reintroduction in Slovenia – released in 1973 – had arrived in B&H. The trend of the range expansion was to the southeast, parallel to the extension of the Dinaric mountain range all the way to the Neretva River. The other direction of expansion was north towards the Krivaja River. Lynx have not yet been noticed in the southeastern mountains of B&H.

1.2. Present trend

The lynx population size has not been determined in any of the hunting units. Only cases of mortality have been recorded. The observation of tracks and sightings are also recorded.

1.3. Legal status

The Hunting Law of B&H of 1978 does not mention the lynx. That is logical, as lynx were not present in the country when the law was established. In the Serbian Republic of B&H, the new Hunting Law of 1994 lists lynx as a protected game. Recent information from that area is that the law will be changed and lynx will be given unprotected status. In the B&H Federation the new Hunting Law is in preparation, and the status of the lynx will have to be determined. With reference to legal and illegal hunting, according to our information, lynx are hunted whenever seen.

1.4. Available literature (reports)

Data for the last 20 years (1980–2000), since the lynx reappeared in B&H, have been collected by hunting professionals at forestry organizations and by local hunting clubs. In Table 1 all animals are listed that were hunted, killed by traffic, or seen alive.

2. Prey species

2.1. Main game for lynx food

All main lynx prey are ungulates (*Artiodactyla*):

1. Roe deer (*Capreolus capreolus*)
2. Chamois (*Rupicapra rupicapra*)
3. Moufflon (*Ovis aries*), fenced
4. Wild boar (*Sus scrofa*)

2.2. Alternative lynx prey

1. Hares (*Leporidae*)
2. Squirrels (*Sciuridae*)
3. Fowl (*Galliformes*): *Tetranoidae* and *Phacianidae*

2.3. Damage to livestock

No cases of lynx damage to livestock have been recorded so far. In one case, a lynx was seen near fenced sheep in 1993 at the Vlašiæ Mt. near Travnik.

3. Habitat

3.1. Status and development of forests

Lynx have so far been seen in medium high and in high mountains (800–1400 m). These mountainous areas are covered with several types of forest dominated by beech, fir and spruce in different mixtures, belonging to the Eurosiberian region. The forests are accessible by trucks for the transport of timber. Ecological rules are followed in forest management; some old trees and snags are left in the forest.

3.2. Protected zones

The protected areas are:

1. "Blidinje" Nature Park near Čvrsnica, 32.340 ha, since 1992.
2. Virgin forest reserves: "Janj" near Šipovo, 195 ha; "Lom" near Drvar, 278 ha, "Plješevica" near Bihač, 50 ha (total 150 ha with the part in Croatia).
3. Forest reserves: "Omar" near Skender Vakuf, 97 ha; "Žuča-Ribnica" near Kakanj, 50 ha.

4. Inhabitants and institutions

The area where lynx occur is the least settled in B&H. People live by livestock, agriculture, and forestry.

4.1. Government organizations

There are two units in B&H: The Serbian Republic and the Federation of B&H. The governments make laws through relevant Ministries. The Federation B&H is

divided in 10 cantons which may have local laws when they are coordinated with the Federal laws.

4.2. Nongovernmental organizations

Hunting NGOs in B&H are organized in three hunting associations:

- Hunting association of Serbian Republic
- Hunting association of Herzeg-Bosnia
- Hunting association of B&H

Each hunting association is equal and is a member of the Conseil International de la Chasse (CIC).

Each local hunting club is a member of one of these hunting associations. Hunting professionals are educated at Forestry Faculties in Sarajevo, Banjaluka, and Zagreb or in High Schools in Ilida and Karlovac. Forestry engineers and technicians are organized in their NGO.

Table 1. Known lynx mortalities and observations of lynx in Bosnia and Herzegovina.

No	Year	Community	Location	Found alive	Dead	Sex	Weight (kg)
1	1980	Bihač	Plješevica	track		–	
2	1983	ZavidovićI	Prometnica		traffic victim	–	
3	1984	Bihač	Plješevica	sighting		–	
4	1985	Bihač	Loskun		Hunted	–	
5	1986	Drvar	–		Hunted	M	
6	1987	Bihač	Plješevica		Hunted	M	
7	1987	Kupres	Cincar	sighting		–	
8	1988	ZavidivićI	Kamenica		Hunted	F	
9	1989	Bihač	Plješevica		Hunted	M	
10	1989	Bihač	Plješevica		Hunted	F	
11	1989	Bihač	Plješevica		Hunted	M	
12	1989	Šipovo	Crni Vrh		Hunted	F	
13	1991	Glamoč	Staretina		Hunted	F	18
14	1991	Glamoč	Priluma		traffic victim	M	
15	1993	Šipovo	Vitoroga		traffic victim	M	
16	1993	Novi Travnik	Vranica		Hunted	M	
17	1993	Vitez	Vranica		Hunted	M	
18	1993	Travnik	Vlašić	sighting		–	
19	1994	Rama	Vran		Hunted	F	
20	1994	Rama	–		Hunted	M	
21	1994	Rama	–		Hunted	F	
22	1996	Posuje	Čvrsnica		Hunted	M	
23	1998	Posušje	Čvrsnica		Hunted	M	
24	1998	Šipovo	Vitoroga		Hunted	M	
25	1999	Rama	Raduša	sighting		–	
26	1999	Kupres	Čučkovine		Hunted	M	20
27	1999	Kupres	Jaram-Kurljaj		Hunted	M	22
28	1999	Glamoč	Cincar		Hunted	M	22
29	1999	B. Grahovo	Šator		Hunted	F	11
30	1999	B. Grahovo	Šator		Hunted	M	21
31	2000	Donji Vakuf	Semešnica	sighting		–	

On the status of the Balkan lynx in the Former Yugoslav Republic of Macedonia

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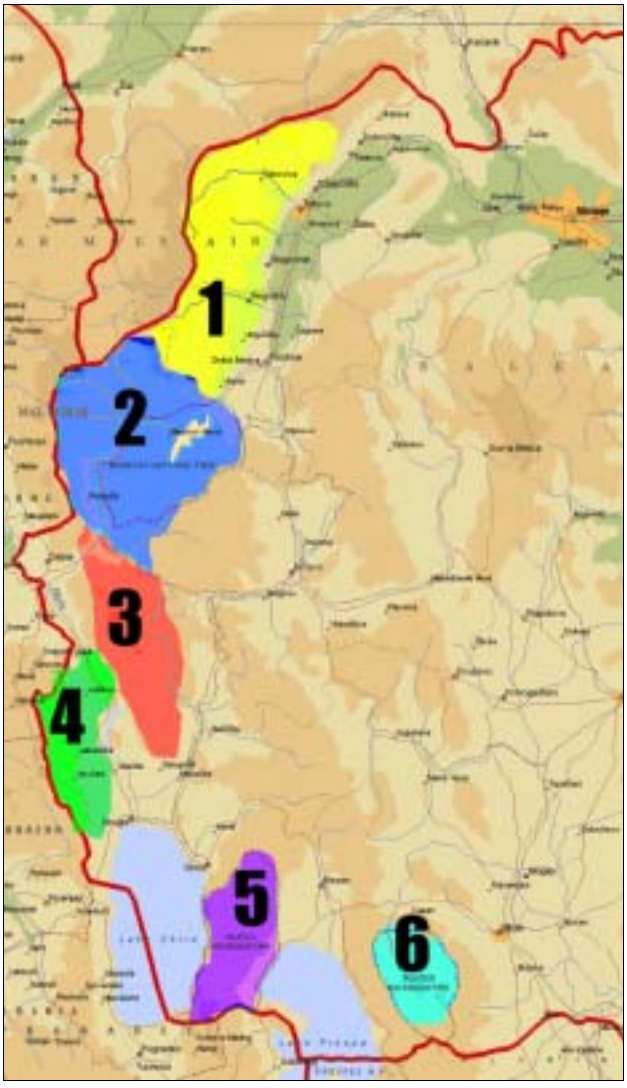
1. Current status and distribution

For easier charting and describing, the territory inhabited by lynx was divided in five areas. Starting from the northern border with Yugoslavia and following the Albanian border they are: Shar Mountains, Mavrovo National Park, Stogovo and Karaorman Mountains, and finally Drimcol region, Galicica National Park and Pelister National Park (Map 1).



Map 1. Regions in the FYR of Macedonia discussed in this report:
1 Shar Mountains (outside Mavrovo National Park)
2 Mavrovo National Park
3 Stogovo and Karaorman Mountains
4 Drimcol region
5 Galicica National Park
6 Pelister National Park

1) Shar Mountains (outside Mavrovo National Park):
Illegal woodcutters from both sides of the border have over-used the northern part of the mountain, and this is now considered a very big problem. The slopes above Tetovo town are being subject to illegal building of vacation houses and villas. There is an initiative for the Shar Mountains to be proclaimed as a national park (updates will be available), and poaching is definitely rising, since there is little or no control of the region.

The Yugoslavian part of the Shar Mountains, according to our sources, was a natural park, but no other information on the current situation is available. So far the locals and hunters we contacted have seen no lynx for the last 10 years, so we have to conclude that there are no lynx in the north part of the mountain. There are wolves, bears and roe deer present.

2) Mavrovo National Park:
The park is quite large and it stretches over 730.8 km^2, including the entire Bistra, Korab, Deshat, and Vratsa Mountains (on the Macedonian side of the border) and part of Shar and Krchin Mountains. To the north, it stretches as far as the point where the borders of Macedonia, Albania and Yugoslavia meet and to the south just out of the reach of Stogovo Mountains.

Although people inhabit all areas of the park, most of the population is located in small villages, which have faced constant mass depopulation for the last 50 years. Today mostly elderly people live in the villages and following this trend, the logging, burning of forests and stock herding are considerably reduced. The forests are under no serious threat, but there is some poaching by the local population and an increasing problem of waste disposal caused by local winter tourism.

The lynx population of the park is considered to be stable. Wardens officially record the sightings. The wardens, who estimate the population, document their sightings (Tab. 1). The observations of the forest police, locals or tourists are rarely documented.

Records of the park and a brochure of the park published in 1995–1996 describe a population of about 20 lynx that periodically follow the local population of chamois (1600 individuals) across and out of the park. According to the employees and the wardens, today there is a certain increase; however no official counting has been conducted. There is also an increase in the population of roe deer (and a few other park animals), which in 1996 numbered over 1200 individuals. There is a distribution map of roe deer, chamois and wild boar of the park available, dating from 1989.

Table 1. Documented lynx sightings of the last 10 years (detailed list of the last 30 years is available).

Year	Locality	Observation
1993	Velebrdo	a lynx was killed by a poacher
1995	in the park	the park rangers and the forest police found a lot of tracks
1996	Brodec	one of the employees saw a lynx
1996	Rech	the warden of the park saw a lynx
1997		a skin of a lynx was found
??	Nostrovo	one of the employees saw a female and two cubs
2000	near park headquarters	tracks discovered
2000	Lazaropole, Mavrovo	young lynx of the year killed

Hunting and habitat loss have long ago extirpated the red deer. There is a population of 70 brown bears, 200 wild cats and about 20 wolves that are the subject of a predator control program due to attacks on livestock. We were able to confirm the existence of a stable population of alternative prey, but the lack of records prohibits any assessments. The increased populations are connected to the migration of animals from Albania and Kosovo during the war. The closeness of natural parks in Yugoslavia along the border correlates with these claims. An increase of game is noted even on Jakupica and Golesnica Mountains (south of Skopje). According to locals from Veles, roe deer flood the area.

3) Stogovo and Karaorman Mountains, Drimcol region:

There is a confirmed population of lynx on Stogovo Mountains. The information was obtained from local people of the village of Brosnica. According to their claims, the animals are frequently seen near the locality Ostrobrdo. However, an estimate of the number is not possible at this time. There is a survey dating from 1997 that describes a population of about five lynx, but having in mind the closeness of Mavrovo National Park, it is possible that the population is shared between these areas.

Local people also confirmed the existence of lynx on Karaorman Mountains (southern part of the Stogovo-Karaorman complex). However, an estimate of the number is not possible. Interviews with local people from the above mentioned mountains (Zupa region) revealed that the lynx has been very rare for the last 10 to 15 years, and that the whole area is facing increasing problems with poaching. For example, one of the interviewed people saw a couple of lynx playing on a clearing in the lowlands of Stogovo Mountains seven years ago. He killed them confusing them with dogs.

The Drimcol region and Mount Jablanica north of Ohrid lake were subject to severe hunting and poaching, so game is relatively rare, and at times even hunting of hares is banned. The last lynx was seen at least ten years ago. So it is safe to conclude that there is no lynx population in this region.

4) Galicica National Park:

The national park stretches over the entire Galicica Mountains and covers over 250 km^2. The highest peak is at 2255m above sea level. There is a road going over the entire mountain, connecting the settlements on the shores of the two lakes. The park employees confirm the existence of lynx in the park; their estimate is two to three animals. A sighting list was not available at this time. Interviews with hunters from the Prespa region and with the forest police indicate – although not very reliably – that there are no lynx present on the Prespa Lake side of the mountain. Roe deer, bear and wolf populate the park. There is only one village at the edge of the park near Lake Prespa.

5) Pelister National Park:

The park extends over an area of 125 km^2, at an altitude ranging from 700 to 2600m. It contains the highest part of the mountain and a little more than a third of its total surface. As in the Galicica NP, the park officials describe a population of from one to three animals. We found some mountain climbers who saw a lynx at the border of the park some 18 months ago. Chamois, wolf, bear, roe and red deer are present in the park. Interviews with hunters from the Prespa region and with the forest police indicate that there are no lynx present on the Prespa Lake side of the mountain. There are two villages in the third zone of the park, an area where the inhabitants are allowed agricultural activities. There were claims that lynx also inhabited Karadzica Mountains. However, this is very unlikely and it is still under investigation (updates if the situation changes will be available).

To summarize, today the lynx population is only stable in Mavrovo National Park with the possibility of a slight increase due to the war in Kosovo. In all other areas, the population trend is decreasing. Compared to 10 years ago, the lynx has disappeared from areas like

the Shar Mountain and Drimcol region. The decrease of the lynx population in the FYR of Macedonia has been important over the last decade.

2. Legal status

Since 1973, lynx have been proclaimed as a natural rarity. They are protected under the *Act on Protection of Natural Rarities*. Since then, the status of lynx has not been changed. In April 1996, lynx were proclaimed as a protected species of which the hunting is permanently banned by a new Hunting Act.

The Ministry of Agriculture and the Ministry of Environment share the responsibilities of enforcing the law. However, the forest police and gamekeepers have not enough manpower; they are poorly paid and have very little equipment. Under these conditions, poaching has increased.

The territory outside the national parks is under the control and protection of hunting clubs (which pay concessions to the government) and the forestry management. There is no real assessment of their work. Although most of the people work for government organizations (under the Ministry of Agriculture) or so-called public enterprises, there seems to be a lack of coordination in their efforts.

Killing a permanently protected animal is punishable by a fine of 20,000 to 50,000 denars ($350 to 900) or imprisonment up to 30 days. The person is also obliged to pay for damage to the concessionaire or to the park management. If the concessionaire does not protect, or if he even hunts a protected animal, he pays a fine of 150,000 to 300,000 denars ($2.500 to 5000). If there is a breaking of the concession arrangement, the person in charge of the enterprise is fined 30.000 to 50.000 denars ($500 to 900). For the export of protected species, ministry approval is needed. A special permit from the National Agency for Protection of Natural Rarities is required in order to capture or kill a protected animal. To hunt protected animals for research, examination, diagnostic or scientific purposes requires a permit signed by the Minister of Agriculture.

Map 2. Present distribution of lynx in the FYR of Macedonia.

3. Status of alternative prey

Although reports are very variable depending on the source, we can confirm fairly stable prey populations in all areas populated by lynx. However, it is impossible to give precise estimates due to the increased number of foxes in the past year, and the lack of recent surveys.

4. Habitat

The status and development of the forests are under the supervision of the concessionaires and they follow individual logging and repopulating programs. The national parks have only negligible logging problems but the areas outside the parks, although protected by foresters, face some problems depending on the region and the size of the human population. The general condition of the forests in the western part of the FYR of Macedonia is considered to be stable, but tending to get worse.

5. People and institutions

5.1. GOs in charge of hunting, forestry and nature conservation

All the national parks and forestry reserves in the country are branches of a single public enterprise (government owned). Responsibility lies with the Ministry of Agriculture, Forestry and Water Management. The parks are partly financed by the government, but they get most of their finances by selling wood to the local population and selling hunting permits to tourists.

The rest of the territory is divided into regions and then offered for concession by the government. The main concessionaire is the public enterprise Macedonian Forests, which controls the major part of the forests in the country. This enterprise is also partly financed by the government, and it also deals with fuel wood over the whole territory of the country.

Both public enterprises – for forestry management and national parks – are responsible for the conservation of the animals' habitat, the forests entrusted to them, as well as for making up the losses caused by logging, hunting and poaching. Also a part of their conservation programs is to provide food for the animals (roe deer, red deer) during the winter. Mavrovo National Park has started a program for reintroduction of the red deer, but results are still unknown.

5.2. NGOs in charge of hunting, forestry and nature conservation

A smaller part of the territory is leased to private companies and hunting societies that form hunting parks. As previously described, the concessionaires are responsible for implementing the hunting restrictions for protected species and for conservation of the habitat, as well as for reduction of undesirable and unprotected species (fox, wolf etc.).

5.3. Universities/sciences involved in wildlife research

- Veterinary faculty Skopje; Department of biology and diseases of wild animals.
- Forestry faculty Skopje; Department of wildlife management, forestry management.
- Faculty of natural sciences Skopje; Biology institute
- Museum of natural sciences.
- National park managements; running independent programs.

6. Stuffed animals

The Museum of Natural Science owns six stuffed lynx. They are listed as a national treasure and are therefore not for sale. Investigation and contacts with private owners were not conducted at this time, due to the possibility of raising interest in the lynx in the local population and thus enhancing poaching.

7. Contacts

Contacts have been established with the director of the public enterprise that controls all the national parks in Macedonia and with the managers of all the above-mentioned national parks. Support for the lynx preservation project was also obtained from the Ministry of Agriculture and the Ministry of Environment, which roughly includes all the relevant government organizations. Special support has been obtained from the Commission for Protection of Special Natural Rarities, which is trying to pass an especially strict protection bill in the parliament. A few NGOs demonstrated also their willingness to help the project. Although a wider inquiry out in the field was not possible at this time, some of the local people have shown interest and are willing to help. We have managed to enlist members from almost all of the mentioned regions. This will certainly prove invaluable for local implementation of the project.

8. Conclusions

a) The final estimate of the number of lynx in the FYR of Macedonia is somewhere between 30 and 35 individuals. About 80% of the animals are located in the National Park Mavrovo and about 15% more reside in the mountains in the immediate vicinity of the park's boundary. Only 3–6 animals live outside the wider Mavrovo region. And 90% of the animals live in national parks.

b) No reports of lynx related attacks on livestock have been documented in the official statistics during the last 10 to 15 years. If any occurred, they probably have been considered as wolf attacks. The government pays for damage done by protected animals.

c) The interviews with local people, who live outside of the national parks, showed that most of the sightings are usually accompanied by shooting at, or killing the lynx. In most cases, the people involved claimed that they had no knowledge of the current legislation, or that they had mistaken the animals for wild cat, which has no legal protection.

d) In all concerned areas, including the national parks, there is some illegal logging and poaching, but it is considered to be a threat only in the northern part of Shar Mountain and in the Drimcol region.

e) For now it seems that only the national parks are a relatively safe haven for protected species, due to the constant control by wardens.

f) One cannot help feeling, that there is little or no co-operation between the public enterprises that control the territory. In spite of the fact, that they are all responsible to the Ministry of Agriculture, there is a noticeable lack of a specialized authority that oversees and coordinates their activities.

References

Sipos, N. 1997. The missing lynx. http//:lynx.uio.no/jon/lynx/

Mirić, D. 1981. The lynx populations of the Balkan Peninsula. Beograd, Serb. *Acad. Sciences and Arts, Separate edition*. DXXXIX, 154 p. (in Serbian)

Kirovski, P. 1996. Abundance and distribution of the Balkan lynx in the Radika river valley.

Micevski, B. 1997. Abundance and distribution of the Balkan lynx in the Radika river valley, summarized results on request of Euronatur.

The lynx populations in the Federal Republic of Yugoslavia

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There is a large amount of documents and data pointing to the existence of lynx in the Federal Republic (FR) of Yugoslavia in the distant and recent past. A few decades ago, the lynx was a subject of research done by the late Dr. Đorđe Mirić, resulting in publications on the status, distribution and origin of the lynx in all the countries of the Balkan Peninsula in the late 1970s and early 1980s. Dr. Mirić realized that the range of the lynx population in the southern and southwestern part of the Balkan Peninsula was isolated from the rest of the European range. Therefore, he tried to prove the hypothesis that there were great differences between this and other populations in Europe, and he gave this population the status of a subspecies (*Lynx lynx martinoi*, Mirić 1978). Only time and some new genetic methods will prove if he was right. However, the precise description of the bionomy of the Balkan lynx and the emphasis on the need for its conservation is the capital contribution of his work.

Recent events, including artificial and/or natural introduction of non-Balkan specimens, have resulted in further complication of the subject and increase the threat to the autochthonous Balkan population. In the last several decades, significant changes in the lynx population took place on the territory of the FR of Yugoslavia, and are now at their peak.

1. Survey of the status of the Balkan lynx in the past, its current status and distribution

In the mid-1950s, the autochthonous population of the Balkan lynx in the former Serbian Federal Republic of Yugoslavia was confined to mountain massifs in the southern and southwestern parts of the country, i.e. the Republic of Montenegro and the Province of Kosovo and Metohija. The status of the population was judged to be critical. Strict measures were enforced, including a total ban on hunting, and the population was kept at a constant level. There were records of Balkan lynx on the southern slopes of Kopaonik Mountains, Serbia, and therefore it was assumed that the population was spreading somewhat, but there were no conclusive results (Mirić 1981). In the same period, lynx were nonexistent in the other parts of former Yugoslavia. The extremely rare sightings of lynx in Bosnia in the mid-1980s, i.e. about 15 years ago, were not supported by scientific proofs.

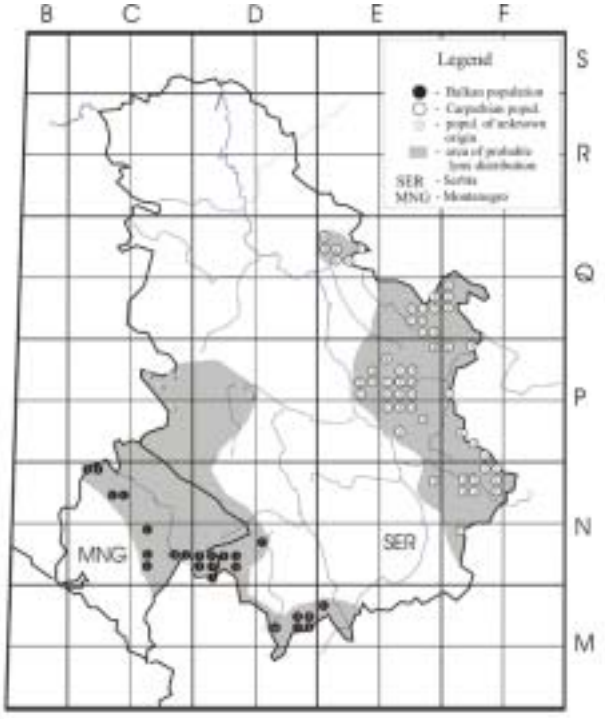
At the beginning of the 20th century, there were some indications that lynx were present in northeastern Serbia, probably based on rare immigrants from neighboring Romania, but for about 75 years this was not enough for a population to be established. Only in the early 1980s, more precisely on November 28th 1983, a first proof of existence of lynx in northeastern Serbia was noted on Mt. Deli Jovan (Milenković 1985). The specimen was determined to belong to the Carpathian subspecies (*Lynx lynx carpathicus*, Kratochvil *et* Štollmann 1963). After this, the lynx was recorded in Serbia several times in many localities (Mirić *et* Paunović 1992, Mirić *et* Paunović 1994, Hadži Pavlović 1997), with numerous testimonies on its presence collected from the local people. This speaks in favor of the hypothesis that the immigration, that is, the spontaneous recolonization of Carpathian lynx in its ancient habitat, was successful (Mirić *et* Paunović 1994). There is also another hypothesis, that the lynx was "hidden" in this long period, that is, the lynx never became extinct in Eastern Serbia but hid in uninhabited and inaccessible areas, where it could not be recorded (Hadži Pavlović 1997).

The valleys of Velika Morava River and its tributaries are situated between the ranges of these two populations. Although Central Serbia was an integral part of the lynx range in the Balkans, timber-felling, cultivation and extreme urbanization, followed by the building of infrastructure, made it a sort of a barrier, preventing the Balkan and Carpathian lynx from contact (Map 1).

In Table 1 – 3, only individual data for each UTM square (10km^2) are given, while numbers on Map 1 show the total numbers found in each UTM square.

1.1. The present trend and development over the last several decades

Data on the Balkan lynx population were much more numerous in the past, up to the 1950s. After that, only sporadic data on illegal shootings and on single specimens were recorded. The actual geopolitical situation during the last few decades made it impossible to as-



Map. 1. Recent distribution of Lynx lynx populations in Federal Rebpublic of Yugoslavia - Serbia and Montenegro (according to the records from last 10 years - dots and asterisks). UTM Grid 10 by10 km.

sess the status of the Balkan lynx population properly. The bombings of 1999 probably had some drastic influence on the Balkan lynx in its ancient habitat in FR Yugoslavia, not to mention the problems for researchers, which will last a long time. However, important data for the last 20 years, explaining the status of the Balkan lynx were published just a short time ago (Grubač 2000). Therefore, we have reason to say that the population trend of the Balkan lynx in our country is regressive (Savić *et al*. 1995, Grubač 2000).

On the other hand, recent data on the lynx population in northeastern and eastern Serbia are getting more numerous and point to an increasing population trend (Mirić *et* Paunović 1992, Mirić *et* Paunović 1994, Hadži Pavlović 1997, Grubač 2000). The distribution of the data also implies a rather quick range expansion. The animals very likely originated from the South Carpathian Mountains in neighbouring Romania. Latest records point to the first occurrence of lynx in Vojvodina, i.e. southeastern Banat, which also borders Romania in the east.

We must also point to the other potential direction of lynx immigration into Serbia – the western way (Grubač 2000, this paper). It is well known that the reintroduction of lynx in Kočevje, Slovenia (Čop 1974) was successful, and the population spread not only throughout Slovenia, but also into Croatia and Bosnia-Herzegovina. Although it is improbable that these lynx spread all the way to the Yugoslavian border, in view of the immense geographical space between, we have a first indication now that it could be a possibility. The observation of lynx on Tara, Mokra Gora and Jelica Mountains (the last located almost in Central Serbia), according to the expert and field service of National Park Tara and other sources, can at this moment only be attributed to immigration from the west. In this way, a third population is becoming established in the FR of Yugoslavia. If the hypothesis that their origin is from Kočevje is right, those lynx are genetically linked to these on the Slovakian Carpathian Mountains.

These recent sightings (and spread of range) of lynx into western Serbia encourage speculation about the origin of lynx in the western parts of Montenegro (Plužine). From the given data (Map 1, Table 1) it is clear that there is a general scarcity of data on lynx in Montenegro. Therefore it may only be concluded that their presence is permanent, and that certain specimens have been illegally shot from time to time.

The actual status of the lynx in the FR of Yugoslavia is very complicated, as its range has a disjunctive character, comprised of an autochthonous population of Balkan lynx in the south and southwest and the population with lynx from the Carpathian Mountains in the northeast, north and west of the country (see Table 1 – 3).

1.2. Population estimates

On the territory of the FR of Yugoslavia, there has never been any organized census of lynx. Even the statistics of hunters' societies do not regulate this important parameter. It would be very difficult to make any approximation based on data we now have. However, with certain reservations, it may be estimated that the Balkan lynx population numbers about 30 individuals. Grubač (2000) estimates the population in Serbia for the period 1990-1999 to be 22-27 individuals, while he concludes that the present population is about 12-18 individuals. The Carpathian population has about 40 individuals, or about 30 according to Grubač (2000). The population in western Serbia is estimated to be 3-6 individuals (*ibid.*).

2. Legal status/hunting/poaching

The lynx is completely protected in both federal units (Serbia and Montenegro) by Orders on Protection of Natural Rarities of Serbia and Montenegro, while the Hunting Laws of both federal units include it among the completely protected game. The first major cause of lynx deaths in the FR of Yugoslavia is direct killing, done mostly through poaching/shooting, but also trapping, road killing and poisoning, respectively. The second problem is degradation and/or changing of the habitat in the broadest possible meaning, while the third one is inadequate hunting management. The last mentioned problem results in insufficient abundance of main prey species. Therefore the lynx is forced to find alternative food sources, and attacks livestock, espe-

cially sheep. This leads to a bad reputation and unpopularity for species, resulting in increased illegal shooting.

3. Prey base

Recent data collecting (Grubač 2000) represents the first scarce but important data on the prey spectrum of Balkans population of lynx: *Alectoris graeca*, *Lepus europaeus*, *Rupicapra rupicapra* (mostly juvenile specimens), *Capreolus capreolus*, *Tetrao urogallus*, *Turdus viscivorus*, micromammals, respectively. On the other hand, the prey of Carpathian population representatives is much less diverse. In the last ten years there have been at least seven attacks on sheep, hunting of *Capreolus capreolus* was observed, and the stomach contents of analyzed specimens included the remains of *Lepus europaeus*, *Turdus merula,* rodents, respectively.

3.1. Status of main wild prey species (e.g. roe deer)

According to hunting data and statistics (the only existing data), the roe deer (*Capreolus capreolus*) has very low numbers in Yugoslavia, due to unsuitable hunting management, while the populations of chamois (*Rupicapra rupicapra*) are relatively stable, but their abundance is much smaller, and they are localized on a few localities.

3.2. Availability of alternative wild prey (e.g. hares, grouse)

According to hunting statistics, the hare (*Lepus europaeus*) also has low numbers in Yugoslavia. Grouse, which used to be numerous, are now present only in minor mountain habitats, the hazel grouse (*Bonasa bonasia*) in forest areas and the rock partridge (*Alectoris graeca*) in open areas and shrub, being the most numerous.

3.3. Information on killing of domestic animals (sheep, goats)

Although the main wild prey species are low in numbers, attacks on livestock were almost unknown for lynx in FR Yugoslavia. Most recent data bring a new light to this important problem (Grubač 2000). They show that the representatives of the Carpathian population are more inclined to feed on domestic animals, mostly sheep. The cause should perhaps be sought in the status of the main wild prey in recent times in Eastern Serbia.

4. Habitat

Members of the Balkan lynx population are mostly found in hill and mountain regions at an altitude range from 550-2.500 m a.s.l. in scarcely populated forest and rocky-forest areas. The Carpathian lynx population is mostly found in forest and forest-rocky-hill-mountain areas at an altitude range from 100-1,000 m a.s.l (incl. the records in Deliblatska peščara sands). Both populations often live in beech, oak and other deciduous forests, and also in thickets, gorges and rocky terrain. Members of the new lynx population in Western Serbia are found in similar habitats at an altitude range from 350-1,200 m a.s.l.

5. Problems

- lack of knowledge of the present status of the Balkan lynx population in the FR of Yugoslavia;
- the origin and status of a specimen which recently showed up in western Yugoslavia;
- the spread of the southern Carpathian population across Eastern Serbia towards the south (to Macedonia) and east (to Bulgaria).

6. Suggestions/actions

- initiate the forming of national expert teams (according to the Action Plan) in every Balkan country;
- define status and distribution, particularly the distribution borders, of the re-introduced lynx population;
- follow the development of the Carpathian lynx and define the overlapping zones, with the use of classical and modern methods;
- prepare national Action Plans for protection and conservation of the Balkan lynx population;
- enforce and support an international co-operative project on monitoring the Balkan lynx.

The available literature/reports/statistics

The literature on lynx in the FR of Yugoslavia is not quantitatively rich. The main papers are:

Čop, J. 1974. – [The Attempt of Reintroduction of Lynx in Kočevje]. Simpozijum o lovstvu. Inst. za šumarstvo i drvnu industriju, 71-74, Beograd (in Serbian with English summary).

Grubač, B. R. 2000. – The Lynx, *Lynx lynx* (Linnaeus, 1758) in Serbia. Protection of Nature 52/1: 151-173, Belgrade.

Hadži Pavlović, M. 1997. – [The Lynx in Timočka Krajina]. Lovački savez Srbije, manuskript, Beograd (in Serbian).

Mirić, Đ. 1978. – *Lynx lynx martinoi* ssp. nova (*Carnivora, Mammalia*) – neue Luchsunterart von der Balkanhalbinsel. Glasnik Prirodnjačkog muzeja, B33: 29–36, Beograd.

Mirić, Đ. 1981. – [The Lynx populations of the Balkan Peninsula]. Serbian Academy of Sciences and Arts. Sep. ed. 539, Dept. of nat. & math. sci. 55, 1–154, Belgrade (in Serbian with English and German summary).

Milenković, M. 1985. – Record of *Lynx lynx* (Linnaeus,

1758) (*Felidae, Carnivora*) in Eastern Serbia. Arch. biol. nauka, 37(1–4): 5P–6P, Beograd.
Mirić, Đ. *et* Paunović, M. 1992. – A New Record of *Lynx lynx* (Linnaeus, 1758) (*Felidae, Carnivora*) in East Serbia. Glasnik Prirodnjackog muzeja u Beogradu, B 47: 171–174, Beograd.
Mirić, Đ. *et* Paunović, M. 1994. – Recovery of *Lynx lynx* (L. 1758) in East Serbia. Bios, 2: 315–318, Thessaloniki.
Savić, I. R., Paunović, M., Milenković, M., Stamenković, S. 1995. – [Diversity of Mammal Fauna (*Mammalia*) of Yugoslavia, with the Review of Internationally Important Species]. In: Stevanović, V., Vasić, V. (eds.), 517-554, Biološki fakultet i Ecolibri, Beograd (in Serbian).

Table 1. Distribution records of Balkan population of Lynx – last 10 years in Montenegro and Southwestern Serbia (incl. Kosovo and Metohija Province).

UTM (10 km^2)	Locality	Habitat	Altitude (*m* a.s.l.)	Date	Data type
CN 19 CN 29	Plužine	-	-	-	-
CN 37 CN 47	Žabljak surroundings, Durmitor Mt.	-	-	Summer 2000	Observed
CN 61 CN 62	Mala Rijeka Canyon	-	-	1995-2000	-
CN 64	Babin Zub, Sinjajevina Mt.	-	-	1999	-
CN82	Rijeka Margaritska River	-	-	(1984)	Killed
CN 82 CN 92	Komovi Mt.	-	-	-	-
DN 01 DN 02	Visitor Mt.	-	-	-	-
DN 10 DN 11	Maja Karanfil Peak, Prokletije Mt.	-	-	-	-
DN 12	Bjeluha, Čakor Mt.	-	-	-	-
DN 22	Rugovska Klisura Gorge, Prokletije Mt.	-	-	Winter 1994/95	Tracks
DN 31	Lovski Potok Stream & Raški Do, Prokletije Mt.	-	-	1995	Observed
DN 32	Čvrljski Krš Rocks, Veternik Mt.	-	-	Fall of 1990	Observed
DN 53	Vrelo Vill., Istočke Planine Mts.	-	-	Jan./Feb. 1996	Killed
DM 66	Stojanović & Mandić frontier post, Koritnik Mt.	-	-	November 1997	Killed
DM 86 DM 87	Prizrenska Bistrica Gorge, the road	Gorge	-	Late fall of 1990	Observed
DM 87	Vrbički Potok Creek	Gorge	-	Fall of 1997	Observed Killed
DM 96	Durlov Potok Creek, Šarplanina Mt.	Beech forest	1.900	Fall of 1992	Observed
DM 97	Čerenačka Reka River, Ošljak Mt.	Forest	1.370	Winter 1993/94	Tracks
EM 08	Above the Jezerce Vill., Nerodimske Šume Forests	Beech forest	800-900	Fall of 1995	Observed

Table 2. Distribution records of Carpathian Lynx population– last 10 years in Eastern Serbia.

UTM (10 km^2)	Locality	Habitat	Altitude (*m* a.s.l.)	Date	Data type
EN 98	Suva Planina Mt.	-	-	1998	Observed
EP 35	Bošnjani Vill., Paraćin	Road	190	January 1991	Observed
EP 36	Area of Senjski Rudnik – Ravanica Monastery	Forest	-	June/July 1990/91	Observed
EP 46	Mihajlova Jama Hole, Stenka	Oak & beech forest	-	Winter of 1998/99	Tracks

Table 2. (cont.) Distribution records of Carpathian Lynx population– last 10 years in Eastern Serbia.

UTM (10 km^2)	Locality	Habitat	Altitude (*m* a.s.l.)	Date	Data type
EP 47	Donji Bigar – Muška Voda, Jablanica River	Beech forest on limestone rocks	-	Fall of 1997	Observed
EP 54	Skok, Rtanj Mt.	Beech forest	-	January 1994	Tracks
EP 55	Poljanica, Krivi Vir Vill.	Pastures & shrubs	600	Mid January 2000	Observed
EP 56	Brezovica	-	-	September 1997	Killed
EP 58	Beljanica Mt.	Rocks	-	Fall of 1998	Observed
EP 62	Ozren Mt., Soko Banja	Beech forest	800	August 1995	Observed
EP 64	Rtanj Mt., southern slopes	Shrubs & beech forest on limestone	-	January 1994	Tracks
EP 65	Vrelska Kosa, Gorge of Radovanska Reka River	Oak forest	-	Fall of 1999	Observed
EP 66	Gorge of Radovanska Reka River (above area)	Bushes	-	January 2000	Observed Tracks
EP 66 EP 76	Mikuljska Reka River, Bogovinski Krš Karst	-	-	1997	Observed
EP 67	Mikulj Gorge	-	-	July 1998	Observed
EP 74	Rtanj Mt., above Rujušte Vill.	-	-	Fall of 1994	Killed
EP 75	Boljevac – Bogovina Road	-	-	March 2000	Observed
EP 76	Klencuš Vrh Peak, Klencuš River	-	900	December 1994	Tracks
EP 77	Lazareva Klisura Gorge	-	-	Fall of winter 1997	Tracks
EP 83	Slemen peak, above Vlaško Polje Vill.	-	-	Winter 1999/2000	Killed
EP 99	Bezak Vrh peak –Svinjak, Tanda Vill.	-	-	Winter 1994	
EQ 07	Flamunda, Deliblatska Peščara sands	Sand dune	-	August 1997	Observed
EQ 08	Korna	Road	140-180	November 1999	Observed
EQ 16 EQ 26	Vinogradi, Kajtasovo	-	-	Winter 1997	Tracks
EQ 17	Šušara, Deliblatska Peščara Sands	Shrubs	-	1993/94	Observed
EQ 47	Kaluđerovo, Bela Crkva	-	-	Fall of 1991	Killed
EQ 71	Debeli Lug, Majdanpek	Deciduous forest	-	Winter 1998	Tracks
EQ 72	Prevoj Kapetanska ridge, Severni Kučaj Mt.	-	-	October 29, 1995	Observed
EQ 80	Garvan Peak (below), Mali Krš Mt.	Mixed deciduous forest	-	Summer 1996	Observed
EQ 81	Blizna Vill., Majdanpek	-	-	Fall of 1995	Killed
EQ 82	Zaliv Hladna Voda Bay, Donji Milanovac	Danube river bank	-	March 13, 1994	Drown
EQ 90	Pripor, Deli Jovan Mt.	-	-	Winter 1997	Tracks
EQ 92	Golubinje, National Park of Đerdap	-	-	July 17/18,1996	Killed
EQ 93 FQ 02 FQ 03	Miroč Mt., different localities	Forest with meadows	-	1993	Tracks Observed
FQ 04	Kazan, Đerdapska Klisura Gorge	Shrubs on limestone rocks	-	August 16, 1991	Observed

Table 2. (cont.) Distribution records of Carpathian Lynx population– last 10 years in Eastern Serbia.

UTM (10 km^2)	Locality	Habitat	Altitude (*m* a.s.l.)	Date	Data type
FN 14	Kalna Vill., Strezimirovac	-	-	1998	Killed
FN 17	Petlovo Bojište, Pirot	-	-	1990	Observed
FN 18	Vodeni Vrtop - Debeli Del – Ljuti Kamik Peaks, Belava Mt.	-	-	1993	Observed
FN 27	Đeltas, Pirot	-	-	June/July 1995	Observed
FN 28	Gnjilanska Korita, Suvodol Vill., Belava Mt.	Lilac shrubs on rocks	-	Fall of 1993	Observed
FN 39	Zaskovci, Topli Do Vill.	Meadow	-	Summer 1998	Killed
FN 47	Izatovac, Braćovac Vills., Vidlič Mt.	Beech forest on the rocks	-	June 1999	Observed
FN 48	Krušje, Rsovac Vill., Vidlič Mt.	Beech forest	-	Fall of 1993	Observed
FN 49	Visoka Strana – Mečija Gora – Golemi Vrh Peaks, Vidlič Mt.	-	-	January 1994	Observed
FP 05	Vratarnica Vill., Zaječar	Timok river bank	-	July 1996	Observed
FP 09	Kruškovac, Sikole Vill.	Forest	-	Winter 1993	Tracks
FP 12	Aldinac Vill.	-	-	Fall of 1994	Observed
FP 21	Orlov Kamen peak, Stara Planina Mt.	Forest	-	Winter 1996	Tracks
FP 29	Čukar, Mokranja Vill.	Shrubs	-	Winter 1993	Tracks
FP 30	Udica, above Topli Do Vill.	-	-	Spring-summer 1993	Killed

Table 3. New distribution records of Lynx population of unknown origin – Western Serbia.

UTM (10 km^2)	Locality	Habitat	Altitude (*m* a.s.l.)	Date	Data type
CP 67	Đanici, Zvezda Area, Tara Mt.	-	350	March 1996	Observed
CP 76	Mitrovac, Tara Mt.	Forest	-	Summer 1996	Observed
CP 84	Nadkrajevi, Vrh Zborište Peak, Mokra Gora Mt.	Pasture & mixed forest on limestone rocks	1.000	June 1995	Observed
CP 87	Sokolske Planine Mts.	-	-	1995/96	Killed
DP 10	Uvac	-	-	Fall of 1997	?
DP 11	Klisura Tisovica Gorge	-	-	Fall of 1994	Observed
DP 36	Ovčarsko-Kablarska Klisura Gorge	-	-	April 1990	Observed
DP 45	Stjenik, Ploča, Jelica Mt.	A cave	-	February 2000	Killed

Existing knowledge on the status and distribution of the Lynx in Albania

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This report on the existing knowledge about lynx status and distribution in Albania is based on the last 10 years of field trips throughout the country. The visits have been carried out in the framework of the PhD thesis by the author (1992–1997), and two projects, respectively: „Existing conditions in the Protected Areas proposed under the World Bank Forestry Project of Albania (1998–2000)" and „Biodiversity Conservation and Forest Management Planning in 13 High Forest Areas of Albania". Some 27 Mountainous Protected Areas (PA), and some 20 other high mountain forest areas, from the North to the South of Albania, have been surveyed during the field work undertaken by the project team, spending some 2–5 days in each forest area.

1. Methods

The main method used to collect data was that of "transects" identified on maps and followed carefully in the field. The researcher looked for animal signs and tracks, mostly for footprints on soft ground or snow, and faeces (Bang & Dahlstrom 1990; *The Collins Guide to Animal Tracks and Signs*).

Apart from this direct method, interviewing target local people, such as shepherds, hunters and foresters, was practiced in almost all the visited areas where possible. To get as much information as possible, questions like when, where, how many, why, in which circumstances etc., were used.

2. Results and Discussions

The remaining population of the lynx includes some 3–4 main nuclei, such as: 1) Alps (Vermosh-Livadhi Harushes); 2) Balgjaj-Martanesh (Mat and Bulqize districts); 3) Qarrishte-Rrajce (Librazhd); and 4) Sopot-Zavaline-Holte (Librazhd-Elbasan-Gramsh districts). The most important nuclei seem to be the last two, Sopot-Zavaline-Holte and Qarrishte/Rajces which include some vast areas of still well preserved high mountain forest areas.

In the Biodiversity Strategy and Action Plan of Albania (BSAP) the lynx (*Lynx lynx*) is one of the priority mammal species for which a Species Action Plan is required to be prepared within the next two years. This is based on the existing data and the trend of the species in Albania during the last 50 years. The lynx population in Albania has known a strong decline since 1970, and a rough estimate shows that the lynx has lost more than 60% of its population since the early 1950s. The current lynx population in Albania is estimated at between 20–25 individuals. This figure shows that the lynx has now become a critically endangered species in Albania, and indicates, at the same time, the urgent need for action to be taken.

3. Proposals

a) There is a need to update information and knowledge about the lynx population, following two main pathways:

(i) Carrying out surveys on the potential lynx areas not yet visited and surveyed during the last 10 years. This will provide information whether the lynx is present or absent in these areas.
(ii) Undertaking more detailed surveys on the lynx areas already identified as such.

b) Based upon the data collected by the field surveys, a Lynx National Recovery Action Plan should be drafted and discussed. This would include:

(i) The identification of sites that are critical for this species to be taken under protection and appropriate management;
(ii) Related institutional and legislation arrangements and enforcement;
(iii) Publication of materials which raise awareness and organization of campaigns, focused particularly on the villages surrounding lynx areas;
(iv) Considering the compensation policy by the state authority for farmers, in the cases of damage caused by lynx; etc.

c) A regional Lynx Recovery Program should be set up in the very near future, in order to better co-ordinate actions and measures to be taken by the western Balkan Countries, raise the Lynx Recovery Program to the European level, and search for more funds to implement it.

Acknowledgment

We would like to thank the PMU (Project Management Unit) and PEMU (Project Environmental Management Unit) of Albania's Forestry project, funded by the World Bank, Italian Government and Government of Albania, that willingly supported our surveys on the high forest areas of Albania we visited and enabled us to collect data and information on biodiversity, particularly on large carnivores. Special thanks are addressed to the district forest services and foresters that offered us detailed maps and available information about the areas we visited. We are deeply grateful to all those local people (particularly shepherds and hunters) that were interviewed and shared their knowledge about their own forest areas with us, whose information was extremely helpful to our survey.

The lynx in Bulgaria: present conservation status and future prospects

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1. Present status and distribution

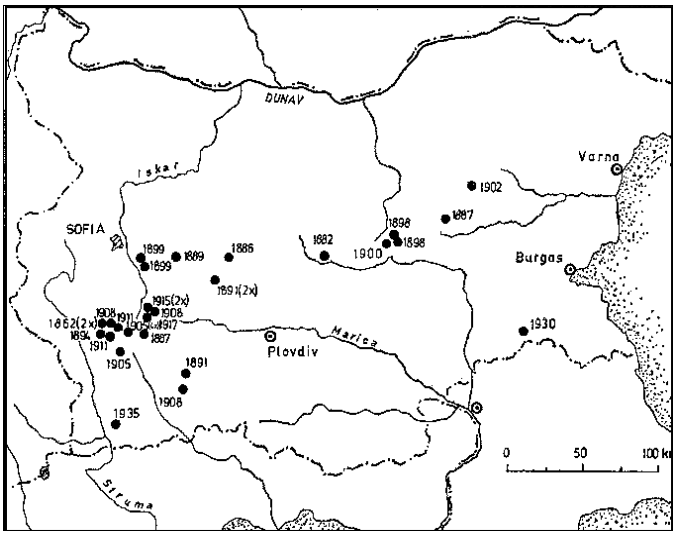
The present official conservation status of the lynx is extinct.

1.1. Historical review

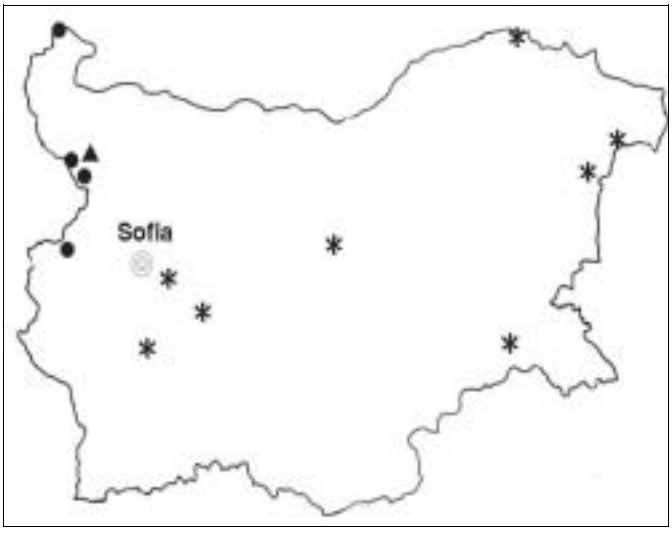
The first records for lynx in Bulgaria date back to 1862 (Map 1, Table 1). The last official records for killed lynx are from Pirin Mountains in 1935, near Melnik (Atanasov 1968), and 1941 Nature reserve Parangalitza (Spiridonov & Spasov 1985). For the period 1862–1941 the recorded cases are 27, covering up to 32 animals, killed, caught or seen. All the records show that the lynx in Bulgaria inhabited mainly the main ranges of Pirin, Rila, Rhodopi and Stara Planina (Balkans) Mountains, less in Sredna gora, Lozen and Strandja Mountains. The species was confined to big forest complexes, both deciduous and coniferous, using rock and shrub concealments. The lynx in Bulgaria occupied more diverse biotopes than other populations in Europe. It has even been seen in dry vegetation (like Strandzja Mountain). Table 1 summarizes the lynx records for the period 1862–1935.

1.2. Current trend/development in the past decades

Current data about lynx presence in Bulgaria are very scarce. During the period 1941–1999 most of the information on observed specimens came from local people. The most interesting fact is that 90% of the information came from the border area between Bulgaria and Yugoslavia – the region of Western Stara Planina, along the border. There are also some reports from Rui Mountain, near Trun (also along the border). The locals, mostly forest guards, shepherds and hunters spoke mainly about observed specimens, but none of these cases was officially proved. From Western Stara Planina there is also additional information about a lynx being killed in 1995 by a local hunter, but it has still not been checked if the skin is available. Some of the conclusions are made from remains – footprints or faeces. These are the only data directly received by fieldwork done by the Balkani Wildlife Society. In March 2000 a footprint similar to that of a lynx was seen and photographed. Later on, additional information was received by a local person of an individual seen in November 1999, exactly where Petko Tzvetkov found the track. There are also many other but uncertain data from different parts of Bulgaria. All the records are summarized in Map 2.



Map 1. Lynx seen or killed in the period 1862–1935, according to Atanasov, N. 1968.



Map 2. Lynx records for the period 1941- 2000 ● observed specimen – reliable data; ▲ tracks; ✱ information by locals and other – uncertain data

Table 1. Lynx records in Bulgaria (from 1862 to 1935), according to Neno Atanasov (1968).

Year	Observation	Locality	Altitude	Biotope
	2 juveniles caught	Rila Monastery, Chermena	1100 m	In hole
1882	Killed	Stara Planina (Balkan), village Kran, Kazanlak district	350–400 m	Rock concealments and bushes
1886	Observed and killed	Stara Planina, near Koprivstitza village,	1000–1200 m	Steep slopes and rock concealments with bushes
1887	Killed	Rila Mountain, Demirkapia, Samokov district	2539 m	Dwarf pine forests
1887	Killed	Stara Planina, place Titcha, Kotel region,	600 m	Mixed forest with bushes
1889	Killed and stuffed in Sofia University	Sredna gora Mountain, village Petrich, Panagjuriste district	500–800 m	Thick oak forest
1891	2 lynx observed	Sredna gora Mountain, peak Malak Bratia,	1000 m	Oak forest and bushes
1891	Killed	West-Rhodopi Mountains, Sjutka peak,	2187 m	Virgin coniferous forest
1894	Tracks of lynx following deer	Rila Mountain, along Ilijna river	1300 m	
1896	Live capture	?, Bulgaria, given to Berlin Zoo		
1898	1 male killed[a]	Tvardishki Balkan, Place Shishkin Rid	1250 m	Thick high-tree forest with scrub
1898	1 female killed[b]	Tvardishki Balkan, Place Shildari,	1250 m	Rocky slopes with thick forest and scrub
1899	Killed	Losen Mountain, German Monastery,	1000 m	Mixed forest with concealments
1899	Observed	Losen Mountain, place Urvich,	1000 m	Rock slopes with thick forest and scrub
1900	Killed	Tvardishki Balkan,	1250 m	
1902	Killed	Varbishki Balkan	800–1000 m	Perennial oak forest
1905	4 live caught juveniles	Rila Mountain, Tichtshiishki kolibi		
1905	Killed	Rila Mountain, place Smeseto		
1908	Killed	Sredna gora Mountain, Verinsko region	500–600 m	Oak forest
1908	Killed	Rila Monastery	1100 m	Mixed deciduous and coniferous forest
1908	Tracks	Tcham Korija, Borovetz	1450 m	
1911	Observed	Rila Mountain, Brichebor	1200–2400 m	
1911	Observed	Kriva reka, Sushichal	1500–2630 m	
1915	Tracks of two lynx found	Rila Mountain, Sitnjakovo	1740 m	Perennial virgin, coniferous forest
1930	Killed	Strandza Mountain, Elchovo district		Thick oak forest
1935	Killed	Pirin Mountain, near Melnik 600 m altitude	600 m	

[a] Stomach full of meat
[b] In stomach – meat covered with fur from red and roe deer

There is a good reason for the assumption that some individuals could migrate to enter Bulgaria from the Carpathian population – records received from Eastern Yugoslavia in 1992–1995 along the border to Bulgaria (Mirić & Paunovic 1992). It could possibly be done by migrations across the Danube through natural re-colonization of the Carpathian lynx. There is also the probability of migration of lynx from the Balkan population because of the war in Kosovo. Therefore more detailed research is needed to prove the presence or the absence of lynx in that region.

In 1992 the Bulgarian NGO Wilderness Fund made an assessment of the habitat in the Central Balkan (Stara Planina Mountains) and a feasibility study with the assistance of an expert from the French National Hunting Service, aiming at a proposed reintroduction in the area. The results were promising at that time but later on drastic changes in the situation occurred – loss of prey base due to poaching and ineffective game and hunting control and loss of suitable habitats because of inappropriate management of protected areas.

1.3. Legal status / hunting / poaching

In the past the lynx was registered as a subject for hunting. Today the lynx is legally protected throughout the whole year by the Bulgarian Law for Protection of Nature, which assigns a fine of 1000 Lv. (= 1000 DEM) for a killed or 500 Lv. for a captured animal. The species is included in the Bulgarian Red Data Book under the category Extinct.

Although it is legally protected, there are some unofficial data that poachers or hunters had killed several lynx in Western Stara Planina during the last ten years. Due to its extinct status and lack of recent information, any specimen eventually found in Bulgaria is vulnerable to poaching.

2. Prey base

The prey base data is collected from official statistics of the National Forestry Board.

2.1. Status of main wild prey species (roe deer *Capreolus capreolus*)

The main prey base for the lynx, the roe deer, has been decreasing in numbers for the last 10 years (Fig. 1.).

2.2. Availability of alternative wild prey (hares and capercaillie)

The alternative prey base consists of *Lepus europeus* and *Tetrao urogalis.* After a decrease up to 1997, the hare population showed an increase over the last two years. The capercaillie population remained fairly stable (Fig. 2. & Fig. 3.).

2.3. Information on killing of domestic animals (sheep, goats)

There is no available information on killing of domestic animals by lynx in Bulgaria.

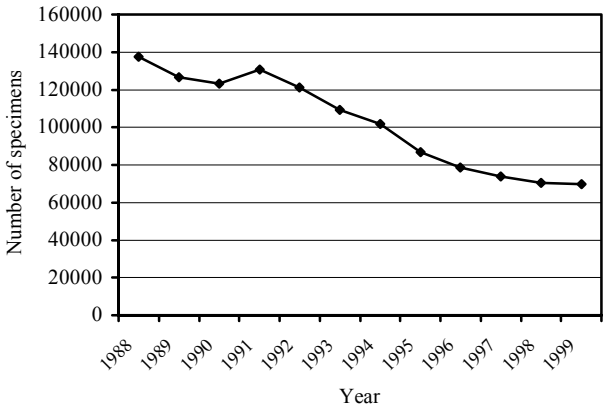


Figure 1. Development of the roe deer population in Bulgaria 1988-1999.

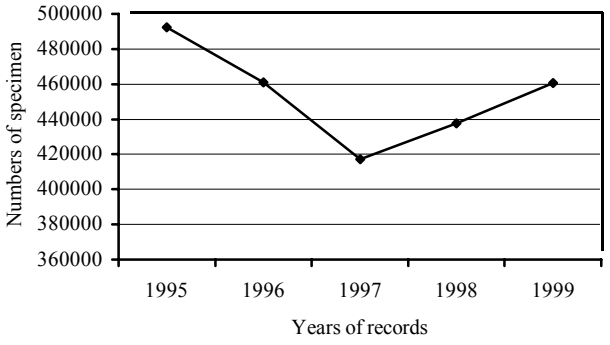


Figure 2. Development of the hare population in Bulgaria 1995-1999

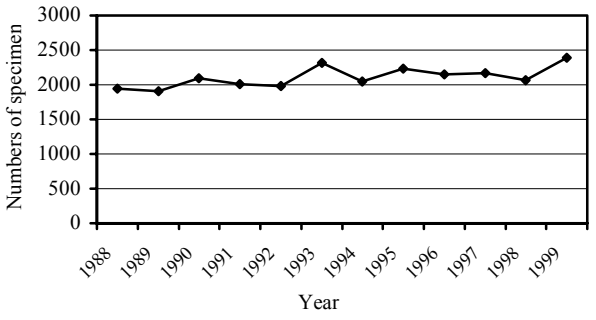


Figure 3. Development of the capercaillie population in Bulgaria 1988 - 1999.

3. Habitat

The habitat suitable for lynx in Bulgaria has shown extensive fluctuations due to the transitional period in the country, accompanied by law changes, land restitution and a bad economic situation.

3.1. Status and development of forests

All forests in Bulgaria are managed and exploited according to the Forest Law and forest management projects. The organizational structure for management of the forests consists of three levels: the Committee of Forests, 16 Regional Forestry Boards and 164 Forest Enterprises. Until recently, all forests were owned by the state, having been nationalized in 1947. The restoration of ownership rights on municipal (57% of the forests prior to 1947) and private forestland (19% before 1947) will soon be accomplished. In 1990 the total forestland area comprised 3871.4 thousands hectares. The stands of natural origin covered 2295.0 th. ha (59.3% of the total). The stands of artificial origin covered 1032.1 th. ha (26.7%). The forested area was 3348 th. ha or 86.5% of the total forestland area. This is 30.16% of the total area of the country (or 0.372 ha of forest per citizen). The coniferous high stem forests represent 33.3% of the total area, while broad-leafed high stem forests are 21.4%.

3.2. Distribution, size, status of protected areas (e.g. national parks)

The distribution of the protected areas is shown on Map 3, compiled by GEF/ARD Biodiversity Project for Bulgaria, 1998.

Map 3. Mapping of protected areas in Bulgaria**.**

The protected areas in Bulgaria are: Reserve, National Park, Natural Monument, Supported Reserve, Nature Park and Protected Place. The sizes of the three national parks are as follows: Pirin 44066.7 ha, Rila 107923.7 ha and Central Balkans 73261.8 ha.

4. People and institutions

Several GO and NGO institutions in Bulgaria are directly connected to lynx conservation:

4.1. Governmental organizations (GOs)

- Ministry of Environment and Waters: directly responsible for conservation legislation and control of protected areas, wildlife and pollution. Controls through regional inspectorates.
- Ministry of Agriculture, Forests and Agrarian Reform: the department of the National Forestry Board is directly responsible for the control and management of the forests and hunting.
- Union of Hunters and Fishermen (semi-government): a new legislation concerning management is being prepared.

4.2. Non-governmental organizations (NGOs)

There are more than 100 NGOs in Bulgaria concerning wildlife conservation but only 5–15 are really functioning.

- Balkani Wildlife Society
- Wilderness Fund
- Bulgarian Biodiversity Preservation Society – SEMPERVIVA
- Green Balkans Federation
- Bulgarian Society for Protection of Birds (conducts mammal conservation projects too)
- Union for Protection of Nature, etc.

4.3. Universities / scientists

Universities:

- Sofia University with related departments, Sofia
- University of Forestry, Sofia
- Veterinarian Institute, Stara Zagora
- Private universities

Research institutions:

- Institute of Zoology, Sofia, and Institute of Ecology, Sofia. Both institutes are under the management of the Bulgarian Academy of Science
- Institute of Forests, Sofia

Summary

Having in mind the new records about the changes in the conservation status of the lynx in Bulgaria, we propose the following steps:

1. Establishment of a national lynx working group (government and non-government organizations included) to produce a national lynx management plan.
2. Research on cases of lynx recently announced as seen or killed in Bulgaria.

3. The historical decline of the lynx should be analyzed; threats should be identified and removed.
4. Taxonomic surveys (including DNA analysis) on tissues of native lynx are needed to clarify the taxonomic status and population affinities of the Balkan population, and to determine its conservation importance. A project has already started (App. 1).
5. Promotion of conservation through appropriate education programs for local people, hunters or any interested groups.
6. Local people should be informed about any steps for lynx management.

Available literature / reports / statistics

Apart from the in depth report done by Atanasov Neno, 1968, there are few available literature sources on lynx in Bulgaria. The available literature is summarized below.

Anonymous, 1900–1901. Ubit ris.[Killed lynx]. *Priroda*, 7 (4–5) (in Bulgarian).

Anonymous, 1900–1902. Oshe edin ubit ris. [Another killed lynx]. *Priroda*, 8 (5): 98 (in Bulgarian).

Anonymous, 1935. Ubit ris v Bulgarija. [Killed lynx in Bulgaria]. *Zora*, 4730: 8 (in Bulgarian).

Anonymous, 1964. Ekzotitzna fauna. Ris. [Exotic fauna. Lynx]. *Lov I ribolov*, 12: 16–18 (in Bulgarian).

Atanasov, N. 1968. Der Luchs (*Lynx lynx* L.) in Bulgarien. 25–32 p. In: Kratochvil, J. 1968. (ed.). *History of the distribution of the lynx in Europe*. – Acta Sc. Nat. Acad. Pracha, Brno, 2 (4), 50 p.

Boetticher von, H., 19339. Der Luchs in Bulgarien. *Z.* Säugetierkunde., 13: 242–243.

Bures, I. 1941. Risove v Macedonija [Lynx in Macedonia]. *Priroda,* 42 (3): 51–52 (in Bulgarian).

Christovic, G.K. 1893. Risove v Bulgarija. [Lynx in Bulgaria] *Priroda, 1* (2): 30–31 (in Bulgarian).

Kacarov, D. 1926. Ima li oshte risove v Bulgarija? [Are there still lynx in Bulgaria?] *Lovna prosveta*, 1 (4): 5 (in Bulgarian).

Kolev, I. 1993. Otnovo za samotnija hischnik – risat [Again about the lonely carnivore – the lynx]. *Lov I robolov*, 9: 12–14 (in Bulgarian).

M. L. 1900. Risat v Bulgarija [The lynx in Bulgaria] *Bulgarski lovec*, 2 (12): 96 (in Bulgarian).

Markov, G. 1957. Obiknoven ris [The common lynx] *Priroda I Znanie* 10 (1): 24 (in Bulgarian).

Mirić, D. 1981. The lynx population of the Balkan Peninsula. Beograd, Serb. *Acad. Sciences and Arts, Separate edition*. DXXXIX, 154 p. (in Serbian).

Mirić, D. and Paunovic, M. 1992. A new record of *Lynx lynx* (Linnaeus, 1758) (*Felidae*, *Carnivora*) in East Serbia. – *Bull. Nat. Hist. Mus. Belgrade*, B 47: 171–174.

Mirić, D. and Paunovic, M. 1994. Recovery of the lynx (*Lynx lynx* L., 1758) in East Serbia. *Bull. Nat. Hist. Mus. Macedonia*, 2., 315–318.

Nankinov, D. 1968. Poslednija ris v Bulgaria. [The last lynx in Bulgaria]. *Otechestven front*, 22 august 1968 (in Bulgarian).

Nedjalkov, N. 1901. Vredata ot risovete I sredstvo za iztrebvaneto im. [The damage caused by lynx and methods for their destruction]. *Bulgariski lovec*. 3 (5): 38–39 (in Bulgarian).

Popov, R. 1933. Materiali za prouchvane na subfosilnite vidove ot rod Felis [Material for study of the subfosils from genus Felis]. *Sp. na Bulg. geogr.d-vo*, S 1–6 (in Bulgarian).

Spasov, N. 2000. Risat – fantom na Bulgarskite gori, moje bi ste ima vtori shans [The lynx – fantom of the Bulgarian forests, may be it will have a second chance]. *Balkanski dialog*, 7 / 3–9 march 2000, 13 p. (in Bulgarian).

Spiridonov, J. 1966. Konete na Freja. [The horses of Freja] *Narodna Mladej*, 205, 28 Dec. 1966 (in Bulgarian).

Spiridonov, J. 1970. Amnistija za risa. [Amnisty for the lynx] *Priroda I Znanie* Nr. 6–7, 56–57 p. (in Bulgarian).

Spiridonov, J. 1974. Rezervatat Tzarichina. [The Tzarichina Reserve] „Nashi rezervati I prirodni zabelejitelnosti“: *Spisanie Nauka I Izkustvo*, pp. 52–73.

Spiridonov, G. and Spassov, N. 1985. Lynx Felis lynx L., 1758. *In Red Data Book of the Peoples Republic of Bulgaria*, vol. 2, Bulgarian Academy of Sciences, Sofia, pp. 137–138.

Spiridonov, G. and Spassov, N. 1998. Large Mammals (Macromammalia) of Bulgaria: Lynx *Bulgaria's Biological Diversity: Conservation Status and Needs Assessment*, Volume I and II. 1998. Curt Meine, ed. Washington, D.C.: Biodiversity Support Program. ISBN: 1-887531-21-1, 473 p.

Velev, Ch. I. 1901. Risat v Bulgaria. [The lynx in Bulgaria]. *Bulgarski lovec*, 3 (1): 5–6 (in Bulgarian).

Zavoev, P. I. 1957. Posledni dni na risa v Bulgaria [The last days for the lynx in Bulgaria]. *Lov I robolov*, 12: 14–15 (in Bulgarian).

Some notes on the systematics of the Balkan lynx

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The Eurasian lynx (*Lynx lynx* L.), like other big mammals of this region of the world, has a huge area of distribution, which includes, however, relatively uniform natural characteristics. In this area nine subspecies of this mammal have been described. For their differentiation classic characteristics are used, such as body and skull size, coloration of the fur and possible geographic isolation. These criteria are also used for the description of the Balkan lynx (*Lynx lynx balcanicus*, Buresch 1941).

Although Buresch, 1941, gave the name, (together with a short characteristic), a more detailed description of this form is given by Mirić, 1978. In his study Mirić also gives a new name to the Balkan lynx, considering the name given by Buresch for *numen nudum.* Still, Buresch was the first to describe this form, so the name *Lynx lynx martinoi* (Mirić 1978) is generally used as synonym according to the International Census System rules.

The distinct characteristics of the Balkan lynx (according to Mirić 1978, 1981) are: the relatively smaller size and the high percentage of unspotted individuals in the population.

If we look at the species in a more general way, we see that these characteristics are subject to a v-shaped changeability, as the size changes from southwest to northeast, and the coloration changes from south to north. This fact questions the evaluation criteria used, and generally shows the presence of one macro-population with variation at the periphery. The inclusion of an ecological criterion could clear the topic to some extent but would not totally solve the problem. Thus, the prevalence of spotted individuals could be linked to the specific biotope. In this case, lynx from the Carpathian region, the Caucasus and the Balkans are distinctively separable from lynx from other areas, by a high percentage of spotted individuals. Concerning size, these lynx form an „internal wedge“, which is relatively independent from the rest of the species.

The lynx from the Carpathian Mountains are in fact bigger in size than those in the north (Scandinavia and Bjalowieza) and northeastern regions (Ural).

This difference is not due to a difference in the prey spectrum (in the three cases mentioned the main prey is the roe deer). Thus, we could positively suggest that the lynx of the southern regions (Carpathian, Caucasus and Balkans) have unique genetic settings, separating them on a subspecific level from the other geographic populations of the species.

The Balkan lynx is exceptional in this group. In the past, the Carpathian and Balkan populations were connected and this link was disconnected fairly early. The smaller size of the Balkan lynx shows that it delineates the south periphery of the v-shaped changeability of the size in the bigger Balkan-Carpathian macro population. However, between the two groups lies a very serious barrier – the Danube River. The Danube River has a seasonal changeability – for the lynx it could be passable during some months in winter. Despite that, the lynx south of the Danube had developed unique characteristics, which could not be found in other populations of the Eurasian lynx. Some of the Balkan lynx in Bulgaria had inhabited plains with dry vegetation. (Dobrudzja region – Atanasov 1968) and same type mountains – Strandzja. This shows that the Balkan lynx had occupied more diverse biotopes than the other populations.

Based on the facts mentioned above we could conclude: Although the subspecies status of the Balkan lynx is still questionable, its population possesses unique ecological characteristics. This fact imposes an urgent need for detailed research and conservation measures.

Recommendations:

a) As the basic part of the contemporary population is concentrated in Kosovo, West Macedonia and East Albania, the political disturbances and the war in this area call for urgent conservation measures, including – as a last step – the capture and establishment of a captive backup of this population.
b) Field study of the current situation of the population
c) Where needed, establishment of protected areas covering an area able to support a viable lynx population. In the case of existing protected areas, stronger control (including international control) with tough measures.
d) Education and involvement of the local people in the „lynx regions“ towards more understanding and support of the recovery measures.
e) Establishment of an International Balkan Lynx Recovery Project for the recovery and furthermore the reintroduction of the lynx into the countries where it is extinct. The Project should aim at trans-boundary cooperation and, if needed, control over a semi-captive population along the boundaries of the countries in areas of natural distribution. These semi-captive populations could serve as a back-up

for the main wild population.

f) Genetic study on the Balkan lynx aiming at the determination of its real systematic status.

g) To convert the lynx into a flagship species for international cooperation between the Balkan countries in regard to conservation of threatened Balkan fauna, environmental research and education.

References

Atanasov, N. 1968. Der Luchs (*Lynx lynx* L.) in Bulgarien. 25–32 p. In: Kratochvil, J. 1968. (ed.). *History of the distribution of the lynx in Europe*. – Acta Sc. Nat. Acad. Pracha, Brno, 2 (4), 50 p.

Bures, I., 1941 Risove v Macedonija [Lynx in Macedonia]. *Priroda,* 42 (3): 51–52 (in Bulgarian).

Mirić, D. 1978. Lynx lynx martinoi ssp. nova (Carnivoa, Mammalia) – Neue Luchsunterart von der Balkanhalbinsel. Bulletin de muséum d'histoire naturelle, Belgrade, Série B, Livre 33, pp. 29–36.

Mirić, D. 1981. The lynx population of the Balkan Peninsula. Beograd, Serb*. Acad. Sciences and Arts, Separate edition*. DXXXIX, 154 p. (in Serbian).

Brief notes on the status and problems of the lynx in Bulgaria

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1. Prehistoric and historic data on the presence of the species

Sub-fossil lynx remains dating back to the Neolithic and the Halcolithic periods exist in some Bulgarian archaeological sites like Salmanovo, Goliamao Delchevo, Ovcharovo, and Dolnoslav.

2. Current status of the species

According to historical data, the lynx has inhabited forests throughout the country. At present, it is accepted that the species has disappeared from the Bulgarian fauna. Its status in the Red Data Book of Bulgaria is extinct (Spiridonov & Spassov 1985). The data for its latest known habitats (Atanassov 1968, Spiridonov & Mileva 1988, unpubl. questionnaire, Spiridonov & Spassov 1985, 1998) indicate the following:

- At the beginning of the century the species still existed in the largest Bulgarian mountains;
- The lynx disappeared from the Eastern Stara Planina Mountain during the thirties of the last century;
- The last data for the presence of the species from the regions of Sredna Gora and Strandja Mountains also date back to the thirties of the last century;
- The last reliable data for lynx occurrence in Pirin are from 1935;
- The last observation of the species in Stara Planina Mountain dates back to 1940 from the region above the town of Karlovo;
- The last report of the species in Bulgaria (1941) is from Rila Mountain – the Parangalitsa Nature Reserve.

There is one more observation of lynx from the Uzunbudjak Nature Reserve in the Strandja Mountain from 1952, but the information is not very reliable.

3. Analysis of the current data for the occurrence of the species

It is interesting to note that for lynx occurrence in Bulgaria – as in northwestern Greece (Komninos & Panagiotopoulou 1991) – a number of unconfirmed reports exist. They refer to the whole territory of the country and date back from the 1960s until now.

During the 1960s and the 1970s some unreliable information about observations and lynx attacks on herds of sheep in the mountains of Rila and Central Stara Planina, as well as in their geographical link with the ridge of Eledjic, were collected by N. Boev. Similar information was gathered for the region along the Danube (the Silistra and the Russe Districts) by G. Spiridonov, T. Michev and N. Spassov (lynx that swim across the Danube?).

The possible presence of the species in the Djendema Nature Reserve in the Stara Planina Mountain in the 1970s and the first half of the 1980s has been reported by N. Spassov, Ts. Petrov and V. Ivanov, according to communications by shepherds and poachers who state they have witnessed lynx. In the mid-1980s scats resembling lynx's were found in the Stara Reka Nature Reserve in the Stara Planina Mountain (above Karlovo town) by G. Spiridonov and in the mid-1990s tracks similar to lynx's were observed in the same region by K. Georgiev. In 1998, G. Spiridonov discovered what were probably lynx scats on Rila Mountain, in the Rila Monastery Forest Nature Reserve. An attack by a lynx on a young cow was reported from the region of Apriltsi in Central Stara Planina Mountain in 1998 (a subsequent inspection by Wilderness Fund experts could not substantiate the information). Soon after this case, a „strange" animal was noticed crossing the motorway in the same region. The people observing it described it as a lynx immediately after seeing samples in the National Natural History Museum.

Last winter (1999) the press released information about a lynx seen by a group of hunters in the region of Balchik, on the northeastern coastline of the Black Sea. Our additional inquiry did not substantiate the information. The lynx killed by a passing car close to Sofia in the Pernik region also turned out to be a mistake; the animal was a wild cat. In recent years, the skin of a lynx killed in Strandja Mountain was shown to experts, but it is not certain if the animal was really shot in Bulgaria.

Most of this information – at least 30 reports known to us – could hardly be referred to as reliable. The reasons for the existence of so many unconfirmed data can be different; many of them are connected with the fact that the wish to meet this secretive carnivore has become part of the mythology.

However, part of the information, even though its is not fully reliable, deserves attention. It is not very probable that the species has been preserved for dozens of years in separate wilderness areas without being discovered or without having animals shot. Still it is possible to have some natural remigration of the species from the west (Spassov *et al.* 1999). The data from

western Bulgaria from recent years deserves special interest (see the above mentioned scats from the Rila Mt.). This information is worth considering given the data for the remigration of lynx across the Iron Gates (on the Danube) from Romania to Serbia and the reliable data for lynx killed in Serbia in the outer areas of the Western Stara Planina Mountain on the border with Bulgaria (Mirić & Paunovic 1992). An animal described as a lynx has been observed in the Rui Mountain (western Bulgaria) close to the Macedonian border by an amateur ornithologist in 1997. There are also some very recent data for an animal killed in the Western Stara Planina Mountain and in the Trun region, western Bulgaria, whose skin is preserved.

4. Problems of lynx conservation in the Balkans

Two problems form the basis of the strategy for the conservation of the lynx in the Balkans:

- The possibility that it forms a separate sub-species (Mirić 1981), which is arguable, but cannot be excluded;
- The lack of information about the population. Most probably it is fragmented into a number of comparatively small sub-populations. Each of them faces serious threats to its long-term survival.

Despite the fact that there are no proofs for the existence of separate sub-species, it is desirable that this possibility be considered in plans for future re-introductions or for supporting a natural re-colonization. Taxonomic surveys (including DNA analysis) of native lynx are needed to clarify the taxonomic status and population affinities of the Balkan population, and to determine its conservation importance. It is also recommendable to include sub-fossil remains, such as are available in Bulgaria. In addition, in Bulgaria there is a well-equipped laboratory ready to take part in such surveys.

The beginning of any program for preservation of the lynx in the Balkans should include a serious study of its status in Albania, Serbia and Macedonia, as well as an assessment of possible and favorable ecological corridors for the local micro-populations. Special attention should be paid to the possibility of migrations across the Danube and the natural re-colonization of the Balkans by the Carpathian lynx.

Given the unclear status of the Balkan lynx, all efforts should be made to preserve and stabilize the already existing native sub-populations and then to look for opportunities to reintroduce it to its former habitats. Of course it is desirable that an assessment of the habitats as well as a feasibility study are carried out so that efforts are focused on areas that may ensure the long-term survival of the species. Such an assessment may even require a redirection of efforts to more promising habitats or to supporting the natural re-colonization.

Such a case is possible for Bulgaria, where natural re-colonization is possible if the Serbian or the Macedonian populations increase their numbers, as well as if a migration from the Carpathian population occurs. There are already data for this (Spassov et al. 1999). During recent years reports of observations of the species in Bulgaria have become more and more regular. Only a small part of them deserve more serious attention and there is no serious proof for the presence of the lynx in Bulgaria. However, the possibility for a natural re-colonization should not be excluded.

Some years ago, the Wilderness Fund developed an idea for the re-introduction of the lynx in Bulgaria. An assessment of the habitats and a feasibility study were made in 1992 with the assistance of an expert of the French National Hunting Service. The results were rather positive. This and the experience gained may serve as a basis for future work. Yet the fact that the prey base has changed shows that a new study is needed for the Bulgarian situation.

References

Atanassov, N. 1968. Der Luchs (*Lynx lynx L.*) in Bulgarien. Acta Sci. Nat. Acad. Praha, Brno, (2) 4.

Komninos, Th. and Panagiotopoulou M. 1991, Recent tangible evidence of the existence of Lynx in Greece. Biol. Gallo-Hellenica. XVIII, pp. 67-74.

Mirić D. 1981. The lynx populations of the Balkan peninsula. Separate edition. Vol. DXXXIX. Serbian Academy of Sciences and Arts. Department of natural and mathematical sciences. N 55. Beograd. 154 p. in Serbian.

Mirić D. and Paunovic, M. 1992. A new record of *Lynx lynx* (Linnaeus, 1758) (*Felidae*, *Carnivora*) in East Serbia. – Bull. Nat. Hist. Mus. Belgrade, B 47: 171–174.

Spassov, N., Georgiev, K., Ivanov, V. and Stoev, P. 1999. Study of the potential ecological corridors between the local populations of the brown bear in Bulgaria. Historia naturalis bulgarica, 10, 1999: 133–146.

Spiridonov, G. and Spassov, N. 1985. Lynx (*Felis lynx L., 1758*). In Red Data Book of the Peoples Republic of Bulgaria, vol. 2, Bulgarian Academy of Sciences, Sofia, pp. 137–138. In Bulgarian.

Spiridonov, G. and Spassov, N. 1998. Large Mammals (*Macromammalia*) of Bulgaria. In: Bulgaria's Biological Diversity: Conservation Status and needs Assessment, Volumes I and II. 1998. Curt Meine, ed. Washington, D. C.: Biodiversity Support Program. ISBN: 1-887531-21-1. 467–481.

Historical distribution and present status of the lynx in Greece

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1. Status of the lynx in Greece

1.1. Distribution in the 19th and early 20th century

The lynx was widespread but very rare in Greece during the 19th century and the beginning of the 20th. During this period, lynx distribution expanded from Mount Olympus south to the Peloponnese. One lynx was killed on Mount Parnitha (vicinity of Athens) on March 18, 1862 (Heldreich 1878). The specimen belongs now to the Zoological Museum of the University of Athens. The scientific mission of Morias (Peloponnese), which took place in the last decades of the 19th century reports lynx distribution on the Peloponnese on the following mountains: Mount Olenos of Achaia, Kynouria Mountains, Flambouritsa gorge (Mount Killini), also an individual was killed in Xilokastro village (Heldreich 1878). The lynx was more common and widespread in the mountains of south and north Pindos and in the mountains of Macedonia and Thrace: Mount Vitsi, Mount Varnoundas, Mount Voras and Rhodope Mountains (Kalostypis 1886). Regular sightings date back 40–45 years in the plain of Vistonida Lake (Thrace) and Nestos Delta Forest „Kotza Orman“ until the large scale deforestation of the alluvial plain in the early 1950s took place (Papaioannou 1952).

Map 1. Lynx distribution in Greece during the 19th and early 20th century.

1.2. Present status, current trend and distribution

Over the last 40 years, there has been a dramatic reduction of the original distribution of lynx. In the framework of the National Inventory of Fauna and Flora, a field survey with the objective of collecting recent data of lynx presence in Greece, as well as identifying the main causes of extinction from certain areas, took place in 1991–1993. Today there are scarce reports of observations from N. Pindos and Voras Mountains. The last reports of sightings and/or damage in the Evros Mountains and the region of Thrace date back 35–40 years. Records from the Rhodope Mountain range ended approximately in 1965, when the nomad shepherds abandoned the area. However, the present status of the lynx in Greece remains uncertain.

Since no monitoring project exists for collecting evidence of lynx presence, there is no possibility of accurately assessing the actual lynx status in the two previously mentioned areas. Moreover, it is also impossible to assess the past or present population levels due to the lack of any official data on lynx kills (before its legal protection) or lynx sightings.

Map 2. Distribution of the lynx in Greece up to 1970

1.3. Recent evidence of presence

During the National Inventory of Fauna and Flora, we examined three target areas: North Pindos Mountains, Rhodope mountain range and Evros Mountains.

1.3.1. North Pindos Mts.

An area of extensive mixed and coniferous forests with scattered habitations, which covers almost 1000 km^2. In general, the people interviewed knew very little about the lynx and the older people had only a faint

idea of the species' appearance and behavior. The three most important reports were the following:

- Sightings and livestock damage in Mount Flega, Metsovo, September–November 1991;
- Sighting in Vrissohori 1986, by M. Karagiannopoulou (farmer, age over 70);
- Sighting in Vrissohori 23/4/1978 by D. Kaprantzas (school teacher, age over 60).

1.3.2. Evros Mountains

Contrary to the situation described in North Pindos, villagers in the Evros Mountains (Thrace) are familiar with the lynx. The species has a local name „sari gutzuk“ (sari = reddish, buff, gutzuk =croptailed, short tailed). The main aim of the research in this area was to investigate the reasons for the extinction of lynx from the area. Among 11 people that were asked, 6 had seen a lynx at least three decades ago in the forests and forested areas of Dadia-Aissymi – Lefkimi, Treis Vryses and Nea Sanda. Shepherds reported that the lynx was already rare in the period 1950–1960. The same is also stated by the Pomaki shepherds, who inhabit the eastern and central part of the Rhodhope Mountains. Local people are familiar with the cry of the lynx and shepherds believe that the lynx were frightening away the wolves which were responsible for the killing of numerous sheep and goats. However, the lynx was attacking too, but in a different manner, killing one or two animals at a time on a regular basis. The last two lynx in the Evros region were sighted by local shepherds in Gimbrena (in the area of Dadia forest), approximately at the end of the 1960s. A lynx was killed in Gimbrena in 1958.

1.3.3. Central and west Rhodhope mountain range

This region is a large undisturbed forested area covering more than 2000 km^2. Most of the villages within this mountain range are now abandoned. The main economic activity is timber production, while livestock raising is very limited. Since the area is practically uninhabited, only a few people can provide information on sightings, and these are mainly forest workers. Sarakatsani nomadic shepherds who lived there until 1965 reported the last records of lynx in this region. During the last 35 years and after the abandonment of traditional livestock raising practices the area has been naturally reforested with dense forests of spruce, beech and pines. Although the Rhodope Mountains have some ideal characteristics as lynx habitat (good roe deer numbers, extensive forest coverage, very low disturbance) it is important to bear in mind that the link with the Pindos Mountains and other forested areas to the west is problematic, since large intensively cultivated plains interfere. Moreover, the lynx is extinct in the north (Bulgarian part of the Rhodope mountain range) and in the east (east Thrace-European part of Turkey). So it has been quite impossible for the lynx to recolonise the Rhodope Mountains after its extinction.

1.4. Additional information from other areas

1.4.1. Mount Voras (border with the Former Yugoslav Republic (FYR) of Macedonia)

Mount Voras or Mount Kaimaktchalan is the third highest mountain in Greece and together with Mounts Tzena and Pinovo they form a continuously forested mountain range along the border with FYR of Macedonia. Forest coverage is over 80% with the exception of the pseudo-alpine areas above the timberline. The region has recently been recolonised by bears, originating from the neighboring mountains of FYR of Macedonia.

Lynx observations:

- Sighting at Dobro Pole, March 1993 (shepherd);
- Sighting at Skopos area, winter 1995–1996 (woodcutters).

Map 3. Recent observations of lynx in Greece (see text).

1.4.2. Nestos Delta

The alluvial plane of Nestos today holds the largest riverine forest in Greece and one of the largest in the Balkans, the „Kotza Orman“. During the beginning of the 1950s large scale drainage and land reclamation works destroyed 80% of the riverine forest. Today, 50 years later, a significant part of the forest has been restored to its natural status and the restoration project is still continuing. The population of jackals is increasing, and a new population of wild boar has been established. The area hosts the only autochthonous wild pheasant population in Europe.

Lynx observations:

1. Sighting in Dasochori (east delta), spring 1998 (fo-

rest ranger and shepherd);
2. Sighting in Paradisos, May 1998 (two old women);
3. Sighting in Dasochori, February 1999 (M. Panayotopoulou).

Our hypothesis about the origins of all the above-mentioned individuals in N. Pindos, Voras Mountain and Nestos are the following:
1. Occasional transborder movements of lynx coming from FYR of Macedonia and/or Albania;
2. Remnants of an autochthonous population;
3. Attempts at reestablishment of a new population nucleus by individuals originating from the neighboring countries;
4. Clandestine releases from zoos or private collections (a possible explanation for the Nestos sightings).

2. Damage to livestock

Shepherds in Thrace have reported occasional damage dating back 30 years. They can identify differences between wolf and lynx attacks. They report that the lynx attacks one animal at a time, and the dogs are afraid of it. Most of the documented reports and the only ones of recent damage are from N. Pindos Mountains (Flega in Metsovo). ARCTUROS has collected 1000 questionnaires on wolf damage (this is the only livestock damage database in Greece) but so far no data on lynx kills have been found. However some modifications on these questionnaires should be made in order to use them to trace possible or older lynx damage.

3. Protection status of the lynx in Greece

Since 1937, law has prohibited hunting of lynx. Today, hunting of lynx is prohibited by the hunting law (s. 258, par. 2z of LD 86/69, as amended by s. 7 of Act 1775/75). The lynx in Greece is also protected under the Bern Convention and the CITES Convention.

4. Habitat suitability and prey base

The abandonment of traditional livestock raising practices as well as the immigration of many people to the larger cities has lead to a marked increase of forest coverage in Greece by 7,9% (National Forest Inventory, 1992) from 18% to 25.9%. Dense forests especially in Rhodope and N. Pindos today cover areas that had been previously dominated by pastures. A large proportion of these areas are protected or their legal protection is under way, so the protection status of probable lynx range can be summarized as follows:
- Valia Kalda National Park (N. Pindos), 100km$^{2;}$
- Vassilitsa (N. Pindos) NATURA 2000, 81.6km$^{2;}$
- Voras Mountain (border with the FYR of Macedonia) NATURA 2000, 100km$^{2;}$
- Tzena and Pinovo Mountains (border with the FYR of Macedonia) NATURA 2000, 127.4km$^{2;}$
- Nestos Delta National Park, 60km$^{2.}$

Although forest coverage is increasing, the prey base remains poor in most areas that could be suitable lynx habitat. Concerning the wild ungulates:
- Red deer is extinct, only a few individuals are observed in Rhodope;
- Roe deer is widespread but the populations are greatly reduced due to illegal hunting;
- Chamois exist in small isolated populations.

The hare is widespread, but there is insufficient data on population densities. The University of Thessaly is conducting a population study in Thessaly and Ipeirous. The grouse has only a small population in Rhodhope and Lailias Mts. The hazel grouse is widespread but rare in Varnoundas, Voras, Lailias and Rhodope ranges. A single wild population of pheasant exists in the Nestos Delta and the partridge (mainly rock) is widespread, locally common due to releases by hunters.

Possible threats include extensive mountain road networks for timbering or tourist purposes, large scale tree felling which causes deterioration of the best forest stands and disturbance by legal and illegal hunting.

5. People and institutions

Governmental agencies:
- Ministry of Agriculture responsible for timber production, hunting laws, national parks, management of the forests;
- Ministry of Environment, Land Planning and Public Works, responsible for protected areas (national parks, Natura 2000 sites), public works (dams, roads e.t.c.).

Non-governmental Organizations (NGOs):
- ARCTUROS
- WWF-Hellas
- Hunter's Federation

Universities and relevant institutions:
- School of Forestry and Natural Environment (Aristotelian University of Thessaloniki)
- Institute of Forest Research (National Agricultural Research Foundation)
- University of Thessaly

6. Prospects and needs for the future

6.1. Historical data

Collection of all historical data on lynx presence in

Greece after 1950. These should be mapped with GIS so the retreat of the distribution is best illustrated. The collection of this data must be done through a questionnaire, which will also reveal the causes and time of extinction.

6.2. Fieldwork in target areas (N. Pindos, Voras Mountains, Nestos Delta) must include:

- Surveys with recorded calls;
- Placement of remote control cameras in selected points;
- Distribution of questionnaires;
- Detailed examination of livestock kills.

There should be a monitoring program in forested areas bordering mainly on the FYR of Macedonia and secondarily Albania, where observations should be regularly collected and evaluated. Also collaboration with local game farmers and stock raisers is needed in order to examine kills on roe deer and livestock respectively. To this end collaboration with ELGA (State organization for damage compensation) would help in quick recognition of livestock damages that can be attributed to lynx.

6.3. Parallel work and collaboration

Parallel work and collaboration with the FYR of Macedonia, Albania and Bulgaria, concerning questionnaire handouts and livestock damage inspection.

Literature referring to the lynx in Greece

The following authors refer to transborder movements of the autochthonous lynx population of Macedonia and Albania across the Greek borders to the mountains Voras and Varnoundas. However, they made no field surveys in these areas.

Bojovic, E. 1978. Der autochtone Luchs in Jugoslawien – Verbreitung – Bestand und Tendenz. In: Wotschikowski, U. Ed. Der Luchs – Erhaltung und Wiedereinbürgerung in Europa. Bernhard, Mammendorf, pp. 25–28.

Čop, J. 1990. Reintroduction of lynx in Yugoslavia. In: Council of Europe Seminar on the situation, conservation needs and reintroduction of lynx in Europe, Neuchatel, Switzerland, 1990, 59–61.

Dakov, 1985. Red data book of the peoples republic of Bulgaria. Bulgarian Academy of Sciences, Sofia, 1985.

Dulic, B. and Mirić, D. 1967. Catalogus faunae Jugoslaviae. IV. Mammalia. Ljubliana (in Serbian).

Dulic, B. and Tortic, M. 1960. Verzeichnis der Säugetiere Jugoslawiens. Säugetierk. Mitt. 8: 1–12.

Festetics, A. 1980. Die Verbreitung des Luchses in Europa. In: Der Luchs in Europa – Verbreitung, Wiedereinbürgerung, Räuber-Beute-Beziehung. A. Festetics, Ed. Kilda Verlag, Graven, pp. 89–160.

Kratochvil, J. 1968. Recent distribution of the lynx in Europe. Acta sc. nat. Brno 5/6: 1–74.

Mirić, D. 1978. Ausrottunsgeschichte des Luchses auf der Balkanhalbinsel. In: Wotschikowski, U. Ed. Der Luchs – Erhaltung und Wiedereinbürgerung in Europa. Mammendorf Druckerei Bernhard Ed. 2: 19–23.

Ondrias 1967. The fauna of Greece.

Spiridonov, G. and Spassov, N. 1990. The lynx in Bulgaria. In: Council of Europe Seminar on the situation, conservation needs and reintroduction of lynx in Europe, Neuchatel, Switzerland, 1990, 59–61.

The lynx in the Balkans – a summary of present knowledge

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1. History of the Balkan lynx population

According to sparse documents from the 17th and 18th centuries and information from the 19th century, the lynx was still present on the whole Balkan Peninsula at the beginning of the 19th century. The extermination of the lynx in the Balkans started only in the 18th century, whereas in Western Europe this process had already started in the 16th century. In the Balkans, extermination started after the liberation from Turkish supremacy (Mirić 1974). The human population started to increase and with it logging and overhunting. Predators were persecuted as pests. The years when the last lynx were killed in the different areas show the development of the disappearance of the lynx in the Balkans (Table 1). Some areas were only liberated from the Turks in the 20th century, and there the lynx still exists today: western FYR of Macedonia, eastern Albania and Kosovo.

2. Distribution of the remnant Balkan lynx population in the 1970s

The remaining lynx population in the Balkans experienced a severe bottleneck in 1935–1940 with an estimated number of 15–20 individuals left. The decrease had started in the 1850s. After the Second World War, the population started to recover again, especially in Kosovo and the FYR of Macedonia (Mirić 1981). In the 1960–70s, it also reappeared in Montenegro. The population estimates vary from 200–300 for Yugoslavia in 1974–1977 with an additional 100 individuals in Albania and Greece (Mirić 1978), to 280 lynx living in the Balkans in 1974 (120 in the FYR of Macedonia, 70 in Kosovo, 10 in Montenegro and the rest in Albania; Mirić 1981). The distribution of the lynx in the mid-1970s is summarized in Fig. 1. Mirić (1974) interpreted the rapid recovery in the 1950s as a consequence of the strong reduction of the wolf population in 1952 and

Table 1. Extinction of lynx in various areas of the Balkans (after Kratochvil *et al*. 1968, Mirić 1974, 1981) and the reappearance of the species (Mirić 1981 and this report).

Area/country	year last lynx killed	observed	year lynx reappeared	reason for recolonization (Reference)
Slovenia	1887	1908	1973	re-introduction (Čop & Frkovic 1998)
Croatia	1886	1903	1975	immigration from the re-introduced lynx in Slovenia (Čop & Frkovic 1998)
Bosnia & Hercegovina WE	1886 1911	1911	1980	immigration from the re-introduced lynx in Slovenia (Saldo, this report)
Montenegro	1913		1960–70s	immigration from neighboring areas (Kosovo, Albania; Mirić 1978, 1981)
FYR of Macedonia E	after 1924		–	no recolonization of this area
E Serbia, FRY	1893	1904	1983	immigration from the Romanian Carpathian Mts. (Paunovic *et al.*, this report)
S Serbia, FRY	??	1902	1946–52	immigration from FYRoM and Kosovo (Mirić 1978)
Bulgaria	1935	1941	1990s	unconfirmed observations at the border to Yugoslavia – western Stara Planina; (Zlatanova *et al.*, Spassov *et al*., this report)
Greece	1958		1990s	some individuals from FYRoM/ Albania might move occasionally into Greece (Panayotopoulou, this report)

1953 in this area. Fengewitsch (1968) estimated a population size of 60–70 animals in 1958 that increased to 80 individuals in 1963. For Kosovo and the western FYR of Macedonia, it could have been as little as 30–40 animals (Festetics 1980). Bojovic (1978) estimated the area occupied in the 1970s at 6000 km^2 for the FYR of Macedonia, Kosovo, Serbia and Montenegro with additionally 2000 km^2 in Albania and Greece. His population estimate for the former Yugoslavia was 220–250 individuals (85–100 in Kosovo, 120–130 in the FYR of Macedonia, and 15–20 in Montenegro). Although the lynx has been protected since 1947, numerous illegal killings occurred (Bojovic 1978). Since the Second World War, two killings are known from Montenegro, 27 from Kosovo (6 of the lynx are in a museum) and 40 from the FYR of Macedonia (8 of them in a museum).

The development of the lynx population is not well documented for all areas. There is very little information on the lynx in Kosovo for the 19th century, but numerous data for the 20th century up to the 1970s (Mirić 1981). The records of the period 1970–1975 are concentrated along the Sara Mountains, its northern foothills and the Prokletija Mountains in southwestern Kosovo. In the Prokletija Mountains, the lynx had been exterminated by 1940, but came back in the mid 1950s (Mirić 1978). Mirić (1963) reported about 30 lynx living in 1955 in the mountains surrounding the Metohia Basin and west of the Vardar River in the FYR of Macedonia. Due to strict protection, the number again reached 50–70 individuals at the end of the 1960s and 120 individuals by 1974 (Mirić 1978). Distribution was concentrated in the northwest of the country (Sara, Korab, Bistra, Stogovo and Jakupica Mountains). In the south (Karaorman, Jablanica, Pelister and Nidze), the lynx was quite rare.

From the FYR of Macedonia, information was also only available for the 20th century. East of Vardar, 5 lynx or more were killed from 1924–1927. Today, there are no lynx in this area. West of Vardar, the lynx has always been present in the mountainous areas. The numbers were even more important than in Kosovo (Mirić 1974). The highest densities were reached in the area of the river Radika (Mirić 1981).

Information on the lynx in Albania was even less. Mirić (1974) cited records from 1896 and 1912 for Ljuma. He indicated that more recently lynx were only living in the mountainous areas of eastern Albania, but the number of individuals was considerable (Mirić 1978).

From Montenegro, the lynx had disappeared by 1913. The last animals were killed in the Bjeasnica Mountains. It only came back in the 1960s and 1970 through individuals immigrating from Kosovo and Albania. The first animals appeared in the Prokleija Mountains. Later the lynx reached the Komovi (1974) and 1976 the Burenj Mountains. (Mirić 1978).

For Greece, Mirić (1974, 1981) indicated only scattered observations for the Pindos Mountains and at the border to Yugoslavia after 1950.

3. Recent reports on the Balkan lynx population

3.1. Council of Europe Report

(Breitenmoser & Breitenmoser-Würsten 1990)

At the time when this first report on the status, conservation needs and reintroduction of the lynx in Europe was produced, no information from Albania was available, and for Yugoslavia only a contact with J. Čop from Slovenia existed. The information in this report was therefore mainly compiled from the literature mentioned above. The Balkan lynx population was considered as endangered. Because of the lack of information a close monitoring was recommended.

3.2. Report on the situation of the lynx in Albania

(Th. Kominos 1994, update 1997, unpubl.)

Th. Kominos, Greece, visited Albania in January 1994 and was in contact with F. Bego and N. Peja from the University of Tirana. He compiled a short report about his visit. The most important information is summarized here.

Lynx hunting has been banned since 1980. Up to then, the government bought the furs and kept most of them in the warehouses of Durres. Lynx have disappeared from two areas since the 1950s. One is a flat area in the north, and the other a mountainous region near the border with Greece in the south. A government report of 1993 mentions two areas in Albania with lynx occurrence. The first one is on the border with Montenegro in the area of Vermosh, and the second is Mirdita located in the centre of the country north of Tirana. The major problems in Albania are poaching and habitat destruction.

1997: It seems as if lynx has almost disappeared from central Albania. Its occurrence is now restricted to the border area with the FYR of Macedonia, north of Ohrida lake. The population is estimated at 15 individuals, with some of them moving across the borders to FYR of Macedonia and Kosovo. The Balkan lynx population does not exceed 20–30 individuals in total.

3.3. Large Carnivores on the Balkan and the Dinarids

(Promberger 1997, minutes of a workshop held at the meeting of the LCIE co-coordination group, Vienna 1997)

A workshop on large carnivores on the Balkan and the Dinarids was held in Vienna in spring 1997 as part of the co-ordination group meeting of the LCIE (Large Carnivore Initiative for Europe). It was joined by biologists from Croatia, FYR of Macedonia and Bulgaria. It became clear once more that there is very little information available on the lynx and that the existing numbers and information on distribution are not more than

rough estimates. Hunters, scientists and managers often have insufficient knowledge about the ecology of the species. The population was estimated to be restricted to a few dozens of individuals in Albania, FYR of Macedonia and the south of Yugoslavia. The most important problems were mentioned as: lack of appropriate area management and monitoring, insufficient food supply (FYR of Macedonia) and illegal hunting.

3.4. Report on the situation of the lynx in the FYR of Macedonia on behalf of Euronatur

(B. Micevski 1997, unpubl.)

The Bird Study and Protection Society of Macedonia (BSPSM) asked hunters, foresters, shepherds and nature lovers in an area of nearly 500 km^2 about the presence of lynx. The area included the Radika valley and parts of Mavrovo NP. The estimated number of individuals was 54 lynx for the whole study area, corresponding to 12 lynx/100 km^2. The explanation for this very high density was that a large part of the area was a national park with a high density of prey species and good protection and that the area was the heart of the autochthonous Balkan lynx population. This high density is in a sharp contrast with all other population estimates.

3.5. European Lynx Action Plan

(Breitenmoser *et al*. 2000)

In the European Lynx Action Plan – a document prepared within the framework of the Large Carnivore Initiative for Europe (LCIE) and published under the Council of Europe – information has been gathered by means of a questionnaire. According to expert knowledge, the Balkan lynx population spreads over an area of 1600 km^2 today and consists of 50 lynx. The status, distribution and number of lynx in the Balkan lynx population are considered unclear. However, it is judged as the most threatened autochthonous lynx population in Europe and should be given every priority in conservation.

4. Summary of the present situation

The situation of the Balkan lynx seems to have changed again very dramatically since the evaluation by Mirić in the 1970s. The recovery of the population that had occurred after the second world war, has obviously already been stopped in the 1980s. During the last 10–15 years, there has probably been an important decline of the Balkan lynx population. If we believe in numbers, the population in the FYR of Macedonia has declined from 120 to 30–35 lynx, and in Albania from some 80 to 20–25 (Table 2). Th. Kominos (1997) even stated, that there might be as few as 15 lynx left in Albania.

For the region of Kosovo, Metohija and Raška County, Grubač (2000) estimated 22–27 individuals for the period of 1990–1999. He was afraid that the population might have dropped to as few as 12–18 individuals due to the war in 1999.

The distribution area would have experienced a drastic reduction (Map 1) from 8000 km^2 in the 1970s (Bojovic 1978) to 1600 km^2 today (Breitenmoser *et al*. 2000). As there is little field experience with lynx on the Balkans, it is very hard to judge all these numbers. However, there is no doubt that the Balkan lynx population is heavily threatened, as the population has decreased everywhere where population trend information is available (Table 2). Only the populations of Bosnia & Herzegovina and the one in eastern Serbia are increasing and expanding. Both are not part of the autochthonous population. In Bosnia & Herzegovina, lynx immigrated from the re-introduced population of Slovenia, and in eastern Serbia lynx are immigrating from the Carpathian Mountains of Romania.

References

Bojovic, D. 1978. Der autochtone Luchs in Jugoslawien – Verbreitung, Bestand und Tendenz. In: Der Luchs – Erhaltung und Wiedereinbürgerung in Europa. U. Wotschikowski, Ed. Bernhard, Mammendorf, pp. 25–28.

Breitenmoser, U. and Breitenmoser-Würsten, Ch. 1990. Status, conservation needs and reintroduction of the lynx (*Lynx lynx*) in Europe. Council of Europe, Nature and Environment Series, No. 45, 47 pp.

Breitenmoser, U., Breitenmoser-Würsten, Ch., Okarma, H., Kaphegyi, T., Kaphegyi-Wallmann, U. and Müller, U. 2000. Action plan for conservation of the Eurasian lynx (*Lynx lynx*) in Europe. Council of Europe, No. 112, 76pp.

Čop, J. and Frkovic, A. 1998. The re-introduction of the lynx in Slovenia and its present status in Slovenia and Croatia. Hystrix 10: 65–76.

Fengewitsch, H.J. 1968. Grossraubwild in Europas Revieren. BLV Verlag München.

Festetics, A. 1980. Die Verbreitung des Luchses in Europa. In: Der Luchs in Europa – Verbreitung, Wiedereinbürgerung, Räuber-Beute-Beziehung. A. Festetics, Ed. Kilda Verlag, Graven, pp. 89–160.

Grubač, B.R. 2000. The lynx, *Lynx lynx* (Linnaeus 1758) in Serbia. Protection of nature 52: 151–173.

Kratochvil, J. 1968. The lynx population in Yugoslavia. *In* Recent distribution of the lynx in Europe. J. Kratochvil *et al*. (eds). Acta sc. nat. Brno 2: 71–74.

Mirić, D. 1963. Written communication on the occurrence of lynx in Yugoslavia.

Mirić, D. 1974. Verbreitung des Balkanluchses in der Vergangenheit und heute. Bulletin du muséum d'histoire naturelle, Belgrade, Série B, Livre 29, pp. 51–99.

Mirić, D. 1978. Ausrottungsgeschichte des Luchses auf der Balkanhalbinsel. In: Der Luchs – Erhaltung und Wiedereinbürgerung in Europa. U. Wotschikowski, Ed. Bernhard, Mammendorf, pp. 19–23.

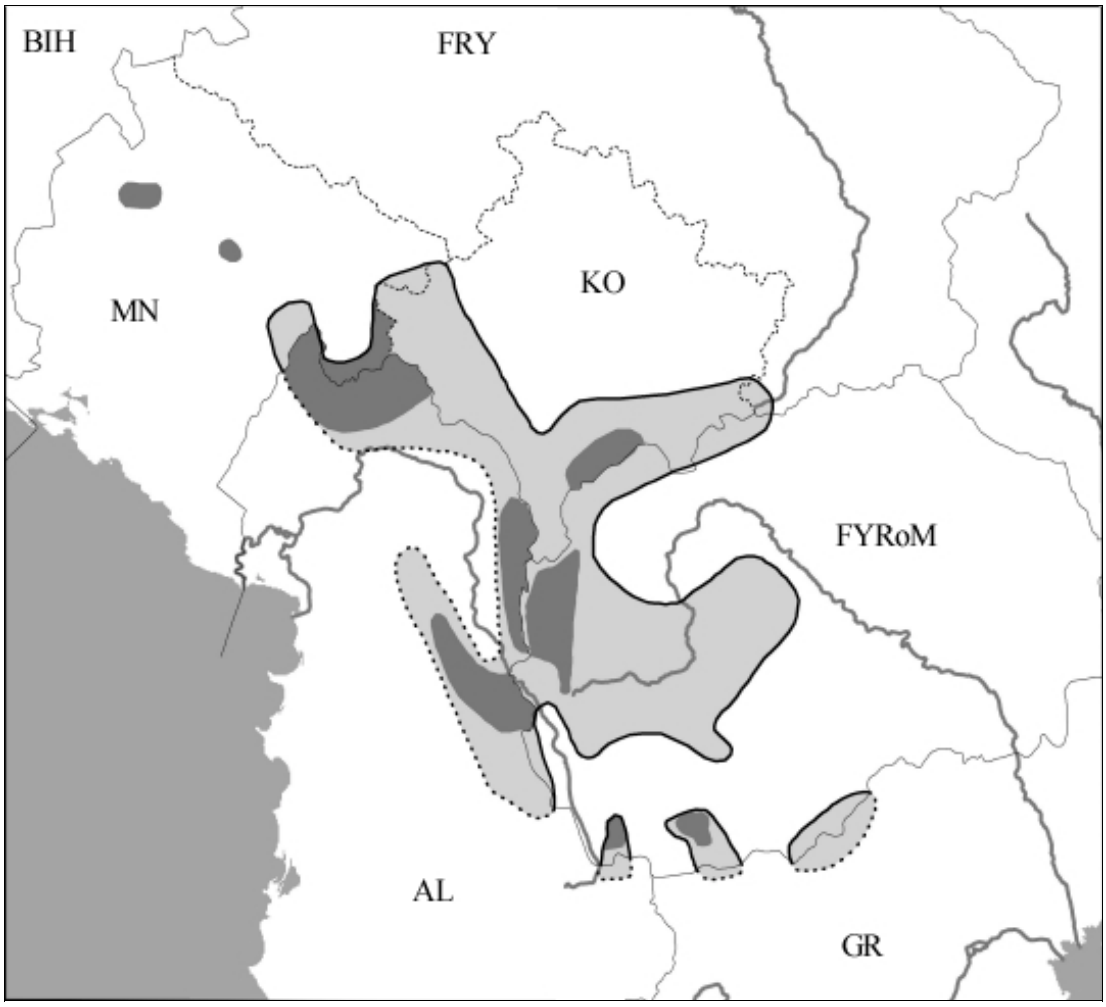
Mirić, D. 1981. The lynx populations of the Balkan Peninsula. Beograd, Serb. *Acad. Sciences and Arts, Separate edition*. DXXXIX, 154 p. (in Serbian)

Promberger, C. (Ed) 1997. Large carnivores on the Balkans and the Dinarids. Proceedings from a workshop in Vienna, Austria, held on 26 April 1997.

Table 2. Population trend, current estimated population size and development of the area occupied by lynx in the Balkans. Bosnia & Herzegovina does not share the autochthonous lynx population, but the country is at the southern expansion front of the re-introduced population of Slovenia. The population trend is indicated according to expert knowledge in this report.

Country	Population size in the 1970s (Mirić 1981)	Population size in 2000 (this report)	Population trend	Development of the area occupied
Bosnia & Hercegovina		?	increasing	increasing
Montenegro	10	?	?	?
Kosovo	70	?	?	?
FYR of Macedonia	120	30–35	decreasing	decreasing
Albania	80	20–25	decreasing	decreasing
E Serbia, FRYugoslavia	–	?	increasing	increasing
S Serbia, FRYugoslavia	?	12–18[1]	decreasing	decreasing
Greece	0	0	sporadic observations[2]	–
Bulgaria	0	0	sporadic observations[3]	–

[1] according to Grubač (2000)
[2] of animals most likely roaming in from FYR of Macedonia or Albania;
[3] animals probably from the expanding population in eastern Serbia (origin Carpathian Mts. of Romania)



Map 1. Distribution of the Balkan lynx population in the 1970s (light grey shaded; after Mirić 1981) and today (dark grey shaded surface; compilation of the information from this report). Thin solid lines: international boundaries, thin dashed lines: national boundaries, thick solid lines: major rivers.

Towards an integrated Balkan lynx conservation programme: What are the next steps for the recovery of the Balkan lynx population?

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The lynx population in the south-western Balkan would, after the population in the Pyrenees, be the first lynx population to go extinct in Europe after the Second World War. This extinction would not take place under a management philosophy aiming for the eradication of large carnivores, but in an era when nature conservation is broadly accepted and when large carnivores are protected by national laws and international treaties. This must not happen.

There can be no doubt that a recovery programme for the Balkan lynx population will be a long lasting and a complicated project, involving many governmental and private organisations and many scientific disciplines. And again, there can be no doubt that the political situation in the south-western Balkan is not favourable for such a process. In the light of the enormous socio-political changes, the ongoing wars, and the poor economic situation of the local people, the conservation of a species such as the lynx may seem to be a luxury. This is not so for several reasons: First, the eradication of a sub-species or a population is a irreversible fact. Second, the lynx will act as an umbrella species for the recovery of the ungulates (the lynx' main prey) and the forests (the lynx' habitat) and hence ameliorate the natural resources also for the local people. And third, a common nature conservation programme will help to reduce mistrust between estranged groups and will provide common goals for a better future.

The time might not yet have come for conservation actions in the countryside involving local administrations and the local people. But there is still a lot of preparatory work to be done. In a first Balkan lynx conservation meeting, held in Plitvice, Croatia, in spring 2000, it was agreed to apply a three-phase approach towards an integrated Balkan lynx conservation programme (Fig. 1). After each phase, a decision-making process must be inserted to decide about the next steps and to review the funding. With the publication of this first report, we have completed the first phase. The conclusions from this report is that there is indeed a need for more precise information on the status and the threats of the Balkan lynx population. Many of the factors important to consider for the design of a sound conservation strategy are unknown or guesses at best. Not only the accurate distribution and the heads of the lynx population are unknown, we also lack background information on the lynx' feeding ecology, habitat use, and threats.

These gaps in our knowledge should now be closed in the second phase (Fig. 1). The concrete tasks during the second phase can be summarised in four items:

1. Establish a network and build partnerships. Many organisations and individuals will have to contribute to a conservation programme. It is important to get these institutions involved at an early stage and to make use from their information and expertise also during the preparatory steps. Potential partners are: NGOs in charge of nature conservation, wildlife management and related fields; scientists working at nature museums, veterinary services, national parks, universities; zoos; hunter's organisation and taxidermists. All these individuals and institutions should be incorporated into a network on national and international level.
2. Conduct a field survey in each country by standardised methods in order to (1) define accurately the distribution of the Balkan lynx occurrences, (2) to have a reasonable estimation of the number of individuals, and (3) to know the recent trends in the population development. Such a survey will most likely be carried out by means of systematic interviews with local hunters, shepherds, foresters, veterinarians, etc., and will therefore allow for a first time to involve local people.
3. Identify the ecological and anthropogenic threats of the Balkan lynx population. We hypothesise that the lynx does not only suffer from direct persecution, but even more from the deterioration of its prey base and the habitat. However, little is known about the ecology and the environmental conditions of the remnant population. Such information must be gathered together with a survey of people's attitudes toward the big cat. Most of these data can be gained during the field survey, but specific information may be available form forest services, hunter's association and other institutions. In order to gain reliable data on the ecology and life history of the lynx, it would be welcome to run a limited field research project in one of the remaining nuclei of the Balkan lynx.
4. Review the recovery potential of the Balkan lynx population. The information gathered in steps 1-3 must be compiled in a feasibility study for a recovery programme. This study must especially address:

4.1. The potential range for a recovery programme or the best suited areas for a re-introduction or translocation project.
4.2. The genetic structure of the Balkan lynx population. Such research is needed to (1) evaluate the taxonomic status of this population or sub-species, respectively, and its genetic relationship to neighbouring populations in the Carpathians; and (2) analyse the level of relatedness and inbreeding in the Balkan lynx population. This knowledge will help to decide about the conservation strategy in regard to captive breeding, translocations, or re-introductions.
4.3. The readiness of all potential partners (GOs, NGOs, local people, international sponsors) to co-operate in an ongoing recovery programme.

Without a clear commitment of all partners needed in an ongoing programme, it will be useless to enter the third phase, which will be the actual recovery project. The second phase outlined here will last at least 2-3 years. It will not only allow to gain all data needed to develop a recovery programme, but also to build partnerships and to train people. The result of the second phase will be a more detailed report on the status of the Balkan lynx population, a network of partners, and a list of recommendations for the conservation actions to be implemented in phase 3.

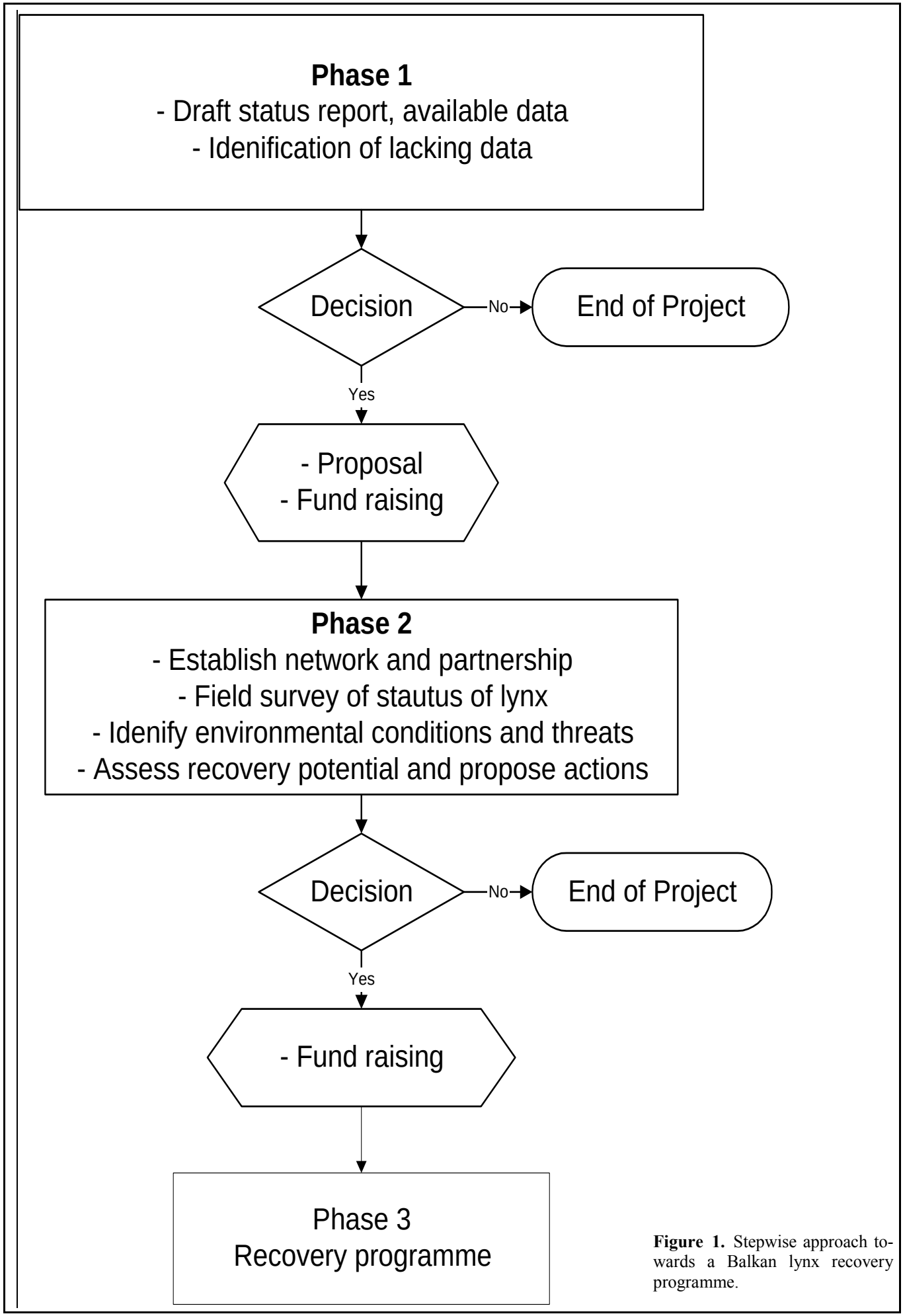

Figure 1. Stepwise approach towards a Balkan lynx recovery programme.

Bisher erschienene KORA Berichte

KORA Bericht Nr. 1	Landry, J.M., 1997. La bête du Val Ferret.
KORA Bericht Nr. 2	Landry, J.M., 1998. L'utilisation du chien de protection dans les Alpes suisses: une première analyse.
KORA Bericht Nr. 3	Workshop on Human Dimension in Large Carnivore Conservation. Contributions to the Workshop 26.11.97 at Landshut, Switzerland, with Prof. Dr. Alistair J. Bath. 1998.
KORA Bericht Nr. 4	Zimmermann, F., 1998. Dispersion et survie des Lynx *(Lynx lynx)* subadultes d'une population réintroduite dans la chaîne du Jura.
KORA Bericht Nr. 2 *d*	Landry, J.M., 1999. Der Einsatz von Herdenschutzhunden in den Schweizer Alpen: erste Erfahrungen.
KORA Bericht Nr. 2 *e*	Landry, J.M., 1999. The use of guard dogs in the Swiss Alps: A first analysis.
KORA Bericht Nr. 5 *d*	Angst, C., Olsson, P., Breitenmoser, U., 2000. Übergriffe von Luchsen auf Kleinvieh und Gehegetiere in der Schweiz. Teil I: Entwicklung und Verteilung der Schäden.
KORA Bericht Nr. 6	Laass, J., 2001. Zustand der Luchspopulation im westlichen Berner Oberland im Winter 2000. Fotofallen-Einsatz Nov./Dez. 2000
KORA Bericht Nr. 7 *e*	Breitenmoser-Würsten, Ch., Breitenmoser, U., (Eds), 2001. The Balkan Lynx Population - History, Recent Knowledge on its Status and Conservation Needs,

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