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**STATUS, CONSERVATION NEEDS
AND REINTRODUCTION
OF THE LYNX (LYNX LYNX)
IN EUROPE**

Nature and environment, No. 45

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AND REINTRODUCTION
OF THE LYNX (LYNX LYNX)
IN EUROPE**

by Urs Breitenmoser and Christine Breitenmoser-Würsten

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1. INTRODUCTION

In 1968, on the behalf of the International Union for Conservation of Nature and Natural Resources (IUCN) and the World Wide Fund for Nature (WWF, former World Wildlife Fund), J. Kratochvil and others published two reports: "History of the Distribution of the Lynx in Europe" (Kratochvil et al. 1968a), and "Recent distribution of the lynx in Europe" (Kratochvil et al. 1968e). In the latter, the authors concentrated on the situation in Norway, Sweden, Finland, Poland, the Soviet Union, Czechoslovakia, Romania, and Yugoslavia - all countries where the lynx still occurred.

In subsequent years, the lynx became a species vehemently discussed in central and western European countries such as Switzerland, Yugoslavia (Slovenia), Germany, Italy, France and Austria, where it no longer existed, but where nature conservationists intended to re-introduce the predator. In 1978, three symposia were held: May 7 - 9 in Murau (Austria); July 14 - 15 in Spiegelau (Federal Republic of Germany); and October 5 - 6 in Strasbourg (France). The most important subject of the meetings was the re-introduction of the lynx in those countries, but all proceedings (see Festetics 1980c, Wotschikowsky 1978b and Kempf 1979a) contain papers on the situation of autochthonous populations as well. Festetics (1980b) gives a good overview of the distribution of the lynx in Europe with many references.

Now, ten years later, the Environment Conservation and Management Division of the Council of Europe (CE) has commissioned a report on the status, conservation needs and re-introduction of the European lynx (Lynx lynx). This report focuses on the following:

- Recent distribution of the lynx in European countries: status and development of the populations;
- Legal situation, hunting and poaching in all countries where the lynx occurs;
- Damage to livestock by lynx;
- Management recommendations and conservation needs of local populations.

We asked local experts for recent data on lynx and for their personal opinions and compared the situation described with the available literature. We hope thereby to get an up-to-date view of the status of the lynx in Europe. Within the scope of this report, it was naturally not possible to confirm all the information. For some countries, we did not receive any new information, and we have to refer to works already published such as Kratochvil et al. (1968e), Matjuschkina (1979) or Festetics (1980c).

Many local experts (see appendix) willingly answered our questions, and for this final version completed in March 1990, we obtained comments from some of our respondents and additional material from G. Mertzianis, Athens; E. Nowak, Bonn; C. de Klemm, Paris. We would like to thank all of them. We have taken into consideration the critique, but could not amplify the text, which was already too long.

It is not the aim of this report to describe the biology of the lynx, but rather to give a short overview of the current situation of the lynx in European countries. We hope it may become the basis for further discussion and cooperation between people working on the conservation of lynx in Europe. We are very grateful to Adrienne and Peter Jackson for proof reading the original English text of this report.

2. A NOTE ON THE TAXONOMY OF THE EUROPEAN LYNX

There are several suggestions for the treatment of subspecies, species and even the genus (Lynx or Felis?) of the lynx. It is not the aim of this report to discuss the classification of lynx. We are dealing with populations, and every population is worth conserving. But the question of species, subspecies and even geographic races is of great importance in a re-introduction programme. It stands to reason that only the "nearest" lynx available should be taken for a re-introduction. In this report, we follow the classification proposed by Wozencraft (1989) and Werdelin (1983), who distinguish two species of lynx in Europe: Lynx lynx and Lynx pardinus (= L. pardina). The lynx of the Iberian peninsula (L. pardinus) - probably one of the most threatened cat species in the world - will be the subject of a special report (J. Ruiz-Olmo in lit.), and is therefore not treated in our report (see remarks on the Pyrenean population in the chapter "France"). All the rest of Europe and the Asian part of Turkey we believe to belong to the area of Lynx lynx. This is contrary to the distribution of L. pardinus according to Van den Brink (1975), but agrees with the judgments of other authors (Miric 1978a, Matjuschkina 1979, Werdelin 1981). We will not deal with subspecies (for this question, see Matjuschkina 1979 and Miric 1978a).

3. STRUCTURE OF THE REPORT, METHOD AND COUNTRIES INVOLVED

The report includes all European countries regardless of whether they are member states of the Council of Europe or not. Tab.1 lists the European countries with their abbreviations, gives some basic information and indicates the status of the local lynx populations. Every country marked with "X" in the column "treated" is handled in detail in its own chapter. More general items are summed up in additional chapters (see index). The basic information for this report was collected by means of a questionnaire. We sent off 68 questionnaires and got back 34. The respondents are mentioned for each country. Their addresses are listed in appendix I, as well as those of persons who gave advice by letter. Where information on the distribution of the lynx from several respondents was contradictory, we tried to make a compromise in fig. 1. These problems are mentioned in the chapters for individual countries. There are separate maps for some countries with more detailed information. The Wildlife Trade Monitoring Unit (WTMU) provided us with information on the fur trade.

Tab.1: Former and recent evidence of lynx in all European countries. Abb = Abbreviation (Country Code), CEM = Member of the Council of Europe, Pre = prehistoric, His = historic, Aut = autochthonous, R-i = reintroduced, Spr = spontaneous resettlement

Abb	Country	CEM	Evidence			Treated in Report		
			Pre	His	Recent	Aut	R-i	Spr
AD	Andorra ¹				?			
AL	Albania				?			x
AT	Austria	x					x	x
BE	Belgium	x	x					
BG	Bulgaria			x				x
CH	Switzerland	x	x	x		x		x
CS	Czechoslovakia			x	x	x		x
CY	Cyprus	x						
DD	Germany (GDR)		x	x			(x)	x
DE	Germany ² (FRG)	x	x	x			(x)	x
DK	Denmark ³	x	x					
ES	Spain ³	x						
FR	France	x	x	x	x	x	x	x
GB	United Kingdom	x	x					
GR	Greece	x	x	x				x
HU	Hungary			x			x	x
IE	Ireland	x						
IS	Iceland	x						
IT	Italy	x	x	x			x	x
LI	Liechtenstein	x		x				x
LU	Luxembourg	x						
MT	Malta	x						
NL	Netherlands ⁴	x	x					
NO	Norway	x		x	x			x
PL	Poland		x	x	x			x
PT	Portugal ⁵	x						
RO	Romania		x	x	x			x
SE	Sweden	x	x	x	x			x
SF	Finland	x	x	x	x			x
SM	San Marino	x						
SU	Soviet Union		x	x	x			x
TR	Turkey	x		x	x			x
YU	Yugoslavia		x	x	x	x		x
MC	Monaco							

¹ see France (Pyrenees), Lynx pardinus?
² Respondent: T. Asferg, Ronde
³ Lynx pardinus (see France, Pyrenees)
⁴ Respondent: J. Mulder, Leiden
⁵ Lynx pardinus

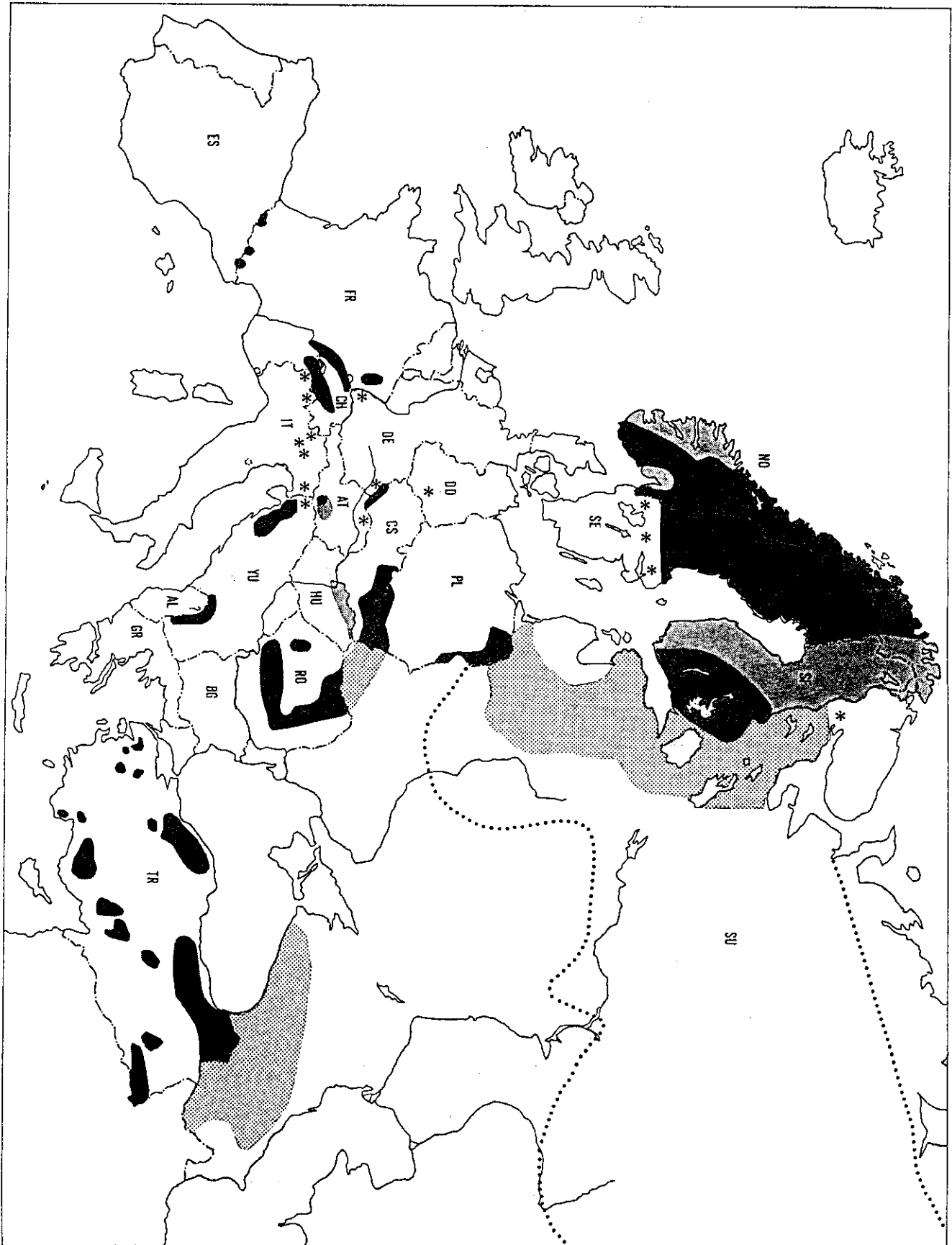


Fig.1: Recent distribution of *Lynx lynx* in Europe. Patterns: Dark grey = Occupied area, light grey = occasionally occupied area or area with low population density according to the respondents; dotted zone = lynx area according to literature; asterisk = isolated observations; dotted line = S and N border of the lynx area in the Union of Soviet Socialist Republics according to (Matjuschkin 1979).

4. STATUS OF THE LYNX IN EUROPEAN COUNTRIES

In the following pages, we will treat briefly the European countries with an existing or potential lynx population, in alphabetic order of their abbreviations (see tab.1). We use information and recommendations from our respondents. The "comment" represents our interpretation and opinion. Fig.1 shows the recent distribution of the lynx in Europe according to our contacts. There are some contradictions between neighbouring countries, but we did not try to adjust them.

AL - Albania

Status: Unknown; probable autochthonous population.

Comment: No data available. Miric (1974) and Matjuschkin (1979) mention the lynx as present along the Yugoslav-Albanian border, Festetics (1980b) and Cop (1988) include the eastern part of Albania in their map of the distribution of the lynx on the Balkan Peninsula. Bojovic (1978) supposes for Albania the same abundance as for Yugoslavia, but concedes that the lynx in Albania is intensively hunted. Kratochvil (1968h) draws a much more restrictive distribution map for Albania, and he admits that there are no data. On an Albanian map of 1982 on the distribution of game species, submitted by E. Nowak, the lynx is indicated in five places in the NE and in one place in S. Albania. The only concrete information (Miric 1974) is dated 1896 and 1912! The recent distribution of the species in Yugoslavia suggests that it might still exist in Albania too, and Albania could be very important for the conservation of the Balkan lynx population (see Yugoslavia).

AT - Austria

Respondents: H. Gossow, W. Kulterer, H. Pechlaner

Status: Eradicated; re-introduced and re-migrating with increasing tendency.

Former presence and recent distribution: Eiberle (1972), Polacsek (1978) and Festetics (1980b) sum up the history of the eradication of the lynx in Austria. The autochthonous population became extinct in all parts of Austria during the 19th century. Polacsek (1978) presents a list of observations in the 20th century. Some of these observations cannot be proved, others may concern animals which had escaped from zoos, and in the NE of the country individuals may have immigrated from Czechoslovakia (Festetics 1980b).

In 1976, the lynx was re-introduced in Austria. This project has been described by Festetics et al. (1980a), Von Berg et al. (1980) and Sommerlatte et al. (1980). Nine lynx (six males, three females) were released in the Styria district (Steiermark, star in fig.2) and followed by radio-telemetry and tracking in the snow. After years of little evidence, there were increasing observations in Carinthia (Kärnten). Today, there is a stable or slightly increasing population in Carinthia, and there have been scattered observations in other districts (H. Gossow, see fig.2b).

In the Waldviertel district (NW of Vienna), the presence of a lynx has been observed since winter 1987/88 (Forstner 1988), (asterisk in fig.2b). This animal probably came from the re-introduced population in Moravia (see Czechoslovakia).



Fig.2a: Dispersal of the lynx in the first years after re-introduction (star); **b:** observations (dots) from 1980-86 and concentration (grey pattern) in Carinthia (from Gossow 1989).

Legal situation, hunting: Considered as a game species, but protected throughout the year in the whole of Austria.

Damage to livestock: In the first years after re-introduction there were no considerable losses of domestic animals. Only in recent years has there been moderate damage in Carinthia. W. Kulterer submitted the following data: 1987: 27 domestic sheep; 1988: four sheep; 1989 (till end of September): 52 sheep, one goat and one calf. Compensation is paid by an insurance ("Bundesländerversicherung") provided by the Carinthian hunters association. The price of a sheep is 1,200 - 2,500 ÖS (W. Kulterer).

Recommendations: The respondents emphasise, that both public education and more research on the lynx is needed.

Comments: The first lynx of the Slovenian re-introduced population have probably reached Austria and increased the existing population in Carinthia district (H. Gossow, see also Yugoslavia and Italy). This may be one reason for the rapid development of recent years. On the other hand, it is quite characteristic for problems of damage to livestock to turn up a few years after the re-introduction (see Switzerland and France). Whereas in the early years predation on ungulates by the lynx provoked controversy with hunters (Gossow & Honsig-Erlenburg 1986), now a dispute with the sheepbreeders has arisen. Problems may even increase in coming years. Gossow (1989) illustrates exemplarily the psychological and public relation challenges of (or rather after) a re-introduction of a large predator. We will focus on that in the chapter "Re-introduction".

BG - Bulgaria

Respondents: G. Spiridonov, N. Spassov

Status: Eradicated.

Former presence and extinction: The traditional area still occupied in the 20th century was: 1. the Balkan Mountains E of Sofia and the Rhodope Mountains SE of Sofia; 2. the NW Balkan Mountains S of Vidin; and 3. the northern part of the Istranca Mountains along the border to Turkey south of Burgas. The last known observation was in 1941. Since then, there have been unsubstantiated rumours of individuals immigrating from neighbouring countries. As reasons for the eradication, G. Spiridonov suggests overhunting, conflicts with farmers and sheepbreeders and loss of nutrition due to the reduction or eradication of ungulate populations.

Legal situation: Protected by law throughout the year since 1986. The species was given protection at the suggestion of G. Spiridonov, when the possibility of spontaneous remigration became probable.

Comments: Evidence for the prehistoric and historic distribution of the lynx in Bulgaria and for its eradication is given by Atanasov (1968). In recent years, several authors erroneously mentioned the species as still present in this country (Festetics 1980b). The only neighbour of Bulgaria with a considerable autochthonous lynx population is Yugoslavia. The range of this population is quite small, and it is doubtful whether it will spread out in the near future. G. Spiridonov and N. Spassov have already suggested the re-introduction of the lynx in Bulgaria.

CH - Switzerland

Contact: U. Breitenmoser, S. Capt, H. Haller

Status: Eradicated - re-introduced in the Alps and in the Jura Mountains.

Former presence and recent distribution: The eradication of the lynx population in Switzerland and in the neighbouring countries has been analysed by Schauenberg (1969) and Eiberle (1972). The last known observations date from the late 19th century. Since 1971, lynx have been re-introduced in the Alps and in the Jura Mountains (Breitenmoser 1983, Haller 1990). At least 25 animals have been released in nine places in Switzerland (fig.3, stars 1-9). All the lynx were caught in the Slovakian Carpathian Mountains (Czechoslovakia, Stehlik 1972). Today, about 10,000 km² in the Alps and about 5,000 km² in the Jura Mountains are reoccupied (fig.3, grey pattern). In the Alps there are large areas above timberline, that are not occupied by lynx at all. The number of lynx in Czechoslovakia is estimated to be 50 to 100 adult individuals. Individual home ranges are large, 100 km² to 450 km² (Haller & Breitenmoser 1986), and lynx abundance therefore very low: about one individual per 100 km² in convenient habitats. In recent years, the population has seemed no longer to be expanding eastwards.

Legal situation, hunting: Protected by law throughout the year. Elimination of individuals possible with permission of the federal authorities. We have information of about 60 dead lynx (all kinds of mortality); poaching appears to be an important cause of death (Haller 1990).

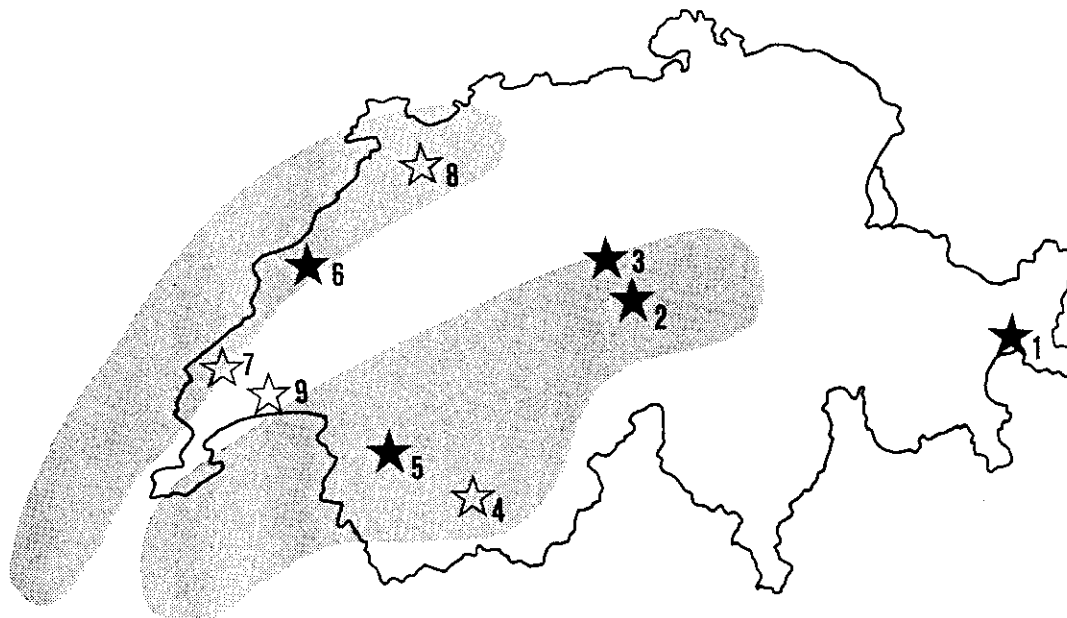


Fig.3: Recent distribution of lynx in Switzerland and places of release: 1 Swiss National Park, 2-5 different places in the northern and central Alps, 6-8 Jura Mountains, 9 Jorat (wooded area in the plain north of Lausanne).

Damage to livestock: The first noticeable damage to livestock occurred in 1979. Since then, the number of sheep killed has increased. A few years after the arrival of the lynx in a region, losses usually reach a peak and decrease again in the following years. The temporary peak in damage is probably a consequence of the re-adaptation of the predator-prey-system (Breitenmoser & Haller 1987). Compensation was paid by the Swiss League for Protection of Nature from 1973 till 1988 (sFr. 100,800.- for 392 kills, about sFr. 250.-/kill). Since April 1988, the Swiss Confederation, together with the cantons, has taken over the compensation.

Tab.2 : Compensated lynx kills of sheep (442), goats (16) and others (15) in CH (Breitenmoser 1988)

Year	1973	75	79	80	81	82	83	84	85	86	87	88
Number	1	1	7	11	53	56	25	32	57	74	71	85

Comments: The different releases of lynx in Switzerland were not coordinated, and clandestine action has caused more conflict than support for the re-introduction. Nevertheless, we must admit that neither the official releases in the Alps nor in the Jura Mountains would have been sufficient to create a population. The controversy over the re-introduction of the big predator continues - 19 years after the first releases. A re-introduction is a long term project that should be accompanied not only by research, but also by continuing public relations.

CS - Czechoslovakia

Respondents: P. Hell, L. Vodák

Status: Carpathian Mountains: autochthonous population not endangered; Bohemian Forest: small, but increasing re-introduced population.

Former presence and recent distribution: There is good information concerning the lynx in Czechoslovakia. Data on the history and the recent distribution of the species can be found in Hell (1961), Kratochvil (1968d), Kratochvil (1968f), Hell (1968), Hell (1972), Strych (1973), Matjuschkin (1979), Stehlik (1979), Hell (1980) and Festetics (1980b). In historical times, the lynx was widespread in Czechoslovakia, but its area became critically reduced. In 1930, only a few animals survived in the Slovakian Carpathian Mountains. Hunting restrictions from 1936 to 1955 helped the population to increase again. Recovery of the lynx populations was coupled with growth of the ungulate populations. Hell (1961) reported "over-reproduction" and resettlement of former range in the W. After 1964, the population decreased again, and since 1970 the lynx has been missing again in Moravia (Hell 1972). Today, the population in the W Carpathian Mountains (Slovakia) is fluctuating, but not currently endangered. The official estimate is 922 individuals; P. Hell believes there are no more than about 500.

In the W of Czechoslovakia (Bohemian Forest along the border to the Bavarian Forest, Federal Republic of Germany), the lynx was re-introduced in 1982. A total of 17 individuals (11 males, six females) has been released. The approximate number of lynx today is 25 - 27 (L. Vodák).

Legal situation, hunting: In Slovakia, the lynx can be shot from September 15th to February 28th. Trapping is only allowed for the export of living animals. In 1988, a total of 81 lynx were shot, three were caught and one was killed by accident. In Bohemia and Moravia, the lynx cannot be hunted.

Damage to livestock: Slovakia: Only little damage by lynx. Some kills are paid by an insurance, but they are not examined and registered. Damage by wolf and brown bear is much more considerable, and therefore, the lynx seems to be of little interest (P. Hell). Bohemia and Moravia: No data on damage. Kills would be registered by official staff, but not compensated (L. Vodák).

Recommendations: More public education is recommended by both respondents. Additionally, P. Hell proposes a reduction of the hunting season in autumn.

Comments: The lynx population in the Slovakian Carpathian Mountains is of great importance for all re-introduction programmes in central and western Europe. The lynx released in Federal Republic of Germany, Switzerland, Yugoslavia, Italy, France and Bohemia (Czechoslovakia) were caught as wild animals in Slovakia (Stehlik 1972). The Slovakian population is not currently endangered, but it has decreased in the last 30 years. Though P. Hell (see Hell 1961) in 1961 proposed active pursuit of the species, he now requests better protection. Stehlik (1979) points out that the period of protection (March to September) is insufficient for young lynx to reach independence from their mothers.

DD - German Democratic Republic

Respondent: M. Stubbe

Status: Eradicated - occasional intruders from Czechoslovakia.

Former presence and recent distribution: The lynx was present in the German Democratic Republic in prehistoric (Matjuschkin 1979) and in historic times (Festetics 1980b, Butzeck et al. 1988). The last isolated colonies became extinct at the end of the 18th century (Butzeck et al. 1988). Occurrence of lynx in the 20th century has resulted from the increase in the population in the Slovakian Carpathian Mountains (see Czechoslovakia). Some of the observations have been made quite far from the border with Czechoslovakia, and have lasted for several years (Butzeck et al. 1988). Today, there are not more than two to four individuals in the Elbsandsteingebirge SE of Dresden (M. Stubbe). Suitable lynx habitat is restricted to the south of the German Democratic Republic, along the border with Czechoslovakia.

Legal situation, hunting: In 1987, all legal protection was removed. The lynx was declared to be a non-indigenous element of the fauna of the German Democratic Republic, and therefore open for hunting (Butzeck et al. 1988).

Recommendation: M. Stubbe suggests legal protection. Butzeck et al. (1988) argues that stronger legal protection in the German Democratic Republic would support the re-introduction programme in Bohemia (Czechoslovakia).

Comments: We agree with Butzeck et al. (1988) that the lynx was an autochthonous species in the German Democratic Republic and therefore belongs to the local fauna.

DE - Federal Republic of Germany

Respondents: S. Gossmann-Köllner, U. Wotschikowsky

Status: Eradicated - attempt at re-introduction and spontaneous remigrations in the Bavarian Forest.

Former presence and recent distribution: The Federal Republic of Germany is part of the prehistoric and historic area of the lynx (Kratochvil 1968e). The species was exterminated by the end of the 19th century. Festetics (1980b) summarises the history of the lynx in different regions of the Federal Republic of Germany.

In 1970, five to nine lynx were released in the Bavarian Forest National Park. As this was a clandestine re-introduction, there are no data available. The released individuals were probably wild animals from Slovakia (Stehlik 1972). The animals could be observed at least till 1985, but there was never a real population (Wotschikowsky 1978a, Zachariae et al. 1987). In recent years, there have been observations of animals entering from the re-introduced population in Bohemia (see Czechoslovakia).

Since 1988, a few observations of lynx have been made in the Black Forest. One individual was killed by a car. It is not known where the lynx came from. Migration from Switzerland (Jura Mountains) or France (Vosges Mountains) is not impossible, but unlikely.

Legal situation: Protected by law throughout the year.

Re-introduction: There are several projects to re-introduce the lynx in the Federal Republic of Germany. Apart from a new attempt in the Bavarian Forest (Plaen 1988, Kluth et al. 1989), releases have been discussed in the Harz Mountains (Stahl 1972), in the Pfälzerwald (Himmer 1978, Van Acken & Gruenwald 1977), in the Black Forest (Kälble 1978, Stehlik 1981) and in the Bavarian Alps (Kluth et al. 1989). At the moment, the last seems to be the most advanced project.

Comments: Insofar as resettlement of the whole Alps is concerned, a re-introduction in the Bavarian Alps would support the indispensable link between the populations of Switzerland and Austria.

FR - France

Respondents: L. Chazel (Pyrenees), R. Estève (Alps),
V. Herrens Schmidt (Jura Mountains, Vosges Mountains, Alps)

Status: Threatened relict of an autochthonous population in the Pyrenees (1); re-colonisation of the Alps (2) and of the Jura Mountains (3) by lynx coming from Switzerland; running of a re-introduction programme in the Vosges Mountains (4).

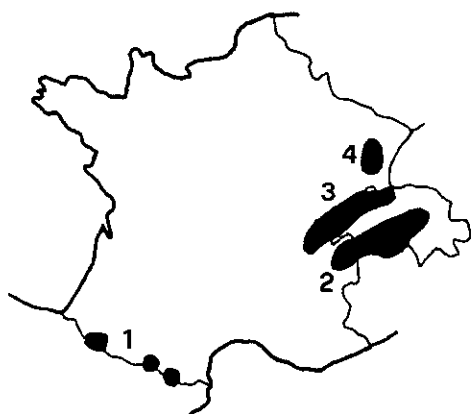


Fig.4: Recent distribution of lynx in France. 1 Pyrenees, 2 Alps, 3 Jura Mountains, 4 Vosges Mountains.

Former presence and recent distribution: The lynx was widespread over France in prehistoric and in historic times. Data are presented by Van den Brink (1975), Matjuschkina (1979), Festetics (1980b), Schauenberg (1969), Kempf (1979b) and Clot & Besson (1974). Mountainous regions have been the last refuge for the species. But the populations were already extinct in the Vosges Mountains in the 17th century (Saint Girons 1968), in the Massif Central and in the Jura Mountains by 1870 (Schauenberg 1969) and in the Alps in the first half of the 20th century (Schauenberg 1969, Kempf 1979b).

Only in the Pyrenees (1), was a relict population able to survive. Today, there are three isolated nuclei of observations along the border to Spain (see map). L. Chazel estimates the number of individuals to be not more than 10 to 15. He regards the Pyrenean lynx as critically endangered, even if the central nucleus seems to be stable and even slightly increasing. The main danger is not poaching, but destruction of habitat.

In the Alps (2), recent occurrence arises from lynx immigrating from Italy or Switzerland. In 1976, a lynx released in the Gran Paradiso National Park (see Italy) was found dead in the Isère district. Later, observations were made in the Haute-Savoie district of individuals intruding from the re-introduced Swiss alpine population (see Kempf 1979b, Estève 1982 and Haller 1990). In 1988, two litters were recorded (R. Estève). The population size is impossible to estimate, but the number of observations has increased. The whole district seems to be settled now (R. Estève). A re-introduction project for the French Alps has been discussed (Choisy 1979).

The French Jura Mountains (3) have been recolonised by animals from the re-established Swiss Jura Mountains population (see Switzerland). The first incident was a lynx killed near Geneva in 1974. Since 1980, the number of observations has increased steadily. Herrenschmidt & Leger (1987b) present a map with 142 lynx observations in the French Jura Mountains. The data are distributed over an area of some 8000 km² in the districts of Ain, Jura and Doubs. V. Herrenschmidt estimates a total of about 40 lynx for the French part of the Jura Mountains population.

In the Vosges Mountains (4), a re-introduction programme has been running since 1983. By 1988, 14 lynx (nine males, five females) had been set free. Thirteen individuals were followed by radio-telemetry (Herrenschmidt et al. 1986, Herrenschmidt & Leger 1987a). Twelve of the released lynx were wild born animals from Czechoslovakia. Two were lynx imported from Great Britain as animals captured in the wild which had remained for a long time in captivity. One had to be recaptured immediately after the releasing, the other died three months later. The two animals were unafraid of humans. Lynx presence is still weak in the Vosges Mountains. V. Herrenschmidt estimates that only six lynx are still alive. Losses as a result of poaching, car accidents etc have been too high. One female at least had litters in the last two years. Further releases are planned by the Ministry of Environment and WWF France, to prevent genetic problems (V. Herrenschmidt).

Legal situation, hunting: Protected by law since 1976. Illegal killings are a particular problem in the Jura Mountains (especially in the Ain district) and in the Vosges Mountains. In the Jura Mountains, the administration has now reacted to the untenable situation (see "damage to livestock"). Sheep breeders are encouraged to rely on protection systems such as broad collars for sheep. Lynx which repeatedly kill sheep will be trapped, and, if it is not possible to catch them, they will be shot. In January 1990, two young lynx were caught in leghold-traps in the Ain district.

Damage to livestock: In the Pyrenees, the Alps and the Vosges Mountains, the killing of domestic animals is of little importance. Strange things however happen in the Jura Mountains, especially in the Ain district. Since 1983, there has been a dramatic increase in the number of sheep killed (Herrenschmidt & Vandel 1989).

Any sheep killed is examined by specially-trained local experts and by an official game warden. Compensation is from 600 FF for a lamb to 1,500 FF for a ewe. Since 1984 compensation has been paid by WWF France.

Tab.3: Lynx kills (sheep) in the districts of Ain, Jura and Doubs (Jura Mts. FR). J.M.Vandel, p.comm.

	Ain	Jura	Doubs	total
1984	4	-	-	4
1985	4	-	-	4
1986	6	-	-	6
1987	12	-	17	29
1988 ¹	123 ²	28 ³	7	158
1989 ¹	289 ²	79 ³	-	368

¹To end of October; ²288 sheep, one goat
³61 sheep, 18 goats

Recommendations: All respondents emphasise that there is a lack of basic information and that more field research should be done. Stronger legal protection is not possible, but the laws in force are not observed. Public education is required if the populations in the Alps and in the Jura Mountains are to survive.

Comments: France is currently the country with the most urgent lynx problems. We will focus on a few aspects in the different lynx regions:

Pyrenees: It has been discussed by many authors whether or not the lynx still exists in the Pyrenees. Saint Girons (1968) Schauenberg (1969) and Festetics (1980b) consider the species as extinct, Graff & Fernex (1978), Kempf (1979b) and L. Chazel (see Chazel 1989) confirmed the survival of a relict population. It is certainly strange that there have been so few data for such a long time, in particular as there have been numerous naturalists attracted by the subject. The only accessible contemporary specimen is a stuffed lynx killed in 1974 (L. Chazel). The population (or the different nuclei) must have been able to survive at an astonishingly low level. Yet, the Pyreneean lynx is highly endangered and priority should be given to its conservation. Better knowledge of the ecology of the remaining animals would help to save them. A research project with radio-telemetry would not only increase data input and quality, but could also help to sensitise public opinion.

From a scientific point of view, the Pyreneean lynx is very interesting, too. Its classification has been discussed by several authors. The presence of Lynx lynx in the N Pyrenees (France) has been attested. The existence of the Pardel lynx Lynx pardinus in France is doubtful. J. Ruiz-Olmo, who is working on the lynx in Spain, attests that Lynx pardinus exists in the Spanish Pre-Pyrenees, and that there is no clear proof for the existence of Lynx lynx. We do not feel competent to argue on the classification of the lynx in the Pyrenees, but we would like to highlight two points:

1. The relict population of Lynx lynx in the French Pyrenees is the only remaining population of the western European lynx - regardless of its systematic status.
2. Evidence from living animals of the sympatric existence of Lynx lynx and Lynx pardinus in the Pyrenees would represent a great step forward in lynx biology.

Alps: The only region in France not too problematic is the Alps. Several authors have postulated that the lynx never disappeared. Until now, there has been no proof of this hypothesis (see also Haller 1990). However, the lynx is back and is not causing too much trouble at present. For the moment, it might be best to collect data seriously but discreetly, to be prepared for any conflict.

Vosges Mountains: Re-introduction of the lynx in the Vosges Mountains is often said to have failed, notably in France itself. On the one hand, the Vosges Mountains might not be the most urgent region for bringing back this predator. On the other hand, after six years and with five females released, we would not write off the project. It is not so easy to bring this cat back (see chapter "Re-introduction").

The worst situation is in the Jura Mountains. As a result of damage to livestock, a violent controversy has broken out that has even led to aggression against people. The matter was not regarded as sufficiently seriously in the beginning, and the chance for constructive dialogue and scientific study has been missed. We must admit that the eruption could not have been expected, and the damage exceeds all experience in Switzerland or Austria. There have been all kinds of rumours about clandestine releases of captive bred lynx and even other big predators (Lynx caracal, Lynx canadensis etc.). S. Capt, who is involved in Swiss lynx research, has been shown a photo of a dead Lynx caracal, said to have been shot in the Ain district. The contact remarked that 18 lynx or lynx-like animals had already been killed in this region. It is impossible to distinguish truth from lies. It is most important to organise an independent investigation, but probably the atmosphere for the moment is too tense. Poaching is frankly admitted by hunters and sheepbreeders in the Jura Mountains. Legal protection is worth nothing if local people do not accept the predator. Local authorities are no longer willing to apply the law, and the ministry in charge has now been forced to take measures. This is not a special French phenomenon. There have been analogous experiences in Switzerland and in Austria.

GR - Greece

Respondents: G. Giannatos, E. Papaevangelou, F. Studer

Status: Eradicated.

Former presence and extinction: The species may have been present almost everywhere in Greece. Prehistoric evidence from Attica is given in (Symeonidis et al. 1978). Recent data are not available. Even for regions considered to be the last refuges (Aos Gorge and Varnous and Voras Mountains, NW-Greece), there has been no proof for the last 20 years (G.Giannatos). Surprisingly, hunters and shepherds from the Peloponnese and southern Pindos Mountains are still familiar with the species, and say it was present till World War II. In other parts of Greece, the lynx is completely unknown. Hunters of the Aos region (NE-Greece) claim that they killed a lynx about 20 years ago.

Legal situation: Protected since 1939.

Comments: Festetics (1980b), Miric (1974), Cop (1988), Matjuschkin (1979), Kratochvil (1968h), and Van den Brink (1975) believe the lynx to be present in the northern part of Greece, but the lack of data is evident. Miric (1978a) mentions the examination of skulls from NW-Greece, but gives no further details. There is one stuffed specimen in the Zoological Museum of the University of Athens, but its origin is uncertain. People such as G. Giannatos or F. Studer, working in N-Greece and collecting data on all big carnivores, have never had a hint of the occurrence of the lynx. The species has not been present in Greece at least since World War II. The reason for its eradication is said to be the loss of habitat (E. Papaevagelou). This may be true for the almost deforested regions of Greece. In the northern part of the country, where the wolf, brown bear and jackal still occur, we expect there are additional reasons (see chapter "Vulnerability").

HU - Hungary

Respondents: G. Nechay, S. Tóth

Status: Eradicated - occasional immigrations.

Former presence and recent distribution: The lynx was present in Hungary in the pleistocene period (Jánossy 1979). In historic times, the species occurred in the northern part of the country as well as in other parts which do not belong any longer to the territory of Hungary (G. Nechay). It was eradicated during the 19th century. The last known observation was in 1915. The reasons for the eradication were overhunting and loss of habitat (S. Tóth). Additional details on the history of the lynx in Hungary are submitted by Kratochvil (1968c) and Festetics (1980b). In 1979, the first observation of spontaneous re-settlement was registered, when a hunter caught a lynx. For 1985/86, a census was made by means of observations of tracks and by local contacts. The estimate was less than ten individuals in NE Hungary, (Pilis Mountains, region of Börzsöny, Mátra, Aggtelek and Zemplén), south of the border to Czechoslovakia. The development trend may be slightly increasing (G. Nechay).

Legal situation: Protected throughout the year.

Recommendations: Public education and more basic information required (S.Tóth).

Comments: It is surprising that the contacts from Czechoslovakia (see distribution map fig.1 and Czechoslovakia) do not include the southern part of the Slovakian Rudohorie Mountains, along the border with Hungary, in the lynx area.

IT - Italy

Respondents: T. Mingozi, B. Ragni

Status: Eradicated - spontaneous resettlement in NW and NE.

Former presence and recent distribution: Details of the former distribution of the lynx in Italy and of its extinction have been communicated by Toschi (1968), Cagnolaro et al. (1975), Matjuschkin (1979), Festetics (1980b) and Ragni (1989). The lynx on the Italian peninsula was eradicated long ago. Classification of the lynx in the peninsula, Sicily and Sardinia has been discussed by several authors. Toschi (1968) states that there is no proof for the existence of another species than Lynx lynx. The lynx survived in the Aostan and Piedmontese Alps till almost 1930 (Mingozi et al. 1988); the last unconfirmed observation was in 1947 (T. Mingozi).

In 1974, an attempt at a re-introduction was made in the Gran Paradiso National Park (Alps, NW Italy). Two males (wild animals procured from Ostrava Zoo, Czechoslovakia) were released, but the project was not followed up (Boitani & Francisci 1978). One animal was found dead near Chambéry, France, eight months later, the other vanished.

In recent years, spontaneous remigrations have been known in two areas of Italy (fig.5): since 1982, lynx have been observed in NE Italy (Region of Friuli-Venezia Giulia, Prealps of Giulia and eastern Carnia, reported by Perco 1989 and B. Ragni). B. Ragni estimates there were about 10 lynx in 1989. These cats are migrants from the re-introduced Slovenian population (see Yugoslavia). In NW Italy, T. Mingozzi reported a few observations in the Aosta Valley and near Domodossola. The lynx in this part of Italy comes from Switzerland, where the re-introduced population is spreading out (Haller 1990). Another observation dating from 1988 was made near Livigno (S of the Swiss National Park in the Engadine, T. Mingozzi). In the Trentino region, lynx have been present for a few years, as shown by litters observed and a young lynx found dead in 1989.

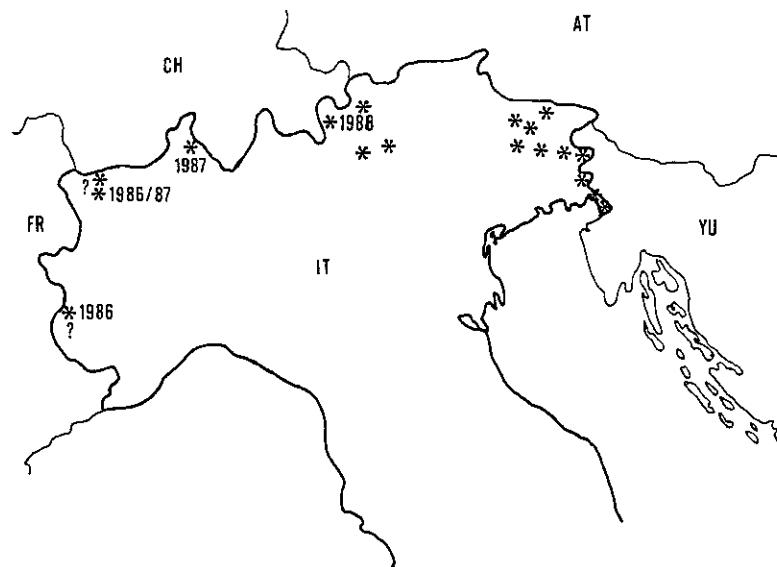


Fig.5: Recent observations in Northern Italy (T.Mingozzi, B.Ragni, Perco 1989).

Re-introduction: For a long time there have been discussions on re-introducing the lynx in the Alps (Gran Paradiso National Park) and also in the Abruzzo Mountains (Abruzzo National Park). There is no definitive project yet.

Legal status: Protected throughout the year; but status is uncertain as the lynx is not listed among game species. B. Ragni reports two lynx hunted (in 1989), one trapped (1981) and one died for unknown reason in the E Italian Alps.

Recommendations: Stronger legal protection, public education and research needed (B.Ragni).

Comment: For the moment, it is impossible to judge whether spontaneous immigration will successfully create a population, but the number of observations is increasing. All depends on the development of the populations in Slovenia (Yugoslavia) and in Switzerland. Nevertheless, a release in the Italian Alps could support the re-introductions in Austria, Switzerland and Yugoslavia (see chapters on countries and "Re-introduction") and help to join these populations as quickly as possible. The observation S of the Swiss National Park in 1988 is surprising. There had been no observations in this region for several years (see Switzerland).

LI - Liechtenstein

Status: Eradicated.

Former presence and recent distribution: The history of big predators in Liechtenstein has been described by Broggi (1981). The last known lynx in Liechtenstein was killed in 1830.

Comments: Liechtenstein is part of the potential area of a future population covering the whole Alps.

NO - Norway

Respondents: H. Christensen, T. Kvam

Status: Stable autochthonous population in an almost traditional area.

Former presence and recent distribution: The Norwegian lynx population was reduced in the 19th century and almost extinct in 1930 (Myrberget 1968, Festetics 1980b). Since then, the occupied area - and therefore the population - has increased again. On the map presented by Myrberget (1968), the lynx area is smaller than on the recent map drawn according to H. Christensen and T. Kvam. Heggberget & Myrberget (1980) report the expansion of the population in the 1960's and 1970's. The population seems to be stable at present. The estimate in 1968 was 150 individuals (Myrberget 1968), today it may be 400 (T. Kvam).

Legal situation, hunting: Since 1846, the harvest of lynx has been surveyed statistically. In 1846-1880, 100-150 lynx were shot annually. In 1930-1960, almost no hunting was possible. The harvest increased again from 1960-1968 and decreased from 1969-1980. Since 1980, the mean annual bag has been about 30 lynx (H. Christensen). In 1988, 27 lynx were shot, five trapped (only box traps permitted), three killed by accidents, and three killed to prevent damage to livestock (T. Kvam). The hunting period is restricted from February 1 to April 1. During this two month period, every licensed hunter may kill lynx with permission from the landowner with no limit in number. Local sheep-holders or reindeer-farmers may offer a premium (usually 1000 - 3000 NOK).

Damage to livestock: Damage to sheep and semi-domestic reindeer is the main problem in managing big predators in Norway. Many data and reports are available from the NINA (Norsk Institutt for Naturforskning, former DVF Viltforskningen, Trondheim, see e.g. Myrberget 1979). In comparison with wolverine (Gulo gulo), wolf (Canis lupus) and brown bear (Ursus arctos), lynx do not cause many problems.

Tab.4: Compensation paid by Norwegian State for damage to livestock in 1977, according to Pavel (1979)

	Sheep	Rein- deer	Goats	Cattle	Compensation (NOK)
Brown bear	398	74	-	5	547,113
Wolverine	431	20	-	-	365,586
Wolf	-	21	-	-	24,508
Eagle	988	1371	106	-	1,564,731

The total amount was 2.5 millions NOK. As the lynx is not a protected species, compensation is only paid exceptionally, in cases of severe damage. Lynx damage is therefore not registered systematically.

Recommendation: T. Kvam proposes a field study programme on lynx. Norway has one of the most intact lynx populations. This would allow basic research on lynx biology, which would not only produce results for the future management of the species in Norway, but also in countries where the lynx population has not such good status.

PL - Poland

Respondents: H. Okarma, Z. Pielowski, J. Romanowsky

Status: Stable autochthonous populations in the Carpathian Mountains and in the lowland in NE (incl. Bialowieza National Park).

Former presence and recent distribution: Festetics (1980b), Haber (1968), Matuszewski & Suminski (1979), Pielowski (1980) present information on the history of the lynx in Poland. After a reduction of the area in historic times, the population reached its minimum in 1850. Since then, there has been a kind of management of the species and censuses have been made (Haber 1968). The area has not been reduced any further. According to the information of our respondents, there was even a slight increase in the area of the species in the NE, compared to the map given by Haber (1968). The official population estimate for 1988 was 435 individuals. Z. Pielowski says the census method is inexact, but the total might be not far wrong. H. Okarma thinks there are fewer, and J. Romanowski's personal estimate is only 200.

Legal situation, hunting: Hunting season from November 1 to March 31. No trapping. A limited number of lynx can be shot. The quota is set by each hunter's association, according to the population estimate. H. Okarma thinks this gives a motive for overestimating the population. In 1987/88, a total of 34 lynx (seven in the NE, 27 in the Carpathian Mountains) were shot. The entire bag 1976 - 1989 was 408 animals (301 + 107, fig.6). Pielowski (1980) gives details on the harvest in the last decades: 1960/61: 13; 1965/66: 17; 1970/71: 16; 1971/72: 21; 1972/73: 22; 1973/74: 28; 1974/75: 31; 1975/76: 30; 1976/77: 32.

Damage to livestock: No problem at all. Very rare single cases. Compensation is paid by the state (Z. Pielowski).

Recommendations: All respondents plead for stronger legal protection, public education and basic research.



Fig.6: Lynx bag in Poland 1976-1989 (H.Okarma).

Comments: The lynx is not currently endangered, and Poland has a good tradition in managing the species. Nevertheless, the respondents feel somewhat irritated because decisions are not based on ecological knowledge but on doubtful estimates. H. Okarma is the only one who rates the lynx as threatened. He argues that there is a considerable danger of poaching because of the high economic value of lynx fur in Poland. This danger is also mentioned by Pielowski (1980). For the NE Poland lynx population, the Bialowieza National Park is an important protected area with no hunting. But the park alone is too small to maintain the population size, all the more as in the Soviet part of the Bialowieza forest all big predators are persecuted.

RO - Romania

Respondent: R. Rösler

Status: Stable autochthonous populations in the mountainous regions (Eastern Carpathian Mountains [1], Southern Carpathian Mountains [2] and Romanian Western Carpathian Mountains [Muntii Apuseni, 3]).

Former presence and recent distribution: Some known publications on the lynx in Romania are Vasiliu & Decei (1964), Kratochvil (1968g) and Festetics (1980b). R. Rösler provides a long list of further Romanian texts which are not easily accessible. Prehistoric evidence is given in Terzea (1977). In historic times, the species was distributed over the whole country. In 1933, when only 100 individuals remained, the

lynx was given protection. Since 1962 - after a considerable increase in numbers - hunting has been free again in the whole of Romania (Vasiliu & Decei 1964). Since 1953, the Ministry of Forests has made an estimate every year of the lynx population according to observations during the year. The number of lynx for the whole of Romania is given as: 500 in 1950, 1,000 in 1960, 800 in 1970 and 1,500 in 1987 (R. Rösler). The lynx habitat in Romania is about 30,000 km², and R. Rösler estimates an optimal population of 1,000 lynx (one individual/30 km²). A. Teoran (1981, according to R. Rösler) defines as optimal population a total of 600 lynx (one individual/50 km²).

Legal situation and hunting: The lynx was declared a National Monument, and is therefore protected. Yet, with licences given by the Ministry of Forests, it can be hunted from September 1 to April 30 in limited numbers (hunting law of 1976). The lynx harvest was 1950: 97; 1955: 38; 1956: 42; 1957: 30; 1958: 28; 1960: 39; 1965: 84; 1970: 81; 1975: 71 and 1980: 10. Accepted hunting methods are shooting and trapping. Poaching is prosecuted, but poisoned baits against wolves also represent a danger for the lynx (R. Rösler).

Damage to livestock: No severe losses. Kills would be appraised and compensated by the state.

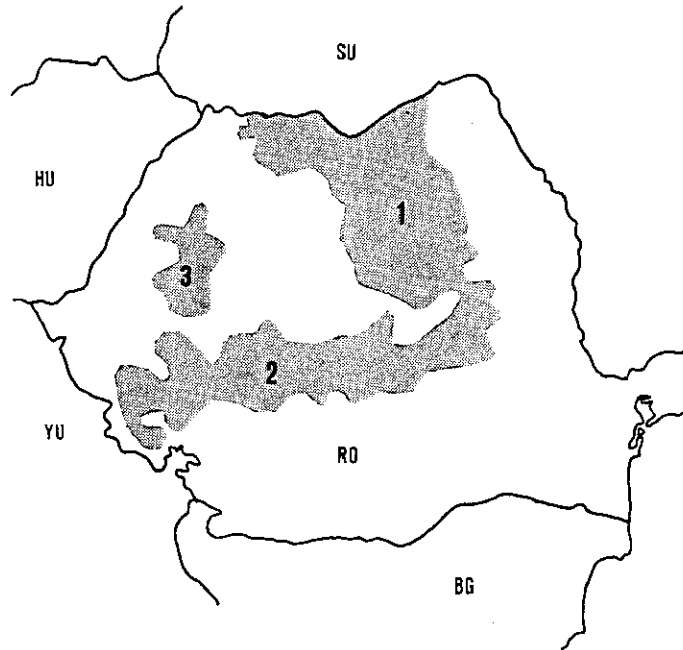


Fig.7: Recent distribution of lynx in Romania. 1 Eastern Carpathian Mts, 2 Southern Carpathian Mountains, 3 Romanian Western Carpathian Mountains (R. Rösler).

Comments: A total of 1,500 lynx in an area of 30,000 km² would represent a density of one individual/20 km². We doubt that the carrying capacity of a habitat, where wolf and brown bear occur as well, could be so high. We believe the population is overestimated.

SE - Sweden

Respondents: A. Bjärvall, E. Isakson, M. Sandell

Status: More or less stable autochthonous population in almost traditional, reoccupied area.

Former presence and recent distribution: The history of the lynx in Sweden is reported by Curry-Lindahl (1968) and Jonsson (1980). Both authors show good maps of the distribution of the predator. In 1925, the species was almost eradicated, but due to more restrictive hunting laws and an increase in the roe deer population (Jonsson 1980), the lynx population recovered rapidly and spread in northern regions where it did not occur before. Today, the whole country north of 60°N is occupied. In recent years, the population has shown some fluctuations in number: 1977: 500 - 1200 (official data); 1978: 600 - 800 (Jonsson 1980); 1989: less than 300 (A. Bjärvall). It is probable that, after the increase in area up to 1970, the number of lynx has been overestimated (E. Isakson), but, in the 1970's and early 1980's, the population was decreasing (Bjärvall & Lindström 1984). Since 1986, the population seems to have slightly increased again, so that it is not currently threatened (A. Bjärvall).

Legal situation, hunting: Since 1986, the species has been protected throughout the year (Jonsson 1986) except within reindeer husbandry areas in the North, where there is an open season from February 16 to either March 31 or April 30. Special hunting permission outside this range is possible, but has not been given yet. In 1988, 13 animals were shot.

Damage to livestock: Compensation is paid for damage to reindeer and sheep caused by wolf (*Canis lupus*), wolverine (*Gulo gulo*), lynx (*Lynx lynx*), brown bear (*Ursus arctos*) and eagle. Sheep have to be appraised by a local veterinary, policeman or gamewarden. For reindeer, the owner plus another person have to certify that the carcass was found. In the year 1987/88, 1348 reindeer (compensation total: 2,988,730 SEK; per kill: 1735 - 2515 SEK) and 80 sheep (compensation total: 69,295 SEK; per kill: 520 - 1800 SEK) were paid (A. Bjärvall).

Tab.5: Comparison of damage to reindeer and sheep by different predators, according to Borgh (1979)

Year	Reindeer				Total	Sheep
	C.l.	G.g.	L.l.	U.a.		
73/74	104	889	856	181	2030	156
74/75	46	690	957	75	1668	86
75/76	8	1063	944	198	2213	133
76/77	38	1125	619	153	1935	113
77/78	225	1367	889	259	2740	99

Recommendation: The respondents believe that, first of all, more basic information and research are needed.

Comments: Fluctuation of the population in recent decades may not only be a result of changing lynx abundance, but also of insufficient census methods. If we presume that about 2/3 of Swedish territory is lynx area (fig.1), the population estimate of 300 lynx would result in an overall ratio of one individual/1,000 km². This is - even for nordic conditions - a very low density. We venture to criticize this, because we know that the Fennoscandian countries have a good tradition of involving scientific experience in wildlife management. Sweden has produced some of the best works on Lynx lynx (see Haglund 1966, Jonsson 1980, Bjärvall & Franzen 1981 and Bjärvall & Lindström 1984), and the Swedes have all prerequisites to carry out a census of the lynx population. It is characteristic of the difficulty in estimating the number of lynx: the more we know, the smaller the population turns out to be (see also chapter "Population estimate").

SF - Finland

Respondent: E. Pulliainen

Status: Increasing re-established population over almost the whole country.

Former presence and recent distribution: The lynx area in Finland has considerably changed during the 19th and 20th centuries (Pulliainen 1968, Festetics 1980b, Nyholm 1979a). In 1950, the lynx population was almost eradicated. As a consequence of an increasing population in Karelia (Union of Soviet Socialist Republics) and legal protection of the species in Sweden, the predator began to repopulate Finland. Today, the lynx occurs in the whole country in varied densities (fig.8). The population is still increasing. The present number of lynx is about 500 (E. Pulliainen).

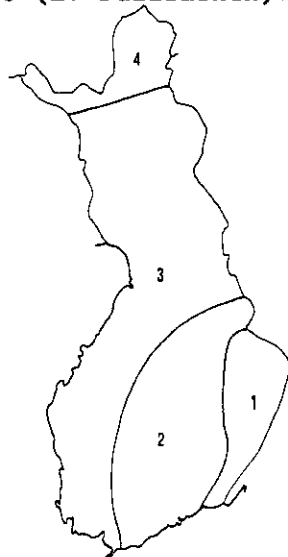


Fig.8: Recent distribution of lynx in Finland: 1 densest population, 2 rather dense population, 3 wandering individuals, 4 very few wandering individuals (E. Pulliainen).

Legal situation, hunting: Protected by law throughout the year, but licences for hunting have been given in recent years. Harvest: 1987/88: 90, 1988/89: 65. The hunting season is from December to March.

Damage to livestock: Data on damage to livestock, mainly to semi-domestic reindeer by predators are found in Nyholm (1979b), Nieminen & Leppaluoto (1985) and Nieminen & Leppaluoto (1988). In comparison with the other big predators, damage caused by lynx is not very high: From 1976-86, reindeer were killed by wolves (3041 kills), brown bears (2790), wolverine (2551), lynx (721), eagle (1794, only calves) and other predators (398) (Nieminen & Leppaluoto 1988). From 1974-86, a mean amount of 2,3100,000 FIM/year was paid from predator damage funds to reindeer herders in Finland. As sheep-breeding is not very widespread in Finland, losses other than reindeer are not too high. In 1977, 1,991,625 FIM (97%) were paid in compensation for reindeer killed, 71,833 FIM (3%) for other domestic animals (Nyholm 1979b).

SU - European part of the Soviet Union

Respondent: A. Zeltuchin

Status: Stable population in partially reduced traditional area. Not endangered.

Former presence and recent distribution: Distribution of the lynx in fig.1 corresponds for the European part of the Soviet Union to A. Zeltuchin, Novikov (1968), Turanin & Kolusev (1968), Matjuschkin (1979), and Danilov et al. (1979). The European part of the Soviet Union has the largest population of Lynx lynx in the world. In the European part of the Soviet Union, three isolated areas exist: an immense region is occupied in the N, from Poland and Finland to the Ural Mountains. We know from publications about the settled area in the western part of this range; for the rest, we have only given the northern and southern limits of occupation according to A. Zeltuchin and Matjuschkin (1979) (fig.1). In the Carpathian Mountains, the lynx area of the European part of the Soviet Union provides the connection between Poland/Czechoslovakia and Romania (Turanin & Kolusev 1968). Another large lynx area is the Caucasus Mountains, where the population of the European part of the Soviet Union joins with the Turkish and - speculatively - with the Iranian population. The official estimate for the RSFSR (including Siberia) for 1988 was 47,000 individuals (A. Zeltuchin).

Legal situation, hunting: Hunting and trapping is allowed by authorised persons from November to February. The bag was in 1983: 2100; 1984: 4500; 1985: 5400; 1986: 5500; 1987: 4300. An amount of 127 - 140 (maximum 200) roubles is paid for a lynx (official numbers communicated by A. Zeltuchin; probably including Siberia).

Damage to livestock: No considerable damage (A. Zeltuchin).

Recommendations: Though A. Zeltuchin does not judge the lynx in the European part of the Soviet Union as threatened, he pleads for stronger legal protection.

TR - Turkey

Respondents: A. Akin (together with N. Turan), M. Serez

Status: Endangered autochthonous population split in several nuclei.

Former presence and recent distribution: The lynx occurred in all wooded regions of Turkey, except in the plains of Aegean and central Anatolia, along the central Black Sea coast and in SE Anatolia (A. Akin, Kumerloeve 1975). Today, the species exists S of Marmara, N Aegean, central and W of the Black Sea, in Asia Minor and in the forested E. There are no data or estimates on population size, but all indications are decreasing. There are no data available for the Thrace region (NW Istanbul, Kumerloeve 1975); the species probably occurred along the northern border to Bulgaria.

Legal situation, hunting: No legal restriction of hunting. Both shooting and trapping are allowed throughout the year. Poaching and poisoned baits against jackal or wolf cause additional mortality. The annual harvest is not recorded. M. Serez's estimate is about 100/year.

Damage to livestock: May occur, but very rarely (A. Akin after consulting local authorities). No official data or measurements.

Recommendations: Legal protection and research (survey of the population) with public education required.

Comments: A. Akin believes the species is threatened because of a decrease in the number of observations and kills; M. Serez even regards the lynx in Turkey as critically endangered. The predators are treated as a plague, even by the authorities. The official strategy is to promote ungulate populations and to suppress carnivores. This policy will compromise efforts at reforestation.

Lynx are also killed through confusion with other predators such as caracal (Lynx caracal) or leopard (Panthera pardus). A. Akin reports two recent examples from 1988 and 1989, where people thought they had killed a leopard, but it was "only" a lynx. It goes without saying that the leopard is acutely endangered as well.

The lynx is also free for tourist hunting in Turkey. The hunting season is August 1 to March 31. The price for a shot lynx is US\$ 1,500.- (Prospectus of Atilla Güray Tours, Frankfurt, Federal Republic of Germany).

Several authors record the Pardel lynx (Lynx pardinus) as existing conspecific with Lynx lynx in Turkey. We do not follow this view (see chapter "A note on the taxonomy"), but it would be very interesting to compare a lynx of Turkey with other specimens.

YU - Yugoslavia

Respondent: J. Cop

Status: Macedonia and Kosovo: Autochthonous population in reduced area, tendency unknown. Slovenia and Croatia: Re-introduced, increasing population.

Former presence and recent distribution: In historic times, the lynx was spread over the whole territory of Yugoslavia with the exception of the region around Belgrade (Kratochvil 1968b, Miric 1974, Cop 1977, Miric 1978b and Festetics 1980b). During the 19th and the first half of the 20th century, the area continuously decreased from north to south. In 1940, a few lynx remained along the Yugoslavian-Albanian border. Since World War II, the population has increased again, and the existence of the species seems to have recovered in the region of Macedonia, Kosovo and Montenegro (Miric 1974, Bojovic 1978, Cop 1989). The recent area of the autochthonous population is about 6000 km² with an estimate of 200 individuals (J. Cop).

In Slovenia, 700 km north of the autochthonous population, the lynx was re-introduced in 1973. Six individuals (1:1) originating from the Carpathian Mountains of Czechoslovakia were released in the Kocevje region. The re-introduction was very successful. The population² increased and spread out. Today, a central area of some 3500 km² is continuously reoccupied, but the total area of observations covers about double the space, and individuals have reached as far as Italy and maybe even Austria. The number of lynx is believed to be 300, but the personal estimate of J. Cop is only 150. For more detailed information on the Slovenian lynx re-introduction, we refer to Cop (1977), Cop (1980) and Cop (1989).

Legal situation, hunting: The autochthonous lynx population in southern Yugoslavia has been protected by law since 1951. Poaching may occur, but there are no data (J. Cop).

In Slovenia, within an area of 2500 km², the number of lynx that can be shot is fixed every year by the Ministry of Forestry. Outside this region, hunting of lynx is not restricted in number. The hunting season is from September 1st to March 1st. Hunting of the re-introduced population started in 1978. Since then, a total of 172 lynx has been shot (Slovenia 75, Croatia 94, Bosnia 3). J. Cop estimates an additional number of 10 - 20 lynx killed illegally.

Damage to livestock: Domestic animals killed by lynx were sheep, goats, dogs and cats. In the centre area of the lynx population, in Slovenia, there is only a little livestock and therefore there is no problem. In Croatia, about 100 sheep have been killed up to now, but the exact number is not known. Any livestock killed is examined by game wardens or a veterinary institute (at least in Slovenia) and in the case of lynx kills, compensation is paid by the state.

There was trouble with semi-domestic moufflons in two hunting enclosures in the central area. These enclosures provoked a concentration of lynx. Several lynx were shot within the enclosures. By 1982, the predator had wiped out the moufflon herd (Cop 1989).

Recommendation: The re-introduced population in Slovenia developed very well, but J. Cop doubts whether a further expansion will be possible if hunting pressure remains at the same level. He proposes stronger protection outside the central area, accompanied by public education and field research on the development of the lynx population.

Comments: The number given for the autochthonous population would represent a lynx density of one individual per 30 km². Bojovic (1978) hypothesises an even higher density. This indicates a remarkable high density compared with the results of radio-telemetric studies. We maintain that the area of a lynx population is easier to evaluate than the number of lynx. Therefore, the population could be weaker than expected. As this is the only remainder of the Balkan lynx (which is considered to be subspecies of its own - see Miric 1978a), the population should be given priority attention. It is important to know the status of the lynx on the Albanian side of the border.

Development of the re-introduced population in Slovenia was the most dynamic ever known. In comparison with the difficulties in re-introduction programmes in the Federal Republic of Germany, Switzerland, France and Austria, it is hard to believe that a population based on six released lynx can suffer a loss of more than 170 individuals by legal hunting and an unknown number of additional victims in only 16 years. For the sake of further re-introductions, it is important to carry out a field study to understand the dynamics of this population. For re-introduction programmes in the Alps, it is important that the expansion of the Slovenian lynx population towards Italy and Austria should not be stopped by too heavy hunting pressures. For the long-term preservation of the lynx in re-settled areas, a joining up of the Slovenian and the Alpine populations would be of first importance.

5. FUR TRADE

The international fur trade is large and has been one of the major threats to many cat species (McMahan 1986). Lynx lynx is not an endangered species, but all cats are listed in appendix II of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). CITES treats Lynx lynx, Lynx canadensis and Lynx pardinus as one species Felis lynx only. The fur trade is recorded by the Wildlife Trade Monitoring Unit (WTMU), located at the World Conservation Monitoring Centre, Cambridge, United Kingdom. WTMU reports for 1986 and 1987 respectively a total of 17,126 and 9,602 Felis lynx skins imported throughout the world. This does not equal the total production of lynx fur, because skins are often re-exported several times. It is almost impossible to evaluate the real size of the original harvest. As for the Union of Soviet Socialist Republics, the only European country with a considerable lynx harvest, for 1986 and 1987 respectively, a total of 2,485 and 2,762 skins was reported.

6. POPULATION ESTIMATE

To know the number of lynx in a certain population is an ultimate precondition for a good management. Direct counting of any game species is very difficult, but for the large predators, it is impossible. The only way is to make an indirect census e.g. by means of snow-tracking. A good method would be

- to monitor the occupied surface;
- to determine the individual home ranges by means of radio-telemetry; and
- to understand the structure and social organisation of the population.

This knowledge would permit determination of the mean abundance and an estimate of the total of lynx in an occupied region. We have reported very different lynx density from one individual/20 km² (Romania) to one individual/1,000 km² (Sweden). There is no doubt that the lynx density in northern Sweden is lower than on the Balkan peninsula. But the huge difference (Romania=50*Sweden) is rather a consequence of census methods than of the lynx density. We have been working by means of radio-telemetry since 1983 in Switzerland in different habitats such as the northern and central Alps and the Jura Mountains. We have found mean home ranges of 286 km² for males and 102 km² for females and total ranges (including excursions during the mating season) of up to 1860 km² for a male (Haller & Breitenmoser 1986), (Haller 1990). One resident male and one female occupy the same range, and there is only a small home range overlap between neighbours. The mean density in suitable habitats in Switzerland is approximately one individual/100 km².

7. VULNERABILITY OF LYNX POPULATIONS

Lynx density is very low (see chapter "Population estimate"), and therefore, every lynx population is vulnerable to overhunting. However, there is one surprising point in the history of the lynx in Europe: in southern Europe, the species became extinct in countries such as Italy, Yugoslavia (Slovenia), Greece, Bulgaria, Hungary, where the brown bear and the wolf - which have been persecuted as hard as the lynx - were able to survive. In northern Europe, the populations of all big carnivores have been reduced, too, but the lynx was "best" able to resist. Like all cats, the lynx is a highly specialised species, with a reduced ecological capacity. Its ability to react to environmental changes is less than that of other predators. Loss of habitat due to deforestation has been more fatal to the lynx than to the wolf or the bear. But the lynx is also a stricter food specialist than the other big carnivores. The cat species is - at least in Europe - linked to the existence of smaller ungulates such as roe deer, chamois or reindeer. Eradication of roe deer or chamois populations in southern and central Europe was lethal, too. As the lynx is not a scavenger, it could not benefit from carcasses of domestic animals on a large scale in the same way as the brown bear and the wolf. The lynx is a solitary-living, "territorial" species, and therefore not able to follow wandering shepherds and concentrate on clusters of good food. In many countries (e.g. Sweden, Romania), the lynx population recovered and spread out with the increasing roe deer population. We will not contradict the opinion that the lynx is vulnerable to overhunting, but we do not agree with the opinion that overhunting was the main or only reason for its extinction. We know (see Norway, Poland, Yugoslavia) that a lynx population can support careful hunting, if its environment is intact. The lynx needs large areas (several thousands of km²) with connected forests and a good population of smaller ungulates as the basis of its nutrition. The latter precondition is today fulfilled almost all over Europe. The problem in future will be the splitting up of areas for the species. To recreate the ecological balance between forest, ungulates and predators, we will have to re-introduce lynx in regions with good preconditions, but smaller than 10,000 km² (about the surface for a population of 100 individuals, see chapter "Population estimate"). Those small populations should be monitored and managed in a long term programme.

8. RE-INTRODUCTION

Since the eradication of lynx populations in many European countries, conditions have changed. Ungulate populations and the forested surface as an important resource for the cat species have increased. Many articles have been written in the last 30 years to plead for re-introduction of the lynx. Apart from ethical arguments, the re-introduction of this predator provides effective management of smaller ungulate populations and their habitat. The lynx can have a considerable effect on the distribution and abundance of its prey species (Breitenmoser & Haller 1987, Haller 1990), and is therefore an important ecological factor in the forest system.

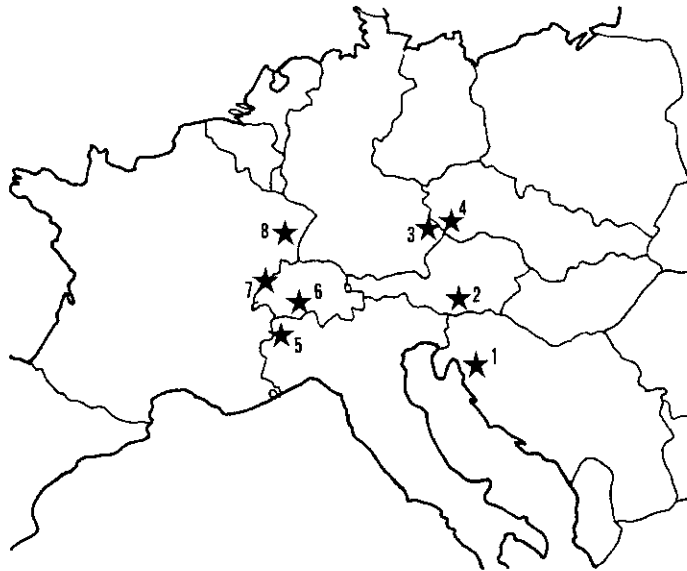


Fig.9: Re-introductions of *Lynx lynx* in central and western Europe since 1970. 1 = Slovenia (Yugoslavia), 2 = Styria (Austria), 3 = Bavarian Forest (Federal Republic of Germany), 4 = Moravian Forest (Czechoslovakia), 5 = Gran Paradiso National Park (Italy), 6 = Swiss Alps (Switzerland), 7 = Swiss Jura Mountains (Switzerland), 8 = Vosges Mountains (France). For details see chapters for each country.

It is not as easy to re-introduce the lynx as was thought after the experience in Switzerland and Yugoslavia. Primarily, the re-introductions in Switzerland (6 and 7) have been described as a good example. In Switzerland, only 10 lynx (six males, four females) were released officially (that means with permission of the authorities). We had knowledge of clandestine releases (Breitenmoser 1983), but we underestimated their significance, and overestimated the population dynamics (see also Haller 1990). In fact, at least 25, if not 30 lynx have been set free in Switzerland. In the Bavarian Forest/Bohemian Forest region, re-introduction failed, with five to nine lynx released in the Federal Republic of Germany in 1970 (3), and should be successful with 17 lynx set free in Czechoslovakia in 1982-86 (4). In Austria (2), nine lynx were released in 1976. The project appeared to fail, but in recent years, there has been an increasing number of observations and typical problems with damage to livestock. In the Vosges Mountains (8), 14 lynx have been re-introduced since 1983. Until now, no population exists there, but it is definitively too early to assess. The only exception has been the extraordinary dynamics of the re-introduced population in Yugoslavia (1), where only six lynx were released.

Tab.6: Number of lynx set free since 1970 in countries with re-introduction programmes

	No in fig.9	# Ind. released			Year(s)	Recent Pop. Size
		F	M	total		
Yugoslavia	1	3	3	6	1973	150
Austria	2	3	6	9	1976	?
Fed Rep of Germany	3	?	?	5-9	1970	-
Czechoslovakia	4	6	11	17	1982-86	25-27
Italy	5	0	2	2	1975	-
Swiss-Alps ¹	6	7	9	16	1972-80	
Swiss-Jura ¹	7	4	4	8	1973-75	50-100
France	8	5	9	14	1983-	6-9

¹Another three unknown individuals were released in 1988 in the plain between the Alps and the Jura Mountains.

To understand the mechanism of a re-introduction, we would like to describe the population dynamics during a resettlement. It summarises our experience in Switzerland and - as far as we can see today - agrees with events in other re-introduction programmes. In the first period after the release, there is dispersal rather than high reproduction. The lynx is a solitary living species with large home ranges and big distances between individuals. If the re-introduction does not fail at this stage, the density will increase later. This is a simple mathematical phenomenon, but it is amplified by the naïvety and concentration of ungulates not adapted to a big predator (Breitenmoser & Haller 1987, Haller 1990). After readaptation of the ungulates, the lynx causes problems with damage to livestock. In the latter phase, lynx density decreases again. The dispersal in the first phase and the rapidity of the whole process depends on the topography. In the northern and central Alps of Switzerland, where the mountains rise up to 4000 metres, the development was fast. In the northern Alps, the situation has already been established; lynx density is not more than about one individual/100 km² (Haller & Breitenmoser 1986). In the central Alps, the population is almost established (Haller 1990). In Austria (Carinthia) and in the French Jura Mountains, the population is at the "damage" stage, and for other regions such as the Vosges Mountains, the French Alps and the eastern Swiss Alps, the lynx population is still at a low level.

9. DAMAGE TO LIVESTOCK

Damage to livestock by lynx is almost unknown in the eastern and central European countries with autochthonous lynx populations such as Union of Soviet Socialist Republics, Poland, Czechoslovakia, Romania and Yugoslavia. It is something of a problem (but almost concealed by damage by other big predators) in the Scandinavian countries Norway and Sweden, and it is a severe problem in countries with re-introduced populations, such as France, Switzerland and Austria. If we look at the losses of Norway or Sweden (see specific chapters), it is exaggerated to call a total of some 400 sheep killed in Switzerland in 15 years a "severe problem". The Swiss Confederation invests almost 50,000,000.- sFr. every year as subsidy for sheep husbandry, and about 25,000.- sFr. as compensation for lynx kills. The damage is not at all an economic problem - not even in the French Jura Mountains - but only a psychological and political one. And this makes the problem important. In central and western Europe, we have lost the tradition of coexisting with big predators, protecting herds against them and accepting some losses. Compensation for damage caused by lynx is not part of official agricultural policy as, for example, in Norway. In Switzerland, compensation has now been paid since 1988 by the confederation and the cantons. Before, it was paid voluntarily by the Swiss League for Protection of Nature. In Austria, the hunters association has taken out an insurance. In France, compensation is paid by WWF-France.

There are a few points we would like to list regarding the damage to livestock in re-introduction programmes:

- Compensation for possible losses must be arranged at the beginning of a re-introduction programme and not on a voluntary and temporary basis.
- To recognise a lynx kill, local experts (e.g. game wardens) must be trained. There is already experience on this subject (see e.g. Herrenschildt & Vandel 1988, Breitenmoser & Denzler 1989, Landa et al. undat.).
- Sheepbreeders must be informed what to do when a kill occurs. It is very important to take the problem seriously at the beginning.
- Cooperation between countries on the question of recognition, compensation and prevention should be increased. It is nonsense for everybody to undergo his own bad experience.
- More studies on the mechanism of lynx predation on livestock has to be undertaken. Why do some lynx kill sheep and others do not? Why does damage not occur in some countries with autochthonous lynx populations?

10. MOST IMPORTANT PROBLEMS

To summarise this report, we would like to highlight a few points which we consider to be important:

1. Threatened autochthonous populations:

- Pyrenean Mountains (France): The population is close to extinction. Every effort should be done to save this last existing autochthonous population of Lynx lynx in western Europe.

- Macedonia-Kosovo-Montenegro (Yugoslavia): A rather small, and therefore potentially endangered population that is said to have been stable in recent years. As there are no data available from Albania and the abundance probably is overestimated in Yugoslavia, this population should at least be closely monitored.

- Turkey: All small populations in Turkey - perhaps with the exception of the one connected to the Caucasus Mountains - are isolated and threatened. The problem is the lack of data. Turkey has several endangered cat species (e.g. Panthera pardus), and it is urgent to establish a conservation and education programme not only for the lynx.

2. **Re-introduction:** In every country with re-introduced lynx (Yugoslavia, Switzerland, France, Austria and Czechoslovakia), monitoring of the population should continue. Re-introduction is a long term project. Often, severe questions and problems occur only many years after the releases (impact on ungulate populations, damage to livestock) or even later (inbreeding effects). Better coordination and cooperation is needed between private organisations (which are often the initiators of a re-introduction) and official institutions, as well as between countries. Further releases should be carried out to create one large connected population in the Alps.

3. **Damage to livestock:** A good recognition and compensation system should be established. Cooperation between countries could support this task. We should know more about the mechanism of damage. Why do lynx cause no damage in eastern countries, but kill sheep when they are re-introduced in Switzerland, Austria or France? Are there differences in lynx behaviour or in sheep husbandry?

4. **Research and management:** Many problems in conservation and management are difficult to answer because we do not have enough basic knowledge. We should develop census methods for large predators, and work on the population dynamics of the lynx and on its relationship to the prey species.

5. **Information exchange:** Many practical experiences have been made in conservation, management and re-introduction of the lynx in Europe. Only a little of this helpful information has ever been published in scientific works. We should expand information exchange and cooperation between local experts and authorities of all European countries. This would make all our work more effective. We hope that this report will be a step in this direction.

11. BIBLIOGRAPHY

- ATANASOV, N. (1968): Der Luchs in Bulgarien. Acta sc.nat.Brno 4:25-32.
- BJÄRVALL, A. & R. FRANZEN (1981): Mortality Transmitters - An Important Tool for Studying Reindeer Calf Mortality. Ambio. 10(1): 26-28.
- BJÄRVALL, A. & D. LINDSTRÖM (1984): Lodjuret 1974-83 i Norrbottens fjällvärld - samt något rød- och fjällräven i samma område (The lynx in Norrbotten mountainous regions Norway from 1974-1983 the red and the arctic fox in the same area). Fauna-Flora(Stockh.). 79(5): 213-226.
- BOITANI, L. & F. FRANCISCI (1978): Ein Versuch der Wiedereinbürgerung des Luchses im Nationalpark Gran Paradiso, Italien. In: WOTSCHIKOWSKY, U. Ed. Der Luchs - Erhaltung und Wiedereinbürgerung in Europa. Mammendorf: Druckerei Bernhard. Ed.2: 63-65.
- BOJOVIC, D. (1978): Der autochthone Luchs in Jugoslawien - Verbreitung, Bestand und Tendenz. In: WOTSCHIKOWSKY, U. Ed. Der Luchs - Erhaltung und Wiedereinbürgerung in Europa. Mammendorf: Druckerei Bernhard. Ed 2: 25-28.
- BORGH, C. (1979): Gällande Svenska erstättningsregler och skadornas omfattning vid angrep pa tamdjur av varg, bjørn, järv och lo. In: MYRBERGET S. Ed. De store rovdyr i norden - NKV's mote songli 1978. Trondheim: DVF Viltforskningen. 110-116.
- BREITENMOSER, U. (1983): Zur Wiedereinbürgerung und Ausbreitung des Luchses Lynx lynx in der Schweiz. Schweiz.Z.Forstwes. 134(3): 207-222.
- BREITENMOSER, U. & H. HALLER (1987): Zur Nahrungsökologie des Luchses Lynx lynx in den schweizerischen Nordalpen. Z.Saeugetierk. 52: 168-191.
- BREITENMOSER, U. (1988): Luchs + Schafe - Dokumentation zu den durch Luchse verursachten Schäden an Haustieren in der Schweiz. Bericht. 43 p. (Unpub)
- BREITENMOSER, U. & T. DENZLER (1989): Luchs, Fuchs, Hund - Beurteilung von Raubtierrissen. "Wildbiologie", Beilage zu Wildtier 3, 10 p.
- BROGGI, F.B. (1981): Zur Ausrottungsgeschichte des Grossraubwildes, im speziellen des Luchses, im nordwestlichen Ostalpenraum. Jb.Hist.V.Liechtenstein 79: 197-210.
- BUTZECK, S., M. STUBBE & R. PIECHOCKI (1988): Beiträge zur Geschichte der Säugetierfauna der DDR - Teil 2: Der Luchs (Contribution to the history of the mammal fauna of east Germany - 2 the lynx Lynx lynx). Hercynia 25(2): 144-168.
- CAGNOLARO, L., D. ROSSO, M. SPAGNESI & B. VENTURI (1975): Inchiesta sulla distribuzione del Gatto selvatico Felis silvestris in Italia e nei Cantoni Ticino e Grigioni (Svizzera) e del Gatto selvatico sardo Felis lybica sarda in Sradegna con notizie sulla Lince Lynx lynx 1971-1973 (Research on the distribution of the wild cat Felis silvestris in Italy and in the Ticino and Grigioni cantons Switzerland and of the Sardinian wild cat Felis libyca sarda in Sardinia Italy with notes on the lynx Lynx lynx 1971-1973). Ric.biol.Selvaggina. 64: 1-109.

- CHAZEL, L. (1989): Notes sur la survivance du lynx dans les Pyrénées françaises. *Mammalia* 53(3): 461-464.
- CHOISY, J.P. (1979): Die Wiedereinbürgerung des Luchses in den französischen Alpen. In: WOTSCHIKOWSKY, U. Ed. *Der Luchs - Erhaltung und Wiedereinbürgerung in Europa*. Mammendorf: Druckerei Bernhard. Ed.2: 142-144.
- CLOT, A. & J.P. BESSON (1974): Nouveaux restes osseux de Lynx dans les Pyrénées. *Bull.soc.hist.nat.Toulouse* 110(1-2): 157-169.
- COP, J. (1977): Die Ansiedlung des Luchses *Lynx lynx* in Slowenien. *Z.Jagdwiss.* 23(1): 30-40.
- COP, J. (1980): Erfahrungen mit der Wiedereinbürgerung des Luchses in Jugoslawien. In: FESTETICS F. Ed. *Der Luchs in Europa*. Greven: Kilda Verlag. p. 264-267.
- COP, J. (1988): Ris. In: KRISTUFEK B., A. BRANCELJ, B. KRZE, J. COP Ed. *Zveri 2: Medvedi - Psi - Macke*. Ljubljana: Izdala Lovska zveza Slovenije - Zlatorogova Knjiznica 17. Ed.1: 233-292.
- COP, J. (1989): Propagation pattern of a re-introduced population of lynx in Yugoslavia and its impact on the ungulate community. In: *Reintroduzione dei predatori nella aree protette (Atti del convegno 24.25.6.1987)*. Torino: Regione Piemont. p. 83-91.
- CURRY-LINDAHL, K. (1968): The lynx population in Sweden. *Acta sc.nat.Brno* 5/6: 21-26.
- DANILOV, P.I., O.S. RUSAKOV & I.L. TUMANOV (1979): *Chiscnye zveri Severo-Zapada SSSR*. Leningrad:Izdatel'stvo "Nauka". 164 p.
- EIBERLE, K. (1972): Lebensweise und Bedeutung des Luchses in der Kulturlandschaft. Hamburg, Berlin:Paul Parey - *Mammalia depicta*. 65 p.
- ESTEVE, R. (1982): Au sujet d'un lynx trouvé mort à Charvonnex (Haute-Savoie). *Bievre* 4: 137-142.
- FESTETICS, A., F.-CH. VON BERG & M. SOMMERLATTE (1980a): Die Wiedereinbürgerung des Luchses in Österreich - ein Forschungs- und Artenschutzprojekt. In: FESTETICS A. Ed. *Der Luchs in Europa*. Greven: Kilda Verlag. p. 268-284.
- FESTETICS, A. (1980b): Die Verbreitung des Luchses in Europa. In: FESTETICS A. Ed. *Der Luchs in Europa - Verbreitung, Wiedereinbürgerung, Räuber-Beute-Beziehung*. Greven: Kilda Verlag. p. 89-146.
- FESTETICS, A. (1980c): *Der Luchs in Europa*. Greven: Kilda Verlag. 356 p.
- FORSTNER, M. (1988): Ein Luchs im Wald- und Mühlviertel - Was wird aus ihm werden?. *Oesterr.Forstz.* 5: 57-58.
- GOSSOW, H. & P. HONSIG-ERLENBURG (1986): Management Problems with Re-introduced Lynx in Austria. In: MILLER S.D., D.D. EVERETT Ed. *Cats of the World - Biology, Conservation, and Management*. Washington, D.C.: National Wildlife Federation. p. 77-83.

- GOSSOW, H. (1989): Problems of re-introducing a big predator: The case of the lynx in Austria. In: Reintroduzione dei predatori nella aree protette (Atti del convegno 24./25.6.1987). Torino: Regione Piemont. p. 28-30.
- GRAFF, A. & A. FERNEX (1978): Le Lynx dans les Pyrénées: Une population relique en France. Bull.Soc.Ind.Mulhouse 3: 80-84.
- HABER, A. (1968): The lynx population in Poland. Acta sc.nat.Brno 5/6: 53-56.
- HAGLUND, B. (1966): De stora rovdjurens vintervanor I. Viltrevy 4: 81-299.
- HALLER, H. (1990): Zur Ökologie des Luchses in Verlauf seiner Wiederansiedlung in den Walliser Alpen. Mammalia depicta - Beih.Z.Saeugetierk. (In Press)
- HALLER, H. & U. BREITENMOSEER (1986): Zur Raumorganisation der in den Schweizer Alpen wiederangesiedelten Population des Luchses Lynx lynx. Z.Saeugetierk. 51(5): 289-311.
- HEGGBERGET, T.M. & S. MYRBERGET (1980): The Norwegian lynx Lynx lynx populations in the 1970's. Fauna norv. 1: 29-33.
- HELL, P. (1961): Starkes Anwachsen der Luchsbestände in der Slowakei. Z.Saeugetierk. 26: 57-59.
- HELL, P. (1968): Polulation density of the lynx in the Czechoslovakian Carpathians. Acta sc.nat.Brno 5/6: 57-66.
- HELL, P. (1972): Schutz und Erhaltung des Luchses in Europa. Z.Jagdwiss. 18: 32-36.
- HELL, P. (1980): Die Situation des Luchses in der Tschechoslowakei. In: FESTETICS A. Ed. Der Luchs in Europa. Greven: Kilda Verlag. p. 187-195.
- HERRENSCHMIDT, V., F. LEGER & G. TERRIER (1986): Mode d'occupation spatiale des lynx Felis lynx L.introduits dans le massif Vosgien - premiers résultats. Gibier faune sauvage 3: 67-81.
- HERRENSCHMIDT, V. & F. LEGER (1987a): Le Lynx, le point sur la colonisation naturelle du Jura et les premiers résultats de suivi scientifique des animaux réintroduits dans les Vosges. Bull.mens.Off.Nation.Chasse 115: 15-25.
- HERRENSCHMIDT, V. & F. LEGER (1987b): Le Lynx Lynx lynx dans le nord-est de la France. La colonisation du massif jurassien français et la réintroduction de l'espèce dans le massif vosgien. Ciconia 11(2): 131-151.
- HERRENSCHMIDT, V. & J.M. VANDEL (1989): Premier bilan des dégats occasionnés par les lynx sur les troupeaux d'animaux domestiques de la chaine du Jura. Thannenkirch: Office National de la Chasse. 20 p.
- HIMMER, G. (1978): Der Pfälzerwald - Vorstellung des grössten geschlossenen Waldgebietes der BRD. In: WOTSCHIKOWSKY, U. Ed. Der Luchs - Erhaltung und Wiedereinbürgerung in Europa. Mammendorf: Druckerei Bernhard. Ed.2: 131-134.

- JANOSSY, D. (1979): A magyarországi pleisztocén tagolása gerinces faunák alapján. Budapest. 207 p.
- JONSSON, S. (1980): Erforschung und Erhaltung des Luchses in Schweden. In: FESTETICS A. Ed. Der Luchs in Europa. Greven: Kilda Verlag. p. 170-180.
- JONSSON, S. (1986): Project lynx. Fauna-Flora(Stockh.) 81(4-5): 165-166.
- KEMPF, C. (1979a): Le Lynx. Bull.mens.Off.Nation.Chasse. No.Sp. Scien.Tech. Nov.
- KEMPF, C. (1979b): Evolution et statut actuel du lynx Lynx lynx en France. Bull.mens.Off.Nation.Chasse.Sp.sc.tech. "Le Lynx": 119-138.
- KLUTH, S., U. WOTSCHIKOWSKY & W. SCHRÖDER (1989): Die Wiedereinbürgerung des Luchses in Bayern - Ökologische Bewertung der Aussetzungen. Oberammergau:Gutachten der Wildbiologischen Gesellschaft München. 26p.
- KRATOCHVIL, J. et al. (1968a): History of the distribution of the lynx in Europe. Acta sc.nat.Brno 4: 1-50.
- KRATOCHVIL, J. (1968b): Survey of the distribution of populations of the genus lynx in Europe. Acta sc.nat.Brno 4: 5-12.
- KRATOCHVIL, J. (1968c): History of the lynx in Hungary. Acta sc.nat.Brno 4: 33-34.
- KRATOCHVIL, J. (1968d): History of occurrence of the lynx in Bohemia and Moravia. Acta sc.nat.Brno 4: 35-48.
- KRATOCHVIL, J. et al. (1968e): Recent distribution of the lynx in Europe. Acta sc.nat.Brno 5/6: 1-74.
- KRATOCHVIL, J. (1968f): Changes in the distribution of the lynx and its protection in Czechoslovakia. Acta sc.nat.Brno 5/6: 4-16.
- KRATOCHVIL, J. (1968g): The lynx population in Rumania. Acta sc.nat.Brno 5/6: 65-70.
- KRATOCHVIL, J. (1968h): The lynx population in Yugoslavia. Acta sc.nat.Brno 5/6: 71-74.
- KUMERLOEVE, H. (1975): Die Säugetiere (Mammalia) der Türkei. Veroeff.Zool.Staatssamml.Muenchen 18: 69-158.
- KÄLBLE, F. (1978): Zur Wiedereinbürgerung des Luchses im Schwarzwald. In: WOTSCHIKOWSKY, U. Ed. Der Luchs - Erhaltung und Wiedereinbürgerung in Europa. Mammendorf: Druckerei Bernhard. Ed.2: 140-141.
- LANDA, A. et al. (undated): Spor og Tegn. Trondheim: Direktoratet for naturforvaltning. 13 p.
- MATJUSCHKIN, E.N. (1979): Der Luchs. Wittenberg Luthersadt: A. Ziemsen Verlag. 160 p.
- MATUSZEWSKI, G. & P. SUMINSKI (1979): Le lynx et sa biologie en Pologne. Bull.mens.Off.Nation.Chasse.Sp.Sc.Tech."Le Lynx": 17-31.

- McMAHAN, L.R. (1986): The international cat trade. In: Cats of the world: biology, conservation and management. Ed. by S.D. Miller and D.D. Everett. Washington D.C.: National Wildlife Federation. 461-488.
- MINGOZZI, T., F. GUIDALI & G. TOSI (1988): Dati storici sulla presenza della lince, Lynx lynx nell'Italia nord-occidentale (Historical data on the distribution of Lynx Lynx lynx in north-western Italy). Ric.Biol.Selvaggina. XIV: 479-500.
- MIRIC, D. (1974): Rasprostranjenje risa na Balkanskom poluostrvu u istorijsko vreme i danas (Verbreitung des Balkanluchses L. lynx in der Vergangenheit und heute). Bull.Mus.d'Hist.Nat.Belgrade - Ser.B. 29: 51-99.
- MIRIC, D. (1978a): Lynx lynx martinoidi ssp. nova - neue Luchsunterart von der Balkanhalbinsel. Bull. museum hist. nat. Belgrade 33: 29-36.
- MIRIC, D. (1978b): Ausrottungsgeschichte des Luchses auf der Balkanhalbinsel. In: WOTSCHIKOWSKY, U. Ed. Der Luchs - Erhaltung und Wiedereinbürgerung in Europa. Mammendorf: Druckerei Bernhard. Ed.2: 19-23.
- MYRBERGET, S. (1968): The lynx population in Norway. Acta sc.nat.Brno 5/6: 17-20.
- MYRBERGET, S. (1979): De Store rovdyr i norden - NKV's mote songli 1978. Trondheim:DVF Viltforskningen - Viltrapport 9, 161 p.
- NIEMINEN, M. & J. LEPPALUOTO (1985): Rovdjurskadorna inom Finlands renskøtselområde under åren 1976-83 (Damage from predation on the reindeer husbandry area in Finland during the years 1976-83). Rangifer 5(1): 15-25.
- NIEMINEN, M. & J. LEPPALUOTO (1988): Predation in the reindeer husbandry area in Finland during 1976-86. Rangifer 8(1): 25-34.
- NOVIKOV, G.A. (1968): Contemporaneous distribution of the lynx in the western part of the USSR. Acta sc.nat.Brno 5/6: 35-48.
- NYHOLM, E.S. (1979a): Över de stora rovdjuren i Finland 1977 - 1978. In: MYRBERGET S. Ed. De store rovdyr i norden - NKV's mote songli 1978. Trondheim: DVF Viltforskningen. p. 50-59.
- NYHOLM, E.S. (1979b): Gällande ersättningsregler och rovdjurens skadegørelse på tamkreatur i Finland. In: MYRBERGET S. Ed. De store rovdyr i norden - NKV's mote songli 1978. Trondheim: DVF Viltforskningen. p. 120-122.
- PAVEL, H. (1979): Gjeldende erstantningsordning og skade voldt av ulv, jerv, bjorn og gaupe i Norge. In: MYRBERGET S. Ed. De store rovdyr i norden - NKV's mote songli 1978. Trondheim: DVF Viltforskningen. p. 100-110.
- PERCO, F. (1989): La reintroduzione dei grandi predatori nella regione Friuli-Venezia Giulia. In: Reintroduzione dei predatori nella aree protette (Atti del convegno 24./25.6.1987). Torino: Regione Piemonte. p. 110-121.

- PIELOWSKI, Z. (1980): Die Situation des Luchses in Polen. In: FESTETICS A. Ed. Der Luchs in Europa. Greven: Kilda Verlag. p. 181-186.
- PLAEN, T. (1988): Überlegungen des Bundes Naturschutz in Bayern zur Wiedereinbürgerung des Europäischen Luchses Lynx lynx (Remarks of the Bavarian nature protection association on the reintroduction of the European lynx Lynx lynx). Waldhygiene 17(5-6): 147-164.
- POLACSEK, K. (1978): Geschichte und frühere Verbreitung des Luchses in Österreich. In: WOTSCHIKOWSKY, U. Ed. Der Luchs - Erhaltung und Wiedereinbürgerung in Europa. Mammendorf: Druckerei Bernhard. Ed.2: 13-18.
- PULLIAINEN, E. (1968): The lynx population in Finland. Acta sc.nat.Brno 5/6: 27-34.
- RAGNI, B. (1989): Requisiti per la reintroduzione della linca e del gatto selvatico in Italia. In: Reintroduzione dei predatori nelle aree protette (Atti del convegno 24/25.6.1987). Torino: Regione Piemonte. p. 67-82.
- SAINT GIRONS, M.-CH. (1968): Rapport sur la disparition du Lynx en France. Acta sc.nat.Brno 4: 15-16.
- SCHAUENBERG, P. (1969): Le lynx Lynx lynx en Suisse et dans les pays voisins. Revue suisse zool. 76(1): 257-287.
- SOMMERLATTE, M., A. FESTETICS & F.-CH. VON BERG (1980): Kontrolle von Luchsen durch Ausfahrten nach ihrer Wiedereinbürgerung in Österreich. In: FESTETICS A. Ed. Der Luchs in Europa. Greven: Kilda Verlag. p. 318-337.
- STAHL, D. (1972): Möglichkeiten und Aussichten einer Wiedereinbürgerung des Luchses Lynx lynx im westlichen Harz. Z.Jagdwiss. 18(2): 57-66.
- STEHLIK, J. (1972): Vysazení rysa ostrovida Lynx lynx v NSR a Svycarsku a uvaha nad jeho dalsim osudem v Ceskoslovensku (Aussetzen des Luchses in der BRD und in der Schweiz, und Erwägungen über sein weiteres Schicksal in der Tschechoslowakei). Ochrana Fauny VI(4): 189-193.
- STEHLIK, J. (1979): Rozsireni a ochrana rysa ostrovida Lynx lynx v Ceskoslovensku (Die Verbreitung und der Schutz des Luchses in der Tschechoslowakei). Cas.slezskeho.muz.ser. a.vedy.priř. 28(1): 81-86.
- STEHLIK, J. (1981): Rytmus aktivity rysa ostrovida Lynx lynx v zajeti (Rhythmus der Aktivität des Nordluchses Lynx lynx in der Gefangenschaft). Cas.slez.Muz.Opava A(30): 129-143.
- STRYCH, V. (1973): Carnivores in Czechoslovakia. Animals.Lond. 16(2): 80-82.
- SYMEONIDIS, N., F. BACHMAYER & H. ZAPFE (1978): Eine jungpliozäne Wirbeltierfauna aus der Höhle von Varona (Attika, Griechenland). Ann.Naturhistor.Mus.Wien 81: 221-228.
- TERZEA, E. (1977): Quaternary fauna from the Livadita cave Romania. Trav.inst.speol."Emile.Racovitza." 16: 163-182.

- TOSCHI, A. (1968): Rapport sur la disparition du Lynx en Italie. Acta sc.nat.Brno 4: 17-24.
- TURANIN, I.I. & I.I. KOLUSEV (1968): Occurrence of the lynx in the Ukrainian Carpathians. Acta sc.nat.Brno 5/6: 49-52.
- VAN ACKEN, D. & A. GRUENWALD (1977): Überlegungen zur Wiedereinbürgerung des Luchses in den Pfälzer Wald. Beitr. Landespflege Rheinland-Pfalz 5: 37-53.
- VAN DEN BRINK, F.H. (1975): Die Säugetiere Europas. Hamburg, Berlin: Paul Parey. Ed.3, 217 p.
- VASILIU, G.D. & P. DECEI (1964): Über den Luchs Lynx lynx in den rumänischen Karpaten. Saeugetierk.Mitt. 12: 155-183.
- VON BERG, F.-CH., M. SOMMERLATTE & A. FESTETICS (1980): Radiotelemetrische Kontrolle von Luchsen nach ihrer Wiedereinbürgerung in Österreich. In: FESTETICS A. Ed. Der Luchs in Europa. Greven: Kilda Verlag. p. 297-317.
- WERDELIN, L. (1981): The evolution of lynxes. Ann.Zool.Fenn. 18: 37-71.
- WERDELIN, L. (1983): Morphological patterns in the skulls of cats. Biol.J.Linnean Soc. 19: 375-391.
- WOTSCHIKOWSKY, U. (1978a): Der Luchs im Bayerischen Wald. In: WOTSCHIKOWSKY, U. Ed. Der Luchs - Erhaltung und Wiedereinbürgerung in Europa. Mammendorf: Druckerei Bernhard. Ed.2: 72-80.
- WOTSCHIKOWSKY, U. (1978b): Der Luchs - Erhaltung und Wiedereinbürgerung in Europa. Mammendorf: Druckerei Bernhard. 163 p.
- WOZENCRAFT, W.C. (1989): Classification of the Recent Carnivora. In: GITTLEMAN J.L. Ed. Carnivore Behaviour, Ecology, and Evolution. London: Chapman and Hall. p. 569-593.
- ZACHARIAE, G., W. ELSTRODT & I. HUHT-GIORGA (1987): Aktionsräume und Verteilung erwachsener Luchse, Lynx lynx L. im Hinteren Bayerischen Wald. Z.Saeugetierk. 52: 9-20.

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