

## 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 non-existent 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.

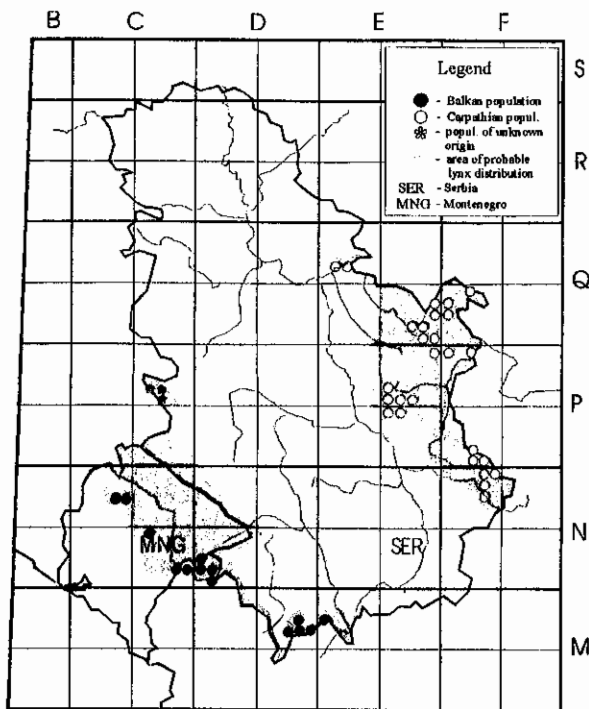
At the beginning of the 20<sup>th</sup> century, there were some indications that lynx were present in northeastern Serbia, probably based on rare immigrants from neighboring Romania, but for about 75 years this was not enough for a population to be established. Only in the early 1980s, more precisely on November 28<sup>th</sup> 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*, Kratochvíl 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<sup>2</sup>) 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 Republic of Yugoslavia - Serbia and Montenegro (according to the records from last 10 years - dots and asterisks). UTM Grid 10 by 10 km.

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-

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 re-introduction 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

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 <sup>2</sup> )	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	Čvrlijski 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 <sup>2</sup> )	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 <sup>2</sup> )	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	Kaluderovo, 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 <sup>2</sup> )	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, Bračovac 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 <sup>2</sup> )	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