

Stahl, P. and Artois, M. 1991. Status and conservation of the wild cat (*Felis silvestris*) in Europe and around the Mediterranean rim. Draft Report: 1-61. Strasbourg, Council of Europe Press. Convention on wildlife and natural habitat conservancy in Europe.

Keywords: 78Eur/CCT/cct_cs/conservation/conservation strategy/distribution/*Felis silvestris*/habitat/habitat connectivity/reintroduction/status/taxonomy/threats/trade/wildcat/wildlife

Abstract: This report is the outcome of a request made by the Permanent Committee of the Commission concerned with Wildlife and Natural Habitat Conservancy in Europe. It describes current data on the status and evolution of the wildcat populations in the countries involved, as well as threats as identified by specialists. Among the major threats for the wildcat are reduction or alteration of habitat, lack of information on population development, cross-breeding, and direct killing by humans. Recommendations for conservation concerning the major threats are presented.

12703

Council of Europe
Conseil de l'Europe



10 FEB. 1992

Strasbourg, 28 October 1991
[TPVS91.62E]

T-PVS (91) 62

CONVENTION ON WILDLIFE AND NATURAL HABITAT CONSERVANCY
IN EUROPE

Permanent Committee

STATUS AND CONSERVATION OF THE WILD CAT (Felis silvestris) IN
EUROPE AND AROUND THE MEDITERRANEAN RIM

by

Philippe STAHL * and Marc ARTOIS **

* Office National de la Chasse
Saint-Benoist - 78610 AUFFARGIS

**CNEVA - LERPAS
BP 9 - 54220 MALZEVILLE

STATUS AND CONSERVATION OF THE WILD CAT
(FELIS SILVESTRIS)
IN EUROPE AND AROUND THE MEDITERRANEAN RIM

Philippe Stahl (1) and Marc ARTOIS (2)

1 - Office National de la Chasse
Saint Benoist - 78610 AUFFARGIS

2 - CNEVA - LERPAS
BP 9 - 54220 MALZEVILLE

July 1991

LIST OF CONTENTS

	page
I. Introduction	7
II. Taxonomy	8
III. Methods used and countries concerned	10
IV. Distribution by country	12
4.1 Albania	12
4.2 Algeria	12
4.3 Austria	12
4.4 Belgium	14
4.5 Bulgaria	16
4.6 Czechoslovakia	17
4.7 Egypt	19
4.8 France	19
4.9 Germany	22
4.10 Greece	27
4.11 Hungary	27
4.12 Israel	29
4.13 Italy	30
4.14 Libya	32
4.15 Luxembourg	32
4.16 Morocco	32
4.17 Netherlands	34
4.18 Poland	34
4.19 Portugal	34
4.20 Romania	36
4.21 Spain	36
4.22 Switzerland	38
4.23 Syria	40
4.24 Tunisia	40
4.25 Turkey	40
4.26 United Kingdom	40
4.27 USSR	43
4.28 Yugoslavia	45
V. The Fur Trade	46
VI. Reintroductions	46
VII. Cross-breeding	47

	page
VIII. Major Problems and Implications for Conservation	49
8.1 Observation of population distribution and development . .	49
8.2 Cross-breeding	50
8.3 Break-up, reduction and alteration of the habitat	50
8.4 Direct kills	51
8.5 Reintroductions	51
8.6 The need for studies	51
IX. Bibliography	52
X. Appendix: Questionnaire on the recent status and conservation of the wild cat	59

STATUS AND CONSERVATION OF THE WILD CAT (FELIS SILVESTRIS) IN EUROPE AND AROUND THE MEDITERRANEAN RIM

I. INTRODUCTION

This report is the outcome of a request made by the Permanent Committee of the Commission concerned with Wildlife and Natural Habitat Conservancy in Europe. Similar reports have already been prepared for other rare or vulnerable wild carnivores such as the lynx and the European mink. These documents present and describe current data on the status and evolution of species (or sub-species) populations in the countries involved, as well as threats they may face, be they potential or actual, as identified by specialists. These data act as the basis for drawing up recommendations relevant to the conservation of the animal in question.

The wild cat (Felis silvestris) is a species with a very extensive distribution area both in Eurasia and throughout the African continent (Fig.1). It lives in broadleaved forests, savannah and steppe, from western Europe to western China and central India, and in every part of Africa (CORBET 1978). Despite this vast distribution area and the large number of countries concerned, this species has only been described and discussed in a relatively small number of studies dealing with its biology and, more particularly, with its ecology "in its natural surroundings". There is no evidence of any major adverse interaction between the wild cat and man. The species does not act as any kind of a carrier for zoonoses that may be transmitted to man (such as rabies, in particular). Its inconspicuous size means that there is no risk of it becoming a serious predator where domestic livestock is concerned. There is no doubt that this has contributed to the fact that the wild cat has been somewhat ignored. What is more, any study of this creature is hampered by its unobtrusive behaviour, by its low population density, which are on average, and in optimum conditions, around 3-5 individuals per 1000 hectares (2500 acres) (see SCHAUBENBERG 1981) and by the type of habitat it frequents.

The most familiar features of the wild cat are the morphology of the species and its osteological characteristics (bone structure, skeleton etc.). Such studies have often been embarked upon to find and establish distinguishing features and criteria between the various sub-species, and, more, particularly, to make a distinction between wild cats and domestic cats (see for example the studies by SCHAUBENBERG, J. KRATOCHVIL & Z. KRATOCHVIL, RANDI & RAGNI, etc.).

Much is also known about the feeding habits of this carnivore, and in particular of the European sub-species. Some twenty studies have been written about this latter in virtually every type of habitat frequented (see SCHAUBENBERG 1981, PIECHOCKI 1990, STAHL & LEGER (forthcoming)). These studies show that the wild cat's diet is based on small prey, including small mammals (rodents, rabbits etc.), which account for much of the diet. These prey are hunted ambush-style on the ground. Hare- and chicken-sized animals are the largest prey that can be caught alive. As a rule, wild cats eat live prey and, unlike domestic cats, eat few miscellaneous scraps. Certain aspects of the wild cat's reproductive behaviour and of the growth patterns of the young (size of litters, sexual maturity, reproductive behaviour) have also been studied in captivity or in the wild (CONDE & SCHAUBENBERG 1969, 1974; VOLF 1969; MEYER-HOLZAPPEL 1969; see also HEMMER 1974).

Most of these studies have been carried out by examining specimens either found dead or kept in captivity. Eco-ethology, on the other hand, has only been dealt with by a handful of studies. Two studies describing the radio-tracking of a small number of individuals have been carried out on the European sub-species, one in Scotland (CORBETT 1979) and the other in France (ARTOIS 1985, STAHL 1986, STAHL *et al* 1988). They present a type of social organization peculiar to the Felidae, based on a division of territory between individuals of the same sex. There may be a total territorial overlap between males and females (French study) or a very slight overlap (Scottish study), probably due to habitat conditions (food distribution and population density). The feeding habits and solitary type of social organization of the wild cat means that it never achieves the higher population densities of the domestic cat. This type of territorial organization also gives rise to an early dispersal of sub-adult cats. During this phase there would appear to be a high mortality rate among males in particular (PIECHOCKI 1986), but a precise study of subadult dispersal still remains to be carried out.

Virtually nothing is known about group dynamics. Causes of death and the relative incidence of these causes for different age groups have only been identified for small samplings of dead animals, usually taken over long periods of time (see PIECHOCKI & STIEFEL 1988 for the largest sampling). These studies show a marked predominance of abiotic causes. But there are different angles at play here, because natural causes, and in particular causes to do with early death, tend to be underrated when compared with deaths caused by human beings (on the road, trapping, hunting etc.). Nothing is known, likewise, about the reproductive rate of females in the wild (fertility and length of fertile period), and the way this may vary with population density or in relation to environmental conditions.

One final methodological factor that should be stressed is the absence of any means of estimating the numbers of wild cats. In fact, not a single method has been developed and tested. Estimates of numbers are subjective. They are obtained by cross-checking observations in the field made over relatively long periods of time or by sample presence/absence surveys. This situation is common with regard to most small carnivores, but the absence of objective diagnostic criteria concerning numerical population development gives rise to different appraisals of the status of the species and of the urgency of the type of conservation measures to be taken, with the obvious exception of examples of conspicuous dramatic developments, such as a reduction of the distribution area.

II. TAXONOMY

Different forms have been identified among wild cat populations in Europe, Asia and Africa. HALTENORTH (1957) found 21 sub-species for the species F. silvestris, but for European populations at least, not one has been authenticated (SCHAUENBERG 1977). Only three different groups can apparently be identified (HEMMER 1978, LEYHAUSEN 1979): (i) the silvestris group which includes the populations in Europe, the Caucasus and Asia Minor, (ii) the lybica group, which includes the populations of Mesopotamia, Palestine, northern Arabia and all the African populations, and (iii) the ornata group which includes the populations from Iran to India and western China. Some authors regard the ornata group and the lybica group as one and the same, with the former included within the latter.

There is still some debate over the taxonomic status that should be given to the silvestris group and the lybica group (and if necessary the ornata group). Some authors (POCOCK 1951; J. KRATOCHVIL 1981; KRATOCHVIL &

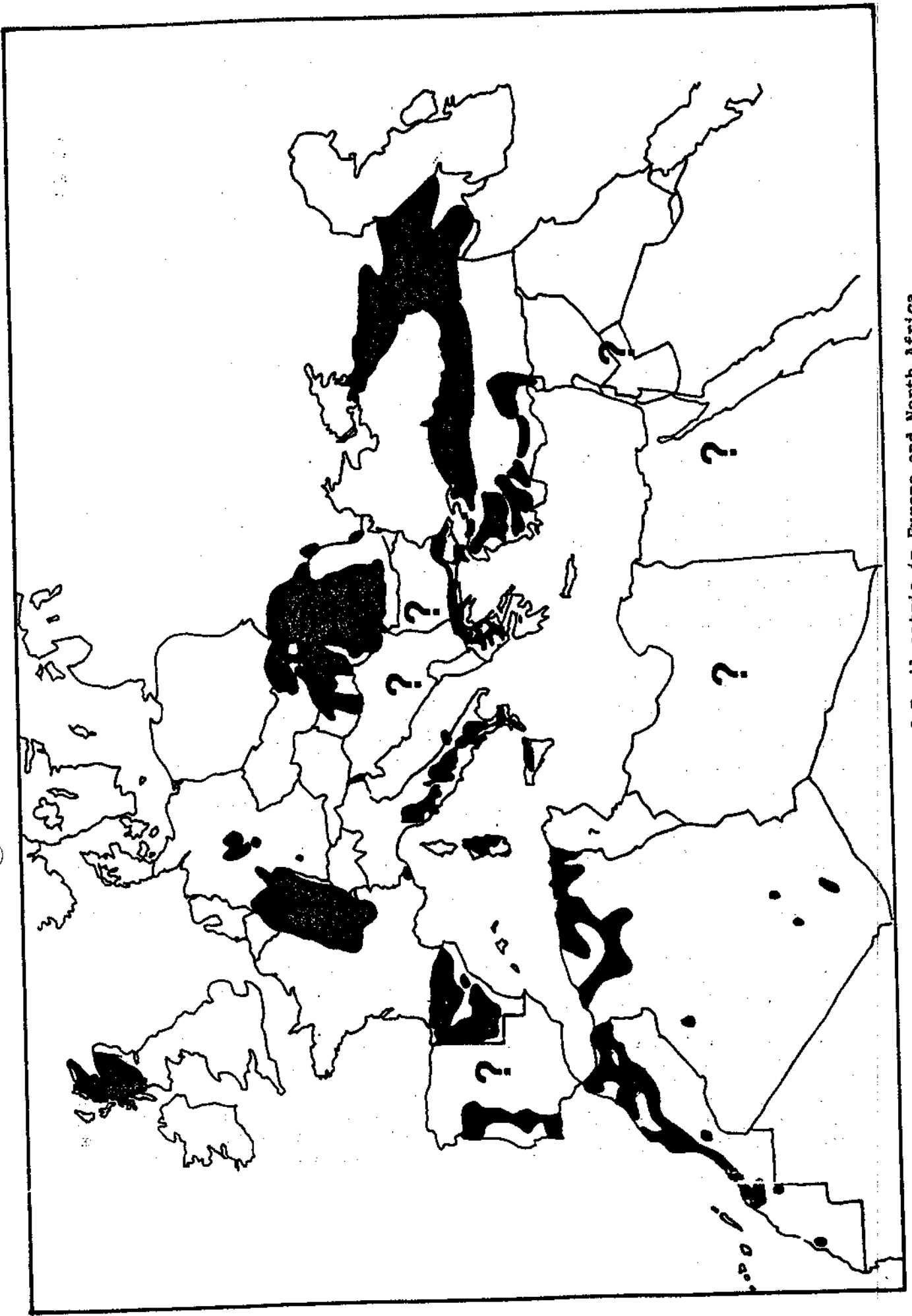


Fig.1: Distribution of *F. silvestris* in Europe and North Africa

KRATOCHVIL 1970, 1976; SCHAUENBERG 1977) consider them to be completely separate species, while others (HALTENORTH 1957; HEMMER 1978; RAGNI & RANDI 1986; RANDI & RAGNI 1986, 1991; RANDI & MARIANI 1981) regard them as sub-species of a polytypical species F. silvestris. The slight genetic gap that exists between these groups (RANDI & RAGNI 1986, 1991), the close phylogenetic relationship between them (HEMMER 1978) and their morphometric continuity (RAGNI & RANDI 1986) all constitute solid arguments in support of regarding the European and African populations as belonging to a single polytypical species F. silvestris. Recent works dealing with mammal classification (CORBET & HILL 1986; WOZENCRAFT 1989) espouse this viewpoint.

In this report we likewise reckon that the African populations belong to the sub-species Felis silvestris lybica, and that the populations of Europe, Asia Minor and the Caucasus belong to the sub-species Felis silvestris silvestris. It should nevertheless be borne in mind that, quite independently of the taxonomic viewpoint, most populations exist in the form of fairly isolated and threatened pockets. This was already identifiable in the 1970s (SLADEK 1972d). In any fauna conservation strategy it is important to ensure that a complex of small populations is maintained.

III. METHODS USED AND COUNTRIES CONCERNED

This report contains bibliographical data on the status and conservation of F.s.lybica in countries with a Mediterranean coastline, and in the Mediterranean islands of Sardinia, Corsica and Crete. Data for F.s.silvestris have been gathered throughout the distribution area of the sub-species. For each of the sub-species the countries concerned by this report are listed in fig.1. We have found no data for some of these countries (Albania, Egypt, Libya, Syria and Tunisia).

There have been very few studies published in scientific journals available for research based on bibliographical data. It is paradoxical that a certain number of surveys and studies have been written on the wild cat, and in particular on the European sub-species (HALTENORTH 1957, DE LEUW 1958, RAGNI 1972, 1981, HEPTNER & NAUMOV 1980, SCHAUENBERG 1981, PIECHOCKI 1990, STAHL & LEGER (forthcoming)). These studies contain a large range of information, much of it scattered or regionally available (reports, newspaper articles). PIECHOCKI's study (1990), in particular, embraces recent original data on the European sub-species, with special reference to its status and the development of its distribution in Germany. It also includes new distribution charts and maps for two other countries (Portugal and Romania). When we have been unable to obtain more information than that gathered by this author, we have used his study as our reference.

To obtain a maximum amount of recent information we also circulated a questionnaire (Appendix I) to some fifty people in a position to refer us to studies under way in their countries or projects in progress. We also enclosed a bibliography of recent studies and publications about their respective countries. We asked them to list any references not mentioned to complete the bibliography. They were also asked for a personal opinion about the evolution of wild cat populations and the scale of threats to this animal's continued survival. Because of the scarcity of recent studies, the personal views of these specialists are therefore not always based on works familiar to all those in the field, but rather on their actual experience in the wild.

LIST OF COUNTRIES CONCERNED BY THIS REPORT
showing ratification dates of the Convention on the Conservation of European
Wildlife and Natural habitats (known as the Bern Convention) and CITES**
signatures.

COUNTRY	BERN	CITES
Albanie/Albanie		
Algeria/Algérie		21/02/84
Austria/Autriche	02/05/83	27/04/82
Belgium/Belgique	24/08/90	01/01/84
Bulgaria/Bulgarie	31/01/91	16/04/91
Czechoslovakia/Tchécoslovaquie		
Egypt/Egypte		04/04/78
France	26/04/90	09/08/78
Germany/Allemagne	13/12/84(FRG)	20/06/78(FRG) 07/01/76(DRG)
Greece/Grèce	13/06/83	
Hungary/Hongrie	16/11/89	29/08/85
Israel		17/03/80
Italy/Italie	11/02/82	30/12/79
Libya/Lybie		
Luxembourg	23/03/82	12/03/84
Morocco/Maroc		14/01/76
Netherlands/Pays-Bas	28/10/80	18/07/84
Poland/Pologne		12/03/90
Portugal	03/02/82	11/03/81
Romania/Roumanie		
Spain/Espagne	27/05/86	28/08/86
Switzerland/Suisse	12/03/81	31/07/75
Syria/Syrie		
Tunisia/Tunisie		01/07/75
Turkey/Turquie	02/05/84	
United Kingdom/Royaume-Uni	28/05/82	31/10/76
USSR/URSS		08/12/76
Yugoslavia/Yougoslavie		
EC/CEE	07/05/82	

* The wild cat is included in Appendix II of the Bern Convention as a
"Strictly protected species". The wild cat has not been the object of any
qualification or declaration.

** The wild cat was listed in CITES Appendix II and is included in the C2-EEC
list (regulation 3626/82 applying CITES within the EEC).

Twenty-five countries were involved in all. We received replies from 17 of the 21 countries to which the questionnaires were sent.

Data on the wild cat's legal status were obtained from the IUCN Environmental Law Centre (Bonn) or from the specialists and experts interviewed.

IV. DISTRIBUTION BY COUNTRY

1. ALBANIA

No data.

2. ALGERIA

Person(s) supplying data: S. AULAGNIER

Current distribution: KOWALSKI & RZEBIK-KOWALKA (1991) have summarized all the data gathered on the sub-species in Algeria. All the observation sites are listed in fig.2, including former sightings of the authors quoted by LE BERRE in 1989 (HEIM DE BALZAC 1936, LAVAUDEN 1928, MONOD 1931, SEURAT 1943) and those made by DE SMET (1989) during a survey carried out in 1985. KOWALSKI & RZEBIK-KOWALKA (1991) report that the wild cat is quite common. It has been observed in northern Algeria, from the coast to the edge of the Sahara. It is also present in the mountain ranges of the central Sahara (Hoggar, Tassili n'Ajjeress).

Recent developments: KOWALSKI & RZEBIK-KOWALKA (1991) have found that the wild cat is still present throughout its original distribution area. A recent study (SELLAMI *et al* 1989) shows the presence of the sub-species in the Mergueb nature reserve. But these authors found that only a few rare specimens could be observed here.

Legal status: Protected since 1983.

Threats: no data.

Observations: We should like to point out that, in our view, insufficient data have been gathered to analyse the development of the wild cat's distribution. Data about its distribution are thin on the ground. What is more, the scarce information available covers the best part of the past hundred years.

3. AUSTRIA

Current distribution: The sub-species is extinct in Austria.

Recent developments: The history of the disappearance of the wild cat in Austria is traced by BAUER 1988 (quoted by PIECHOCKI 1990). In the 19th century the wild cat was already rare in Upper Austria (Ober-Österreich). The last surviving animal in this region was reported at the very beginning of this century (Inviertel, in 1902). The wild cat was still present in the northwest of the country, in Lower Austria (Nieder-Österreich), in the 19th century (Leithagebirge mountains, southern bank of the Danube between Vienna and Hainburg, and in the Wiener Wald). The last four references to the wild cat in Lower Austria were made between 1902 and 1912.

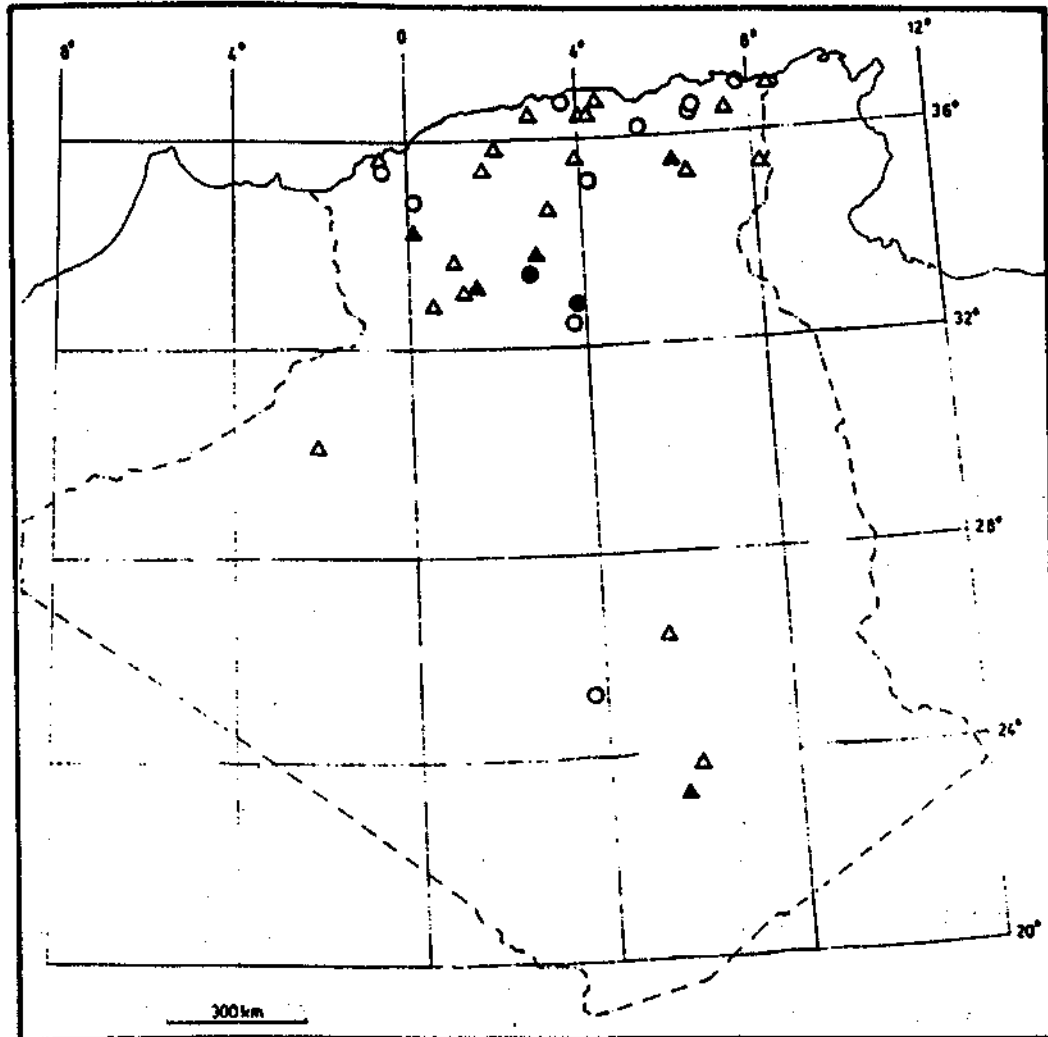


Fig.2: Distribution of *F.s.lybica* in Algeria
(KOWALSKI & RZEBIK-KOWALSKA 1991)
The different symbols indicate different sources of information

In the southern part of the country, in Carinthia, the wild cat survived until the middle of this century in the Klagenfurt region. Four individuals were recorded between 1945 and 1952, possibly coming from the Yugoslavian forest (TRATZ 1953). The wild cat disappeared from this region in about the mid-fifties.

The causes of the wild cat's disappearance from Austria as proposed by BAUER include hunting by man as well as other factors such as climatic changes that have taken place over the last hundred years.

BAUER maintains (in SMIT & WINJGAARDEN 1981) that animals hailing from Slovakia were observed during the 1970s in northern parts of the country (Lower Austria).

Legal status: Totally protected.

Observations: Sightings recorded in Lower Austria in 1970 and thereabouts do not seem to have led to any recolonization in this region. This may be due to a standstill situation in the Slovakian wild cat populations from this period on (see Czechoslovakia). In our view, the absence of colonization in southern Austria by Slovenian populations may also be due to unfavourable conditions for the wild cat in parts of this area. The situation in much of Austria can be compared with that found in Switzerland (see SCHAUENBERG 1970 for a description), where the animal disappeared very early on from part of the country in mountain habitats which were ill-suited to the sub-species, and where the wild cat has never been present in much of the country anyway (in the Alps in particular).

4. BELGIUM

Person(s) supplying data: T. DEWITTE, J. DOUCET, R. LIBOIS.

Current distribution: At the present time the sub-species is to be found in Belgian Lorraine and in the Ardennes range. It also spills over into the Fagne depression in the northeast of the country (Hautes Fagnes) and the Famenne region to the south (the Entre-Sambre-et-Meuse area).

Recent developments: PARENT (1975, 1976) carried out a survey between 1965 and 1971 which enabled him to retrace the history of wild cat recolonization in Belgium. The sub-species had disappeared from the Belgian Ardennes around the beginning of this century. A few rare catches are recorded up until 1930, but from then on the sub-species seems to have vanished altogether. It reappeared in Belgian Lorraine, on the Bajocian coast, in 1946; and in the Ardennes after 1960. From 1955 onwards more and more sightings and catches were recorded in the central area of Belgian Lorraine, and then in the southern Ardennes in 1962 and in the central Ardennes in about 1966. This south-to-north recolonization was probably due to individuals coming from French Lorraine, where wild cat populations had always been large. This recolonization pattern involves using forested corridors (fig.3). On the map the recolonization routes established by charting catches show the importance of the uninterrupted forested area. Extensive non-wooded and non-forested areas, as well as inhabited and built-up areas, and farmland or grazing lands all represent obstacles which hamper the recolonization process.

A comparable situation has been recorded in northeast Belgium, in the Hautes Fagnes. The wild cat was extremely rare here before 1940, then made a reappearance in 1950, and has been frequent from 1966 on. This is a population which represents an extension of the Eifel population in Germany. It has spread as far as the Ardennes where, according to PARENT (1975), the German and Lorraine populations were on the point of overlapping.

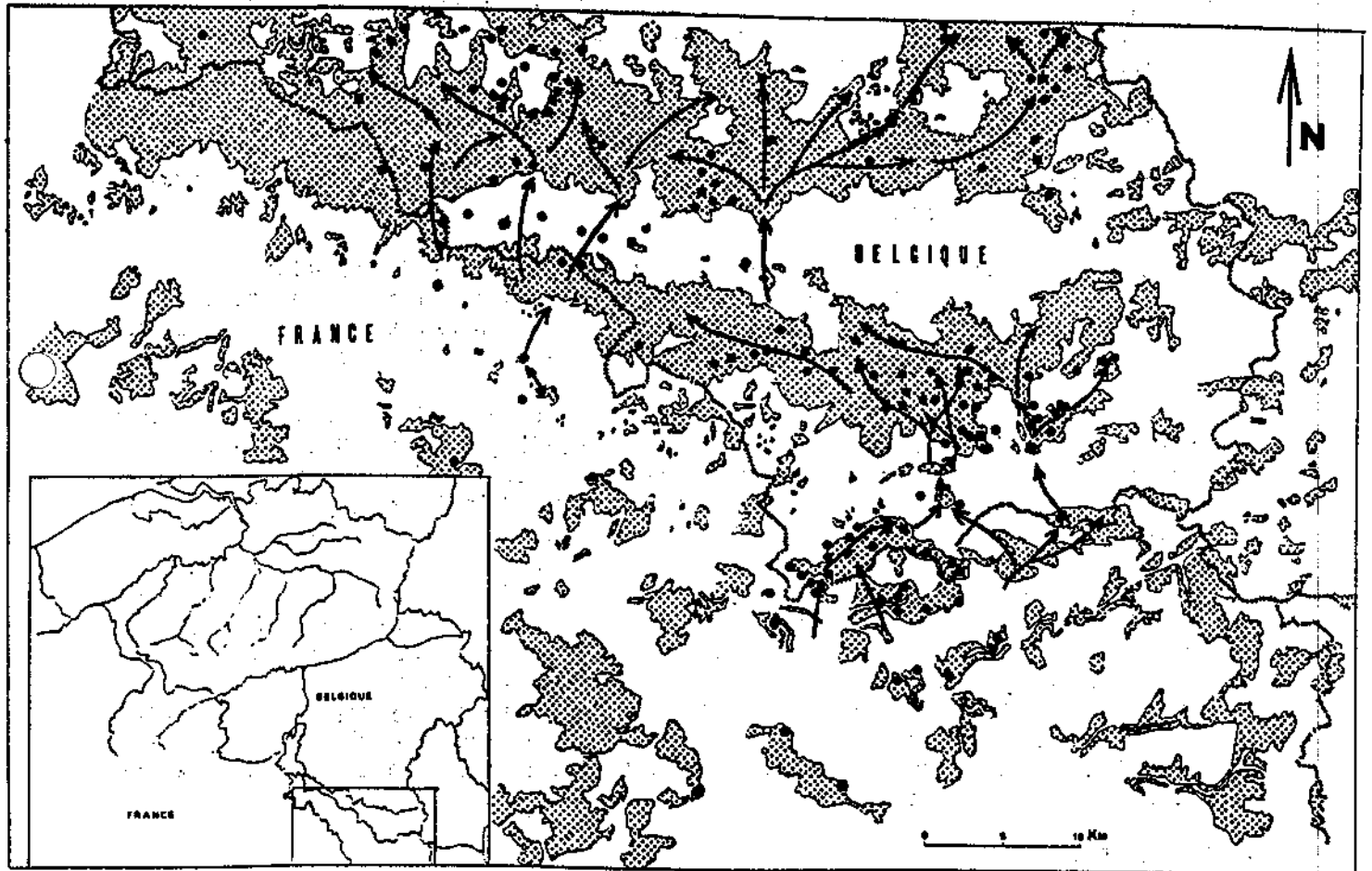


Fig. 3: Recolonization of southern Belgium by *F.s.silvestris* from French Lorraine
After PARENT (1975)

The origins of this recolonization spreading from France lie in the destruction of the Verdun zone in 1914-18. The key factors for PARENT are (i) the low level of human activity in the region and the tapering off of hunting and trapping, and (ii) the reforestation programmes, initiated in 1929, which have given rise to a proliferation of rodents.

In the province of Entre-Sambre-et-Meuse the population spread is still very slow, if, indeed, it exists at all (LIBOIS, forthcoming publication). For DOUCET and for DEWITTE, recent sightings outside the traditional distribution area (DOUCET & LIBOIS 1978) can be linked more with a stepped-up observation programme than with continuing recolonization.

Legal status: Game for which hunting has not been authorized since 1973. In the new Walloon hunting code, which is currently in preparation, the wild cat is no longer included in the list of game. This means that it has become a totally protected species.

Threats: For LIBOIS, factors detrimental to the wild cat include:

- direct killing of animals by accidental trapping or deliberate killing. As a rule, trapping is carried out in such a way as to avoid catching protected animals or animals not classified as game. This is not always the outcome in practice.

- direct killing on roads and as a result of forestry operations (tree extraction and logging) during the breeding season. DOUCET estimates that five to ten wild cats are run over each year in Entre-Sambre-et-Meuse (700 km² / 270 sq.mi.). In one commune alone (Viroinval), three cases of litters being destroyed by the removal of log piles in the forest were recorded in 1989 and 1990, according to DEWITTE.

- alterations to the forest habitat; the forested area has been increasing over the past century, but the introduction of resin-producing tree species has been on the up, and the area taken up by broadleaved species has been decreasing (LIBOIS). Forestry practices tend to encourage the replacement of coppices with standards (stands of oak and hornbeam) by high forest, which involves the elimination of secondary species and the decline of lower vegetation levels. This represents a modification of the natural habitat which works against the wild cat.

5. BULGARIA

Person(s) supplying data: G. SPIRIDONOV.

Current distribution: A survey (SPIRIDONOV & MILEVA) on the distribution of the wild cat involving forestry authorities (165 replies out of 168 authorities approached) is under way, but the results have not yet been published.

Recent developments: According to ZIMINA (1962), the sub-species was still plentiful in beech forests above 800 m / 2600 feet, and in coniferous forests at altitudes of between 700-1000 m / 2300-3300 feet. ATANASSOV & PESCHEV (1963) found the sub-species to be plentiful in various areas scattered all over the country (Dobrudza and Ludogorie, Stara Planina, Stredna-Gora, the Rodopi mountains, Pirin, Belasitza, Osogovo and Strandza-Planina). According to SPIRIDONOV, the survey in progress does not show any noteworthy change in the recent distribution of the wild cat. SPIRIDONOV nevertheless considers the sub-species to be vulnerable.

Legal status: the wild cat can be hunted all year round except in national parks, reserves and natural monuments. Shooting, trapping and the destruction of litters are all permitted.

Threats: For SPIRIDONOV the two main threats involve litter destruction and killings, and cross breeding with the domestic cat.

As far as elimination by hunting is concerned, ZIMINA (1962) referred to an average annual culling of 1778 individuals for the period 1953-1958, out of a total population estimated at 3000 animals. These estimates were probably inaccurate because, according to SPIRIDONOV, the number of wild cats killed has shown a constant level for several decades (3000-6000 individuals a year).

According to SPIRIDONOV, there is evidence of cross-breeding in 89 forestry districts. In 76 of these, cross-breeding is apparently rare or very rare, but in 10 it is frequent. Data gathered by observations made of 300 wild cat skins show that cross-bred animals account for about 5% (SPASSOV & SPIRIDONOV, unpublished study).

Observations: The sub-species is present in more than 25 reserves set up or enlarged between 1978 and 1991. These reserves, where the wild cat is not hunted, are home to between 3-4 and 15-20 individuals. The wild cat is also present in older reserves.

In a situation where there would appear to be hybrid animals, conservation of the sub-species involves maintaining high population density and stability. To achieve this it would seem hard to justify year-round hunting.

6. CZECHOSLOVAKIA

Person(s) supplying data: I. KOZENA AND J. SLADEK.

Current distribution: The distribution area covers eastern Slovakia, but continuous distribution has only been observed in the Carpathians in central and eastern Slovakia. The sub-species no longer exists in Bohemia and Moravia.

Recent developments: Recent distribution development in Czechoslovakia has been studied by SLADEK. In 1963, a study undertaken established that, in Slovakia, the wild cat only existed in the western Carpathian mountains (SLADEK 1972 a,b,c). The sub-species was reckoned to be present in almost all forested areas. Its main distribution area was delimited by the river Vah. The highest densities were observed in the oak belt at altitudes of between 300-400 m./1000-1300 ft. It was already no longer present in the White Carpathians and occurred only in very small numbers in the Lesser Carpathians. It is possible that there was a residual population in this region or alternatively an incidence of rogue individuals coming from the western part of the main Slovakian distribution area.

In Bohemia the sub-species disappeared from most areas in the course of the 18th century (KOKES 1974). It survived up until the second half of the 20th century in southern Bohemia and in the mountainous border region of northern Bohemia. One or two individuals were once again recorded in the 1950s in these parts, coming from Thuringia and Saxony in Germany (BARTA 1958, HANAK 1967).

In Moravia the sub-species survived until the first half of the 20th century in the mountainous regions to the east bordering on the main Slovakian distribution area.

As far as the Slovak region is concerned, the 1963 survey shows that the wild cat's distribution area had generally shrunk. But some growth was indicated in certain regions from which it had long since vanished (SLADEK

1972 b). According to SLADEK, however, the number of animals has almost tripled in ten years, if one takes as one's reference the data of a comprehensive survey made by FERIANCOVA (1955) for the 1952-1953 period. This survey gave an estimate of around 700 individuals, while SLADEK's study (1966) gives an estimate of 2500-3000 individuals.

According to SLADEK (1989 in PIECHOCKI 1990), hunting statistics and the number of naturalized animals show that the wild cat population in the Western Carpathians started to drop in the 1970s. Today this decrease has reached the 60% mark (from 2500-3000 individuals in 1963 to about 1000 at the present time). It has also been accompanied by a reduction of the distribution area. Between 1982 and 1989 SLADEK's capture statistics show a trend towards a drop in numbers as well as a drop in the number of animals killed:

Year	1982	1983	1984	1985	1986	1987	1988	1989
Killed	1298	1132	1084	1108	1012	1019	1013	986
Caught	203	193	177	151	167	110	116	112

Legal status: protected in the Czechoslovak Republic since 1956. May be hunted in the Slovak Republic between December 1 and February 28, and all year round in pheasant farms.



Fig. 4: Distribution of F.s.silvestris in Slovakia
After SLADEK (1972)

Threats: The wild cat is registered as a vulnerable species in the red book of rare and endangered species in Czechoslovakia. For SLADEK, in addition to the diminished habitat, threats include cross-breeding with the domestic cat, rabies, the use of pesticides in agriculture and the growing numbers of foxes. KOZENA describes modifications to the forest habitat and the break-up of population groups. In the sample (n=50) examined by KRATOCHVIL & KRATOCHVIL (1976), no cross-bred animals were observed on the basis of an osteological examination of the skulls. SLADEK & PALASTHY (1979) also show a well-defined separation between the wild cats and the domestic cats examined in Slovakia.

Observations: The sub-species is present in the Tatra National Park and in the other protected areas in Slovakia. Introductions were made in 1972 in western Bohemia in the Sumava Mountains, but the results are not known by the authors contacted. Data on numerical population growth between 1950 and 1960 are to

be treated with caution, in our view. This is also the opinion of FERIANCOVA (1955), who indicates that he cannot guarantee the figures given. He thinks that the reliable data are those for the wild cat's distribution area. We share this view. According to SLADEK, wild cat numbers have been dropping considerably over the past twenty years, mainly, it would seem, because of habitat changes. In this respect it is likely that any direct additional destruction of wild cats can only accelerate this downward trend. The danger posed by rabies is, in our view, highly exaggerated. The sub-species is not particularly vulnerable to the rabies virus (ARTOIS et al 1984).

7. EGYPT

Current distribution: LE BERRE (1989), who quotes HARRISON (1968) and OSBORNE & HELM (1980), considers that the sub-species is present in the Nile valley and on the Mediterranean coast, in the Sinai peninsula. AL-SAFADI & NADER (1990) have drawn up a distribution map for the Middle East, and stress both the difficulty in identifying the sub-species and the frequency of cross-breeding with the domestic cat in this region.

Recent developments: No data on recent developments.

Threats: No data.

8. FRANCE

Current distribution: The description of the wild cat's distribution is based on a nationwide survey carried out among naturalists by the Société Française pour l'Etude et la Protection des Mammifères (SFEPM) (FAYARD 1984), with a commentary by RIOLS (1984). Another study on the distribution of carnivores, also covering the entire country, has been carried out by the Office National de la Chasse (ONC, not published). It shows a similar distribution.

The two sub-species of F. silvestris are present in France. In Corsica, three skulls have been examined by VIGNE (1988), including the skull described by LAVAUDEN (1929) as a new species F. reyi. VIGNE shows their similarity with skulls of domestic cats and concludes that F. silvestris is not present. Nevertheless, two specimens found more recently in two remote regions of Corsica are similar to F.s.lybica, from both the phenotypical and the craniometric viewpoint (ARRIGHI & SALOTTI 1988). These skulls would point to the presence of this sub-species in this island, probably of anthropocorous origin, as in Sardinia (RAGNI 1988). SALOTTI (1984) indicates fifteen or so possible sightings in various parts of the island.

The European sub-species (Felis silvestris silvestris) lives in the continental regions of France. The area where it is most commonly found is the northeast quarter of the country, southwards to the latitude of Lyons. This area includes all the départements in the Lorraine, Champagne-Ardenne, Burgundy and Franche-Comté regions. The wild cat is plentiful in these regions and is to be found in every type of wooded or forested habitat where there has been adequate research carried out. Because of the considerable continuity of the forested ranges and wooded zones in this part of northeast France, there are undoubtedly areas where the wild cat is present which extend uninterruptedly over areas of several hundred square kilometres/miles. On the Alsatian side of the Vosges the wild cat occurs essentially at the sandstone-dominated lower levels, but is completely absent from the plain. The wild cat also occurs in the Pyrenees and, according to the ONC survey, is more widespread than is suggested by the distribution map drawn up by the SFEPM survey.

There are still small populations in the Centre region of France (THEVENIN 1986). Some of these groups have been known about for a long time, but have remained isolated. In the département of Allier, the wild cat is present in the western third of the département, in particular in the Tronçais forest (BRUGIERE *et al* 1986). In the Rhône-Alpes region, the wild cat is present mostly in the département of Ain, but restricted to the southern part of the Jura where it is considered to be common (FAYARD *et al* 1979). Recordings are rare and sometimes even debatable in the other départements (ARIAGNO & DELAGE 1970, ARIAGNO 1976, NOBLET 1979, ARIAGNO *et al* 1981, FAYARD *et al* 1981, FONS *et al* 1977). In the Ardèche, the presence of the wild cat has not been definitely ascertained (FAUGIER *et al* 1989). In the Provence-Côte d'Azur region there is uncertainty about its presence (CHEYLAN 1979). A few specimens recently captured in the Hautes-Alpes and the Alpes Maritimes may, however, well be wild cats. In the Massif Central it is thought to be present in Creuse, Corrèze and in the Puy de Dôme (J.P. MALAFOSSE, pers. comm., F. DE BEAUFORT in SAINT GIRONS (1973), RIOLS 1984, BRUGIERE *et al* 1986). Here the wild cat certainly occupies a split habitat and wild cat populations are small. Despite the scarcity of recent sightings, proof of the wild cat's presence has been recently established, because a male animal, authenticated by B.CONDE, was caught in December 1989 on the boundary between the départements of Corrèze and the Puy de Dôme.

Recent developments: As far as recent population trends are concerned, there are various scenarios. The tendency is vague in the Pyrenees and the Massif Central, where there is a need for research to be carried out. In the Pyrenees the wild cat was already rare in the last third of the 19th century, according to ASTRE (1963), although it seems to be well represented today. Recent sightings in the Massif Central show the survival of probably isolated populations. Population groupings are probably stable in the traditional distribution area in northeastern France, where there is nothing to suggest either a general dwindling of the populations, or any major division of the area. The disappearance of the sub-species has been observed in the Alsatian plain. The latest sightings have been extremely few and far between, or date back a good way (GRAUL 1897, ULRICH 1967, BAUMGART 1977, WAECHTER 1979), and this region cannot be recolonized because of the alteration and parcelling-up of the habitats. The sub-species also seems to have vanished from the Alps: in Haute-Savoie and in Savoie the last three authentic records date back to 1959 and 1969 (SCHAUENBERG 1970), in Haute-Savoie, and to 1960, in Savoie (REMY & CONDE 1962).

Last of all, at the western edge of the traditional area where wild cats are present in northeastern France, recordings and sightings in the bordering départements have become more and more regular. This is due to stepped-up observation on the one hand, but also to a spread of the sub-species on the other. This is probably the case in the département of Aisne (P. LIENARD, pers. comm.), where, at the present time, the wild cat occurs throughout the département, as well as in Seine-et-Marne in the Fontainebleau forest area (LUSTRAT & VIGNON, pers. comm.), where B. CONDE has authenticated a sighting. Recent, authenticated sightings have also been made in the Centre region in the Loiret, in the Orléans forest and in the département of Loir-et-Cher near Romorontain.

Legal Status: Under total protection since 1976.

Threats: The most endangered population is without any doubt the Corsican one. In-depth studies are required to establish the wild cat's specific status. In zones where the sub-species is marginally present (the Centre region, Massif Central), in low density patterns and almost certainly in isolated groups, there is a major risk of cross-breeding. Some individuals found in these parts

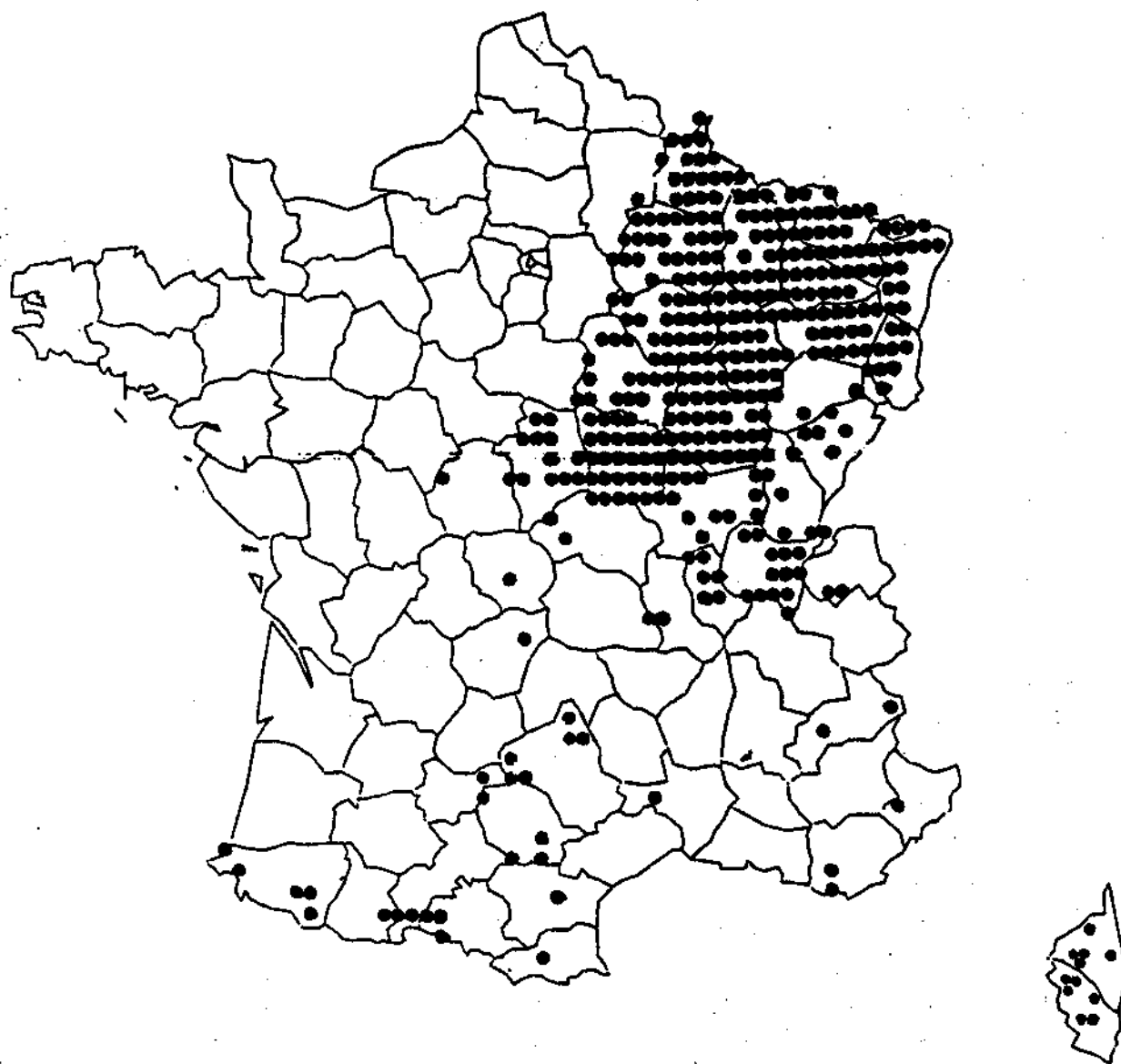


Fig. 5: Distribution of F.s.silvestris in continental France (SFEPM 1984)
and F.s.lybica in Corsica, after SALOTTI 1984.

provide clear evidence of this. In northeastern France there is no serious potential threat to the animal's survival at the present time. Intentional killings certainly occur, despite the animal's protected status, but they probably bear little relation to the mortality rate that existed when trapping was a widespread activity. CONDE (1979) refers to annual kills of between about 500 and 1000 individuals for the département of the Meuse alone.

9. GERMANY

Person(s) supplying data: U. HEINRICH, M. HELLER, H. HEMMER, G. WOREL.

Current distribution: The current status of the sub-species is nowhere better documented than in Germany. The distribution of the wild cat in western Germany has been described by RÖBEN (1974, 1976), and in eastern Germany by PIECHOCKI (1981, 1986, 1990). Since RÖBEN's study, research and surveys have been carried out in various Länder (regions). These have resulted in an accurate picture of the wild cat's population status and developments. The wild cat occurs in three main areas in Germany.

The first area is situated in the west of the country, along the border with Belgium, Luxembourg and France. It covers Rheinland-Palatinate, the southern part of Rhineland-Westphalia and the northern part of Saarland (Eifel, Hunsrück, Pfälzer Wald mountains). The distribution of the sub-species is described by VOGT (1985). The wild cat is present everywhere where the forest has not been overly parcelled out, but has disappeared, since about 1970, from areas where all that is left is small isolated woods (for example, Rheinhessen and Nordpfälzer Bergland).

The second area where the wild cat is present is close by in the southern part of Hesse. It is situated on the right bank of the Rhine, north of Frankfurt, and is thus separated from the preceding area. The results of a survey (HOSSFELD 1989) show a healthy presence in the Rheingau-Taunus area and in the Hochtaunus. According to RAIMER (quoted by PIECHOCKI 1990), there are possible connections with another population living further to the north (Westerwald).

The third main area where the wild cat occurs is situated in the central part of the country, straddling the former border between East and West Germany, in the Harz mountain range. On the western side, in northern Hesse and southern Lower Saxony (Fig. 6), the wild cat is present in the Harz, Solling, Kaufunger Wald, Reinhardts Wald and Knüll regions (RAIMER & SCHNEIDER 1983, PFLÜGER in PIECHOCKI 1990). On the eastern side, in former East Germany, the principal area delimited on the basis of data supplied by PIECHOCKI (1981, 1986, 1990) seems to form an arc that passes through Halberstadt in the north, and Eisleben, Sondershausen and Ebleben in the south (Fig. 7). Outside these relatively major areas where the wild cat is present, small isolated populations still exist as well. In Baden-Württemberg, northwest of Stuttgart, a very small population numbering around 15-20 individuals was just recently discovered (HELLER 1981, 1983, 1988) in the Stromberg area. Its origins are not known. The wild cat appeared to have disappeared from Baden-Württemberg towards the end of the 19th century, but this might well be a small residual indigenous population that had simply gone unnoticed, or alternatively a group of individuals coming from the populations in the Palatinate, some 30 miles away. If this were the case, however, they would have to have crossed the Rhine. Recent sightings have been reported in the north of the Black Forest (HELLER 1990a) and in the "Obere Donau" (Upper Danube) Wildlife Park in the Schwäbisches Alb (HELLER 1990b). In Bavaria, the sub-species seems to have disappeared towards the end of the 19th century. But two sightings were made in the early 1960s and 1970s in northern Bavaria (FÖRSTEL 1973, NÜSSEIN

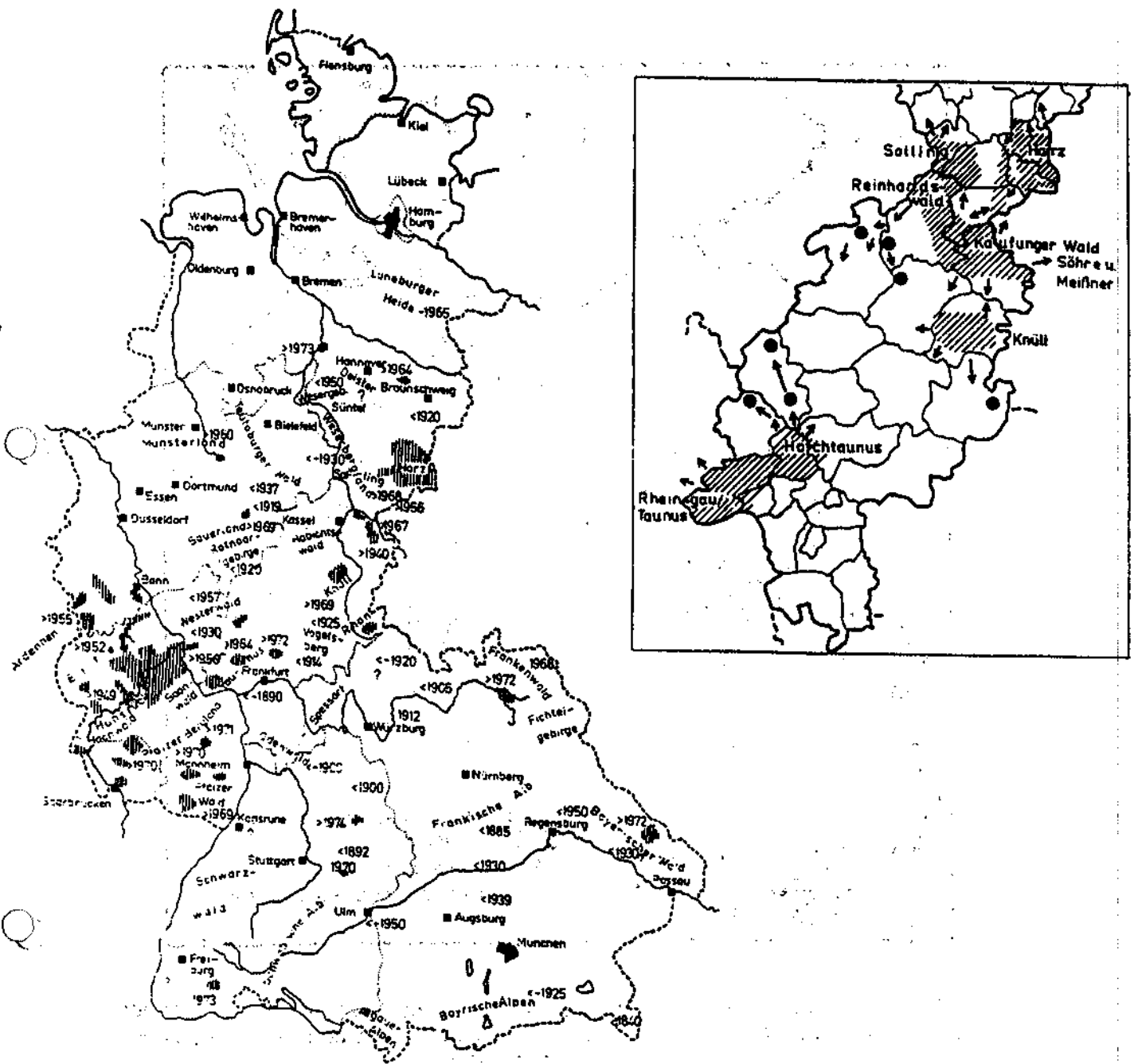


Fig. 6: Distribution of *F.s. silvestris* in western Germany (RÖBEN 1976) and detail of current distribution in Hesse and in southern Lower Saxony (RAIMER & PFLUGER in PIECHOCKI 1990).

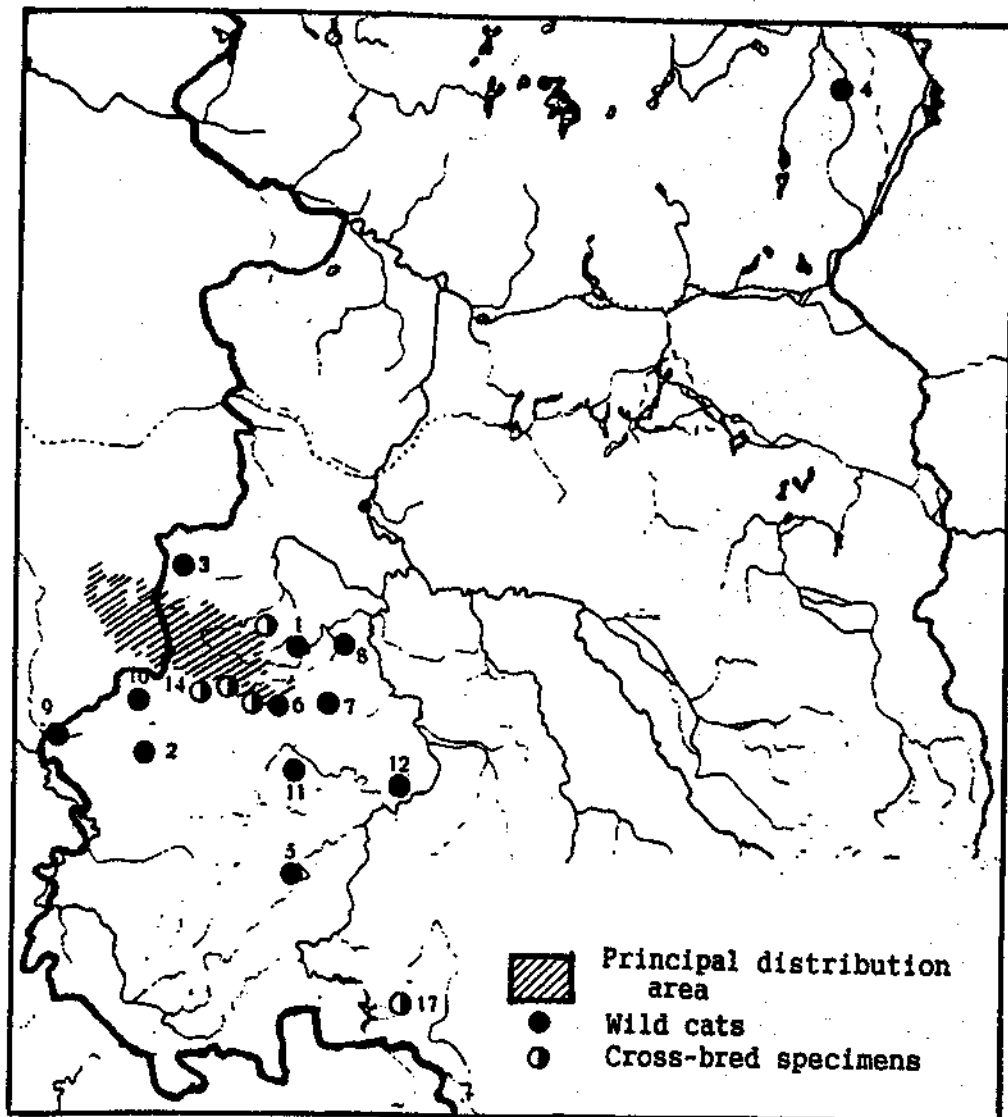


Fig. 7: Distribution of *F.s.silvestris* in former West Germany (PIECHOCKI 1986) and siting of individuals found dead outside the principal distribution area

1973). As far as we know, there have been no further sightings since. In the area in what used to be East Germany, there may still be small isolated populations in the south of the Harz region (Thuringia). In the northeast of the Thüringer Wald (Thuringian Forest) a sub-adult female was found in 1978 about 50 miles from the Harz region (PIECHOCKI 1978, 1986). This considerable distance has caused PIECHOCKI to think that there may be a small indigenous population here. In the Thüringer Schiefergebirge there may also be a small isolated population still surviving (PIECHOCKI 1990 p.78).

Current developments: According to RÖBEN (1974), the sub-species had vanished from a large number of areas in western Germany during the second half of the 19th century. By about 1930 it was only to be found in a few mountainous regions (Eifel, Hunsrück, Pfälzer Wald, west of the Taunus, Kaufunger Wald, Harz and probably in the Meissner region). Between 1930 and 1960 it was noted that these population nuclei remaining both in Rhineland-Palatinate (RÖBEN 1974) and in the Harz mountains had spread. RÖBEN's survey came up with a population estimate of 800 individuals. RÖBEN was of the view that this estimate was very much on the low side, and that the real numbers were probably in the region of at least 2000 individuals. In eastern Germany the Harz population was likewise stable and then increasing after the Second World War. Eleven migrations originating from the principal known distribution area in the country were authenticated between 1959 and 1984. The distance at which these individuals were found in relation to the known distribution area ranged from 3-55 km / 2-35 miles (PIECHOCKI 1989). The individuals in question were nine males aged between 5 and 18 months, and two females. These movements were probably due to intra-sexual competition for territorial stake-outs, which would tend to show that the population density existing in the Harz region is high.

Since the end of the 1960s, however, the situation seems to have been reversed in western Germany. In the Hochtaunus area, for example, the frequency of sightings has been dropping for the past five years (HOSSFELD(ER) [?] 1989). According to RAIMER (quoted by PIECHOCKI 1990) current numbers for the whole of western Germany total between 1200 and 1500 individuals, and the survival of certain populations is under threat:

REGION	ESTIMATED NO	STATUS
1. Harz	200	healthy population
2. Solling	50	very threatened, less than 20-30 individuals
3. Kaufunger Wald Söhre, Meissner	50	threatened
4. Reinhardswald	30	well protected
5. Knüll	25	extremely threatened
6. Hochtaunus	30	extremely threatened
7. Rheingau-Taunus possible link with Westerwald	100	threatened, with serious number of illegal kills
8. Eifel	200-300	healthy population, subject to poaching
9. Hunsrück	200	healthy population
10. Pfälzer Wald	300-400	healthy population
11. Stromberg	25	extremely threatened

Legal status: under complete protection since 1934.

Threats: Legal protection probably contributed to population growth in western Germany between the Second World War and 1950. Since the end of the 1960s, economic growth in western Germany has been matched by major habitat upheavals. The consequences of these changes include:

- the disappearance of certain habitats. It is thus estimated that 120 hectares / 300 acres of woodland and fields vanish each day (PIECHOCKI 1990).
- the parcelling out of the habitat as a result of road construction and urbanization. The creation of these environmental barriers constitutes a major threat in western Germany. At the present time various small populations appear to be seriously isolated. One such is the group living in the wooded area of the Warndt in Saarland (HERRMANN 1987). The Hochtannus and Rheingau-Taunus populations are separated by a motorway and encircled by rivers (Rhine and Lahn) and additional motorways (HOSSFELD 1989). The same applies to the residual populations of Baden-Württemberg. Plans for motorways running across Hesse, Rhineland-Westphalia and Baden-Württemberg do not look hopeful for a stabilization of population numbers over the years to come, except for one or two specific regions (PIECHOCKI 1990 p.37).

This factor goes hand in hand with the increasing direct killing of individuals on expressways.

Cross-breeding with the domestic cat has been observed in small populations such as the Stromberg group (HELLER), and beyond the main distribution area in the Harz mountains in eastern Germany (PIECHOCKI 1986, fig. 7).

For HELLER, WOREL and HEINRICH direct killing seems even more serious. Six cases are mentioned in the Stromberg area between 1980 and 1985 for an estimated population of 25 individuals. In the northwest and south of the Saarland the major factors constricting the distribution area of the subspecies within the large forests are, for HERRMANN (1991), illegal catches and the isolation of populations by built-up areas and roads. The table below showing identified causes of death is biased, but nevertheless gives an idea of the relative importance of causes of death due to man.

CAUSES	Rhineland-Palatinate (VOGT 1984)		Meissner Kaufunger Wald (PFLÜGER 1987)		Eastern Germany (PIECHOCKI 1990)	
	no.	%	no.	%	no.	%
Direct killing (shooting, trapping, dogs)	9	33.0	10	79.9	56	55.4
Killed on roads	15	55.6	3	23.1	22	21.8
Disease					15	14.9
Other natural causes	1	3.7			7	6.9
Unknown	2	7.4			1	1.0
TOTAL	27	100.0	13	100.0	101	100.0

10. GREECE

Person(s) supplying data: P. ADAMAKOPOULOS, G. GIANNATOS, E. PAPADEVANGELOU.

Current distribution: As yet, little is known about the distribution of the wild cat. ADAMAKOPOULOS has drawn up a map showing recent sightings (1985-1990) of the animal (Fig.8). Forty sites, scattered over more or less all the continental part of the country have been listed. The wild cat occurs from sea level to mountainous regions at middle altitudes. It seems to live in every type of habitat: wetland areas, farmlands, maquis scrubland, and forests (GIANNATOS). The map shows just one site in the Peloponnese. This site had traces observed by HAZIRVASSANIS in 1987 on Mount Ziria. The survival of the wild cat in Crete, where there was a recent sighting (a dead animal) reported by SCHWAAB et al, is still uncertain. Previous references and data are those gathered by ZIMMERMAN (1952). This species has been described as F.s. cretensis Haltenorth, 1953, but for RAGNI it is more likely to be associated with F.s.lybica.

Recent developments: ADAMAKOPOULOS is of the view that there have been no conspicuous changes in the wild cat's distribution in Greece in relation to the pattern described in the 1960s, but, as she points out, data are few and far between. PAPADEVANGELOU thinks that population numbers have dropped and that the distribution in the north and centre of the country has been split up.

Legal status: protected since 1990 (PAPADEVANGELOU).

Threats: Those questioned could not gauge the extent of the threats posed to the wild cat in continental Greece. ADAMAKOPOULOS describes the use of poisoned bait for the fox and the marten. The wild cat is present in various reserves and National Parks in the north of the country. The most serious situation is in the Peloponnese and Crete. For GIANNATOS, if the wild cat still exists in these regions--which remains to be proved--it is extremely threatened and its extinction is imminent.

11. HUNGARY

Person(s) supplying data: L. SZEMETHY

Current distribution: A survey has been carried out among hunters, farmers, foresters and rangers responsible for nature conservancy (SZEMETHY 1989), covering 80% of the country. The aim of this study, which was repeated in 1990, is to establish the distribution of the wild cat and cross-bred specimens throughout the country and to detect any changes occurring in the animal's distribution. The results obtained in 1987 show that the wild cat is best represented in the range of middle altitude mountains that extends across the north of the country from the Bakony forest in the southeast as far as the border with Slovakia in the northwest of the country. It is also present in the Hungarian plains to the east of the river Tisza. To the west of the Danube it would seem to occur most of all in the south of the country, in the region around Pécz. The map drawn up by SZEMETHY for 1990 (Fig.8) nevertheless shows that there are also areas inhabited by the wild cat in the central part of the country, west of the Danube, which acts as a link between the southern and northern population groups.

Recent developments: The populations seem to be stable in the mountains, and there would appear to be a slight rise in numbers in the east of the country, along the river Tisza. According to SZEMETHY, this may be due to cross-breeding.

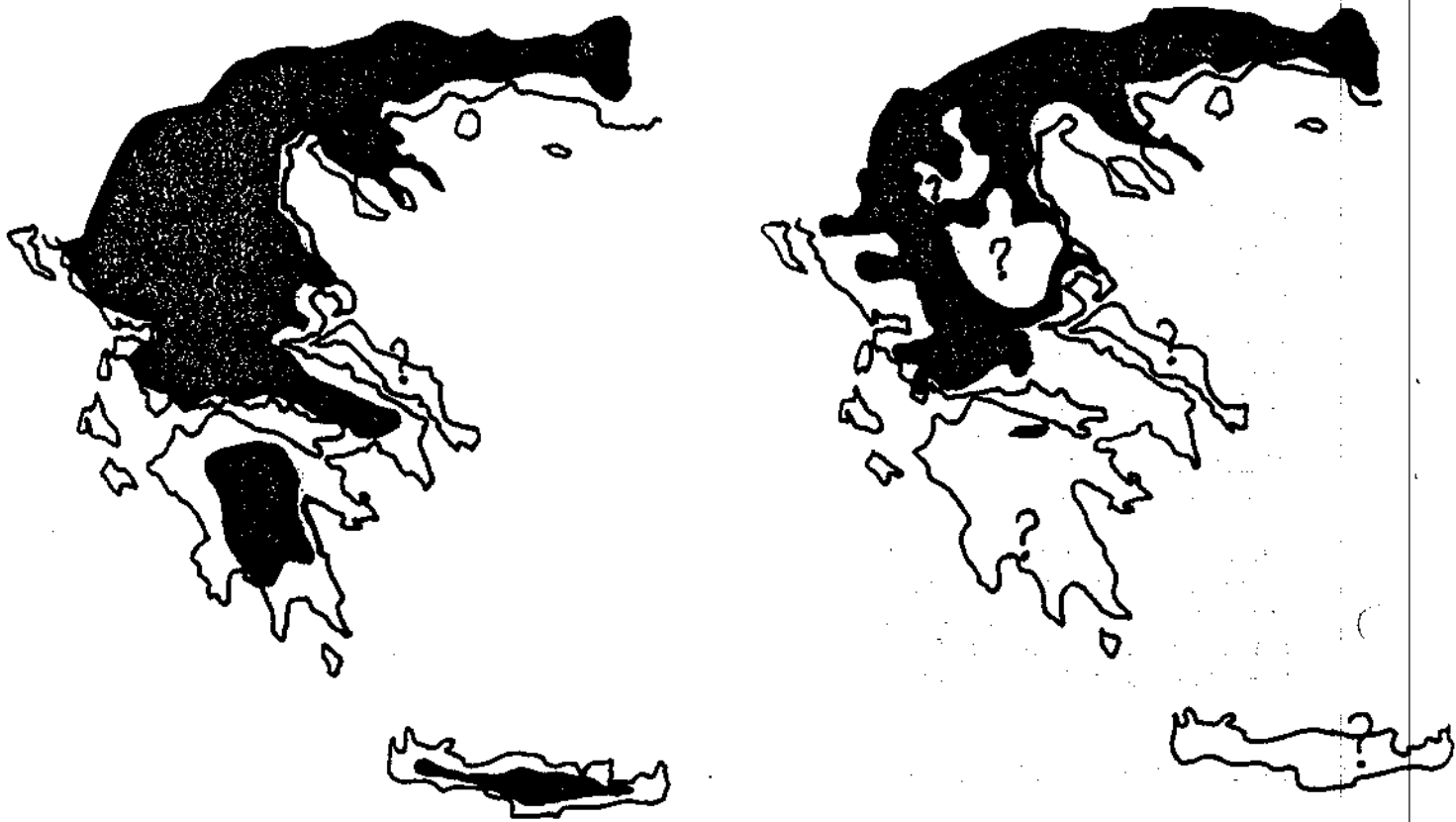


Fig. 8: Distribution of F.s.silvestris in Greece in the first half of this century, and current distribution (ADAMAKOPOULOS forthcoming publication).

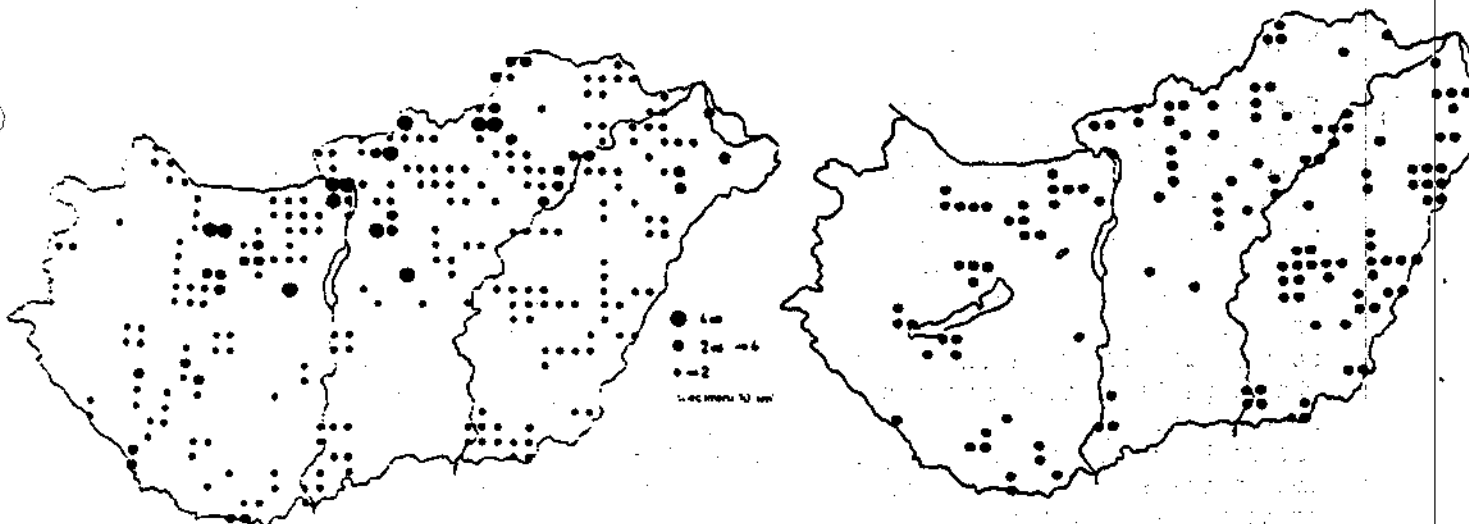


Fig. 9: Distribution of F.s.silvestris in Hungary in 1990 (left),
Distribution of cross-bred specimens out of
F.s.silvestris x F.s.catus (right) (SZEMETHY).

Legal status: protected since 1974.

Threats: The threats described by SZEMETHY have to do with the alteration and regression of the forest habitat, illegal kills, and cross-breeding with the domestic cat. The results from cross-breeding data have not yet been published. Based on a multivariate analysis of the craniometric data and the pattern of the coat, it would appear, according to SZEMETHY, that there is a widespread presence of cross-bred animals in the country (Fig.8).

12. ISRAEL

Person(s) supplying data: H. MENDELSSOHN.

Current distribution: We have not had access to any references on the distribution of the wild cat in the country, but we have seen a detailed and alarming description of the situation of *F.s.lybica* in Israel, made available to us by H. MENDELSSOHN. The same situation may also apply in other parts of the Mediterranean basin where there are sharp increases in the density of human populations. This study merits a little closer attention, in the detail.

At the present time, for MENDELSSOHN, "thoroughbred" wild cats are rare or maybe already extinct. Virtually all the specimens caught over the last ten years and brought to the Tel Aviv University "Research Zoo" for identification were cross-bred animals. This development seems to have been a swift one.

Recent developments: Initially, and up until the 1930s and 1940s, the wild cat was very widespread throughout the country. It lived in almost every type of habitat, apart from sand dunes. But its favourite habitat was the Mediterranean forest in hill-country and rocky terrain, where the approximate density was estimated at one individual per sq.km. The main problem that has beset the wild cat here has not been human hunting, but the feral domestic cat. With increased human population and settlement in an ever-growing number of places, the number of domestic cats has risen considerably since the 1940s, and many of these domestic cats have become feral, thus adding to the already existing populations. These animals scavenge for food in rubbish dumps and dustbins.

Legal status: Protected since 1954.

Threats: Feral cats endanger wild cats in different ways:

1) Competition: wild cats live at a density of approximately one individual per sq.km., whereas feral cats live near human settlements and habitations at a density of several individuals per acre and venture deep into natural habitats too. Based on nighttime counts, they would appear to be far more plentiful than wild cats. Feral cats are considerably larger than wild cats, so they can compete strongly for food, as well for females on heat. Other features work against the wild cat too, when it comes to competing with the domestic cat: it only feeds on live prey, whereas the domestic cat has a wide-ranging diet (including waste foods); the wild cat only reproduces once a year, with sexual maturity occurring at one year, whereas the domestic cat reproduces twice a year and females can bear young from the age of eight months.

2) Cross-breeding: this seems to be straightforward enough, because there are no behavioural, vocal or olfactory obstacles between the two forms, and because feral males, which are larger than male wild cats, are probably well-placed when it comes to competing for females on heat.

3) Panleukopenia: Adult feral cats seem to be resistant to feline panleukopenia. Their resistance is probably acquired during the first year of their life. Wild cats, on the contrary, are 100% vulnerable to panleukopenia during their first year unless they are vaccinated. It is therefore possible that the disappearance of wild cats is not due only to competition and cross-breeding, but also to infection by this feline disease.

A few wild cat specimens are housed in the University Zoo, but in the long term there is a risk of excessive consanguinity and domestication. Unlike stray dogs which are shot by night by nature reserve rangers, there appear to be no practical methods of getting rid of feral cats. As a result, and despite the existence of reserves of the right size, it does not seem to be a good idea to go ahead with re-introductions.

13. ITALY

Person(s) supplying data: E. NATOLI, B. RAGNI.

Current distribution: The wild cat's recent distribution area in Italy has been charted on the basis of two surveys carried out over the length and breadth of the country between 1971 and 1973 (CAGNOLARO *et al* 1983) and between 1976 and 1977 (PAVAN & MAZZOLDI 1983). As in France, and probably Greece, too, both sub-species are represented: F.s.silvestris is present in continental Italy and in Sicily, while F.s.lybica var. sarda is present in Sardinia (Fig.10).

In the north of the country, present distribution of the European sub-species includes two small isolated areas (Fig.9). One is situated in the Appennines and the Ligurian Alps along the French border in the province of Imperia. In our view, this area is probably isolated in so much as there is little probability that wild cat populations have survived on the French side of the border. The second zone where wild cats are found is situated along the Yugoslavian border, in the Friuli Venezia Giulia region, in the pre-Alps and in the Carnic Alps. Here, contrary to the previous example, there may be a migratory movement from other parts. According to RAGNI (1988), movements from Slovenia have been observed since the 1980s. Outside these two areas, the wild cat does not occur anywhere else in the whole of northern Italy, down to a line passing through Piombino, Perugia and Fabriano. South of this line, the distribution area is more or less continuous, spreading east and west from the Appennines. In Sicily, the European sub-species is represented most particularly along the northern mountain range (RAGNI, *op.cit.*).

The Sardinian wild cat has a less well-defined distribution area than the European sub-species. It seems to overlap almost completely with the distribution of the island's wooded and forested mountainous areas. The result is a somewhat parcelled distribution (RAGNI *op.cit.*).

Recent developments: For RAGNI (1981), the current wild cat population trend in Italy is showing a slight yet progressive drop in numbers. For NATOLI, on the other hand, the wild cat in eastern Sicily is benefiting from the increasing desertification of this region, a phenomenon that is being accompanied by rural emigration. RAGNI (1988) puts forward the hypothesis that there may be a dispersal into neighbouring regions from the area currently inhabited by the wild cat in the northeast of the country to the Yugoslavian border. He thinks that the distribution area in the peninsula and in Sicily should remain stable, given the current habitat conditions, with a possible extension northwards. Wild cats are possibly more vulnerable in Sardinia, because of their affinity with the catus group and their geographical isolation.

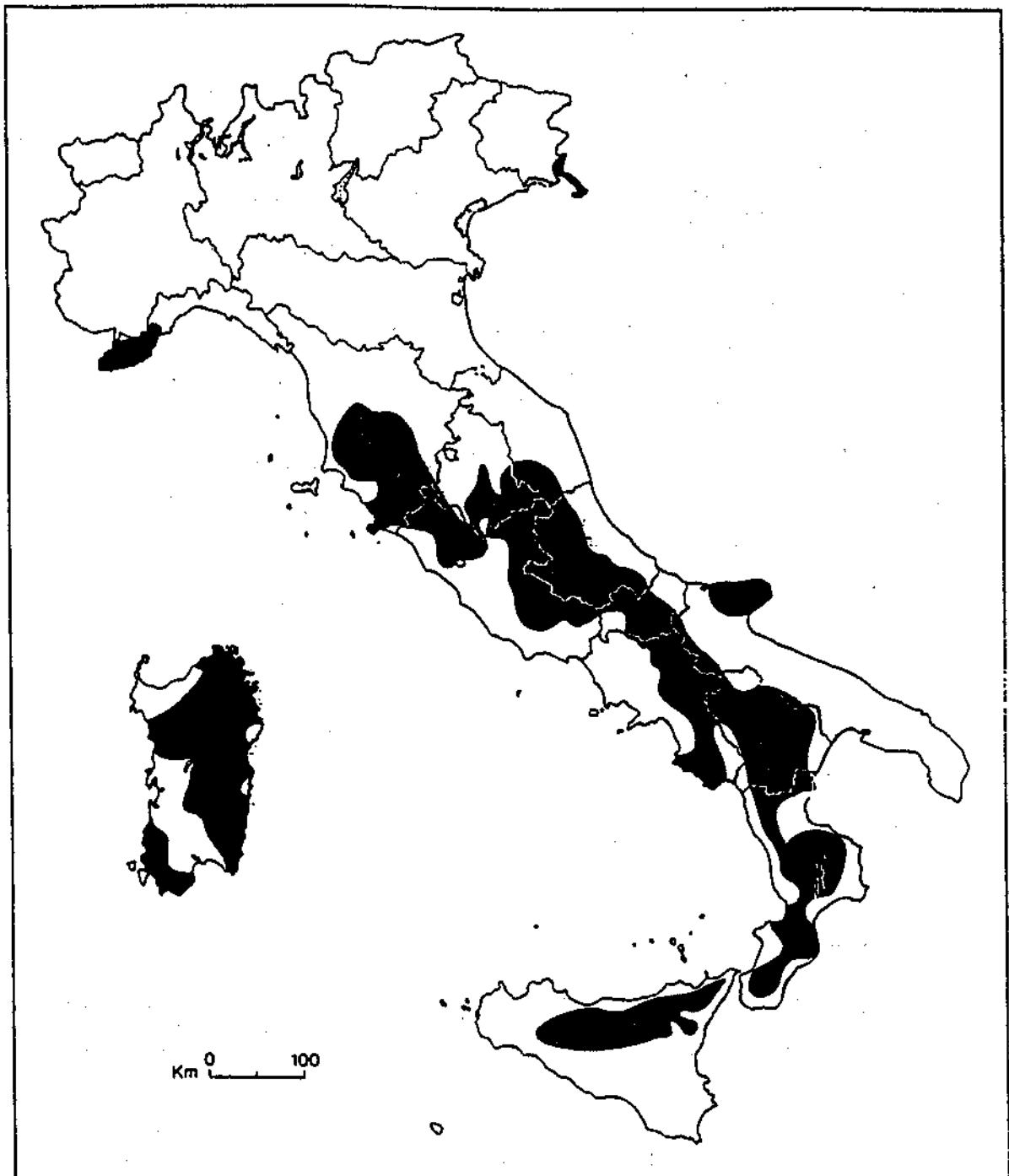


Fig. 10: Distribution of *F.s.silvestris* in Italy and Sicily, and of *F.s.lybica* in Sardinia (PAVAN & MAZZOLDI 1983).

Legal status: indirectly protected in so much as the wild cat is not included in the list of game species.

Threats: For RAGNI, the major threat that has been noted for the past ten years or so in Italy, which is probably the same throughout the wild cat's distribution area, is posed by the interaction between a variety of factors, and namely:

- the development of the road network at local and national levels,
- increase in road traffic,
- extension and modification of the road system up to the 1980s.

These changes involve a:

- splitting up of the habitats,
- reduction of the size of the habitats,
- creation of environmental barriers between populations,
- direct killing of individuals.

For RAGNI it remains to be proved that cross-breeding between wild cat and domestic cat populations constitutes the principal threat. Results obtained on genetic variability and phylogenetic relations between Italian wild and domestic cats (RANDI & RAGNI 1986, 1991), as well as on their craniometric characteristics (RAGNI & RANDI 1986) and the pattern/colour range of the coat (RANDI & RAGNI 1986) lead these authors to conclude that there is little likelihood of any significant genetic flow between the populations of European wild cats and domestic cats. They point out, nonetheless, that cross-breeding is possibly an important factor in small low-density isolated populations, which suffer from a significant mortality rate caused by human activity. They add that cross-breeding may be a particularly important factor in populations on Mediterranean islands, which present a strong genetic affinity with domestic cats.

14. LIBYA

No data.

15. LUXEMBOURG

Current distribution: Luxembourg (PARENT 1975, 1976) was colonized in about 1940-1950 in the south and east (Gutland) by populations from France and Belgium, and in the northeast (Oesling) by populations from the Eifel region of Germany.

Recent developments: We are not familiar with any recent references to the development of wild cat populations, but the situation is probably similar to the situation in Wallonia, French Lorraine and Rhineland-Palatinate.

Legal status: under total protection.

16. MOROCCO

Person(s) supplying data: S. AULAGNIER

Current distribution: The distribution area (Fig.11) follows the various mountain ranges: Rif, Central Plateau, Middle Atlas, High Atlas, and extends in the south as far as Western Sahara (AULAGNIER & THEVENOT 1986).

Recent developments: Forestry Commission (Eaux et Forêts) statistics for the period 1959-1971 given by AULAGNIER refer to between 19 and 368 catches a year (about a hundred on average). There is no clear trend. AULAGNIER nevertheless

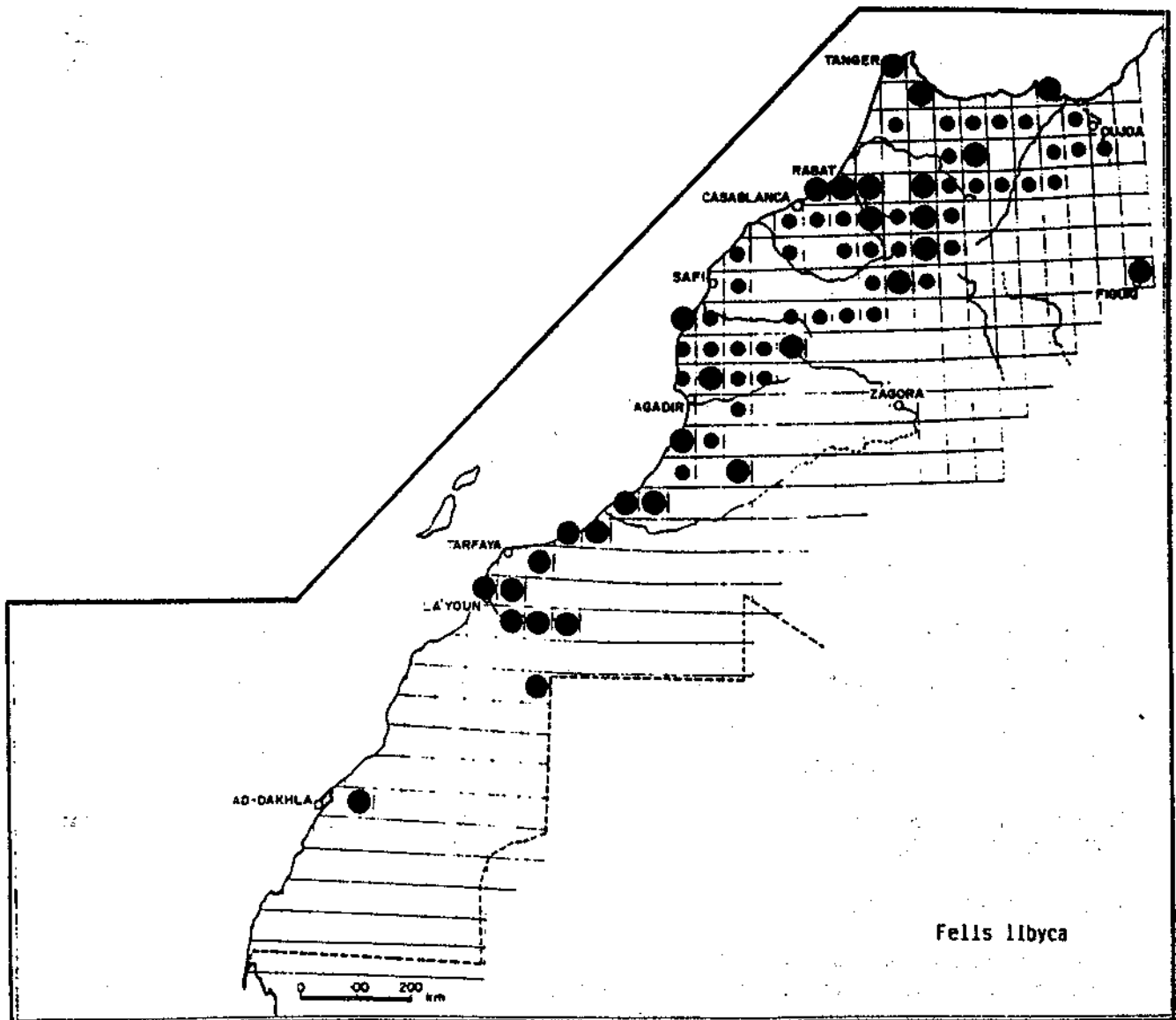


Fig.11: Distribution of *F.s.lybica* in Morocco
(AULAGNIER & THEVENOT 1986)

points out the risk of confusion with domestic cats in this type of statistic. Outside of areas taken over by agriculture, AULAGNIER (1990) considers that the sub-species is common but there is a likelihood of the distribution area becoming smaller and parcelled out in all the various regions that have been taken over by man.

Legal status: protected by law since 1974.

Threats: In AULAGNIER's view the sub-species is under no threat at local level.

Observations: Population growth, giving rise to an increased agricultural development, and industrial development in the country are the causes which have affected the panther (combined with direct killing), and, in the medium term, these factors could pose a problem for the wild cat as well.

17. NETHERLANDS

Person(s) supplying data: J. MULDER.

Current distribution: The sub-species is extinct. A few individuals mistaken for wild cats were caught sporadically in the 1950s and in the early 1960s (VAN BREE 1959, VAN BREE 1963). In fact these animals were actually feral cats (VAN BREE *et al* 1971). An authentic wild cat was nevertheless found in the Dutch Limburg region (DE HAAN 1970), but this is the last known sighting.

Observations: Given the small area appropriate for wild cats in the country, it would seem unlikely that any stable and durable populations could re-establish themselves in this country.

18. POLAND

Person(s) supplying data: H. OKARMA, Z. PIELOWSKI.

Current distribution: The wild cat occurs only in the southwest of the country (TOMEK 1958, PUCEK & RACZYNSKI 1983). It seems to have disappeared from all other parts. This distribution area is situated in the Carpathian mountains, on the border with Slovakia (Fig. 12). Forestry statistics supplied by LINDEMANN (1953) indicate the presence of about 90 to 180 individuals in the 1930s in the western Carpathians.

Recent developments: Present population trends in Poland are not known (OKARMA, PIELOWSKI).

Legal status: protected since 1948.

Threats: PIELOWSKI mentions as a potential threat the splitting up of populations by the development of infrastructures and cross-breeding with the domestic cat. A breeding programme in captivity may be launched at some future date.

19. PORTUGAL

Person(s) supplying data: M. LOPEZ-FERNANDEZ

Current distribution: According to the map prepared by PIECHOCKI based on data supplied by Margarida SANTHOS-REIS (Fig.13), the wild cat occurs essentially in the north and south of the country, as well as along the whole eastern border with Spain. But we do not know if this survey covers the whole country.

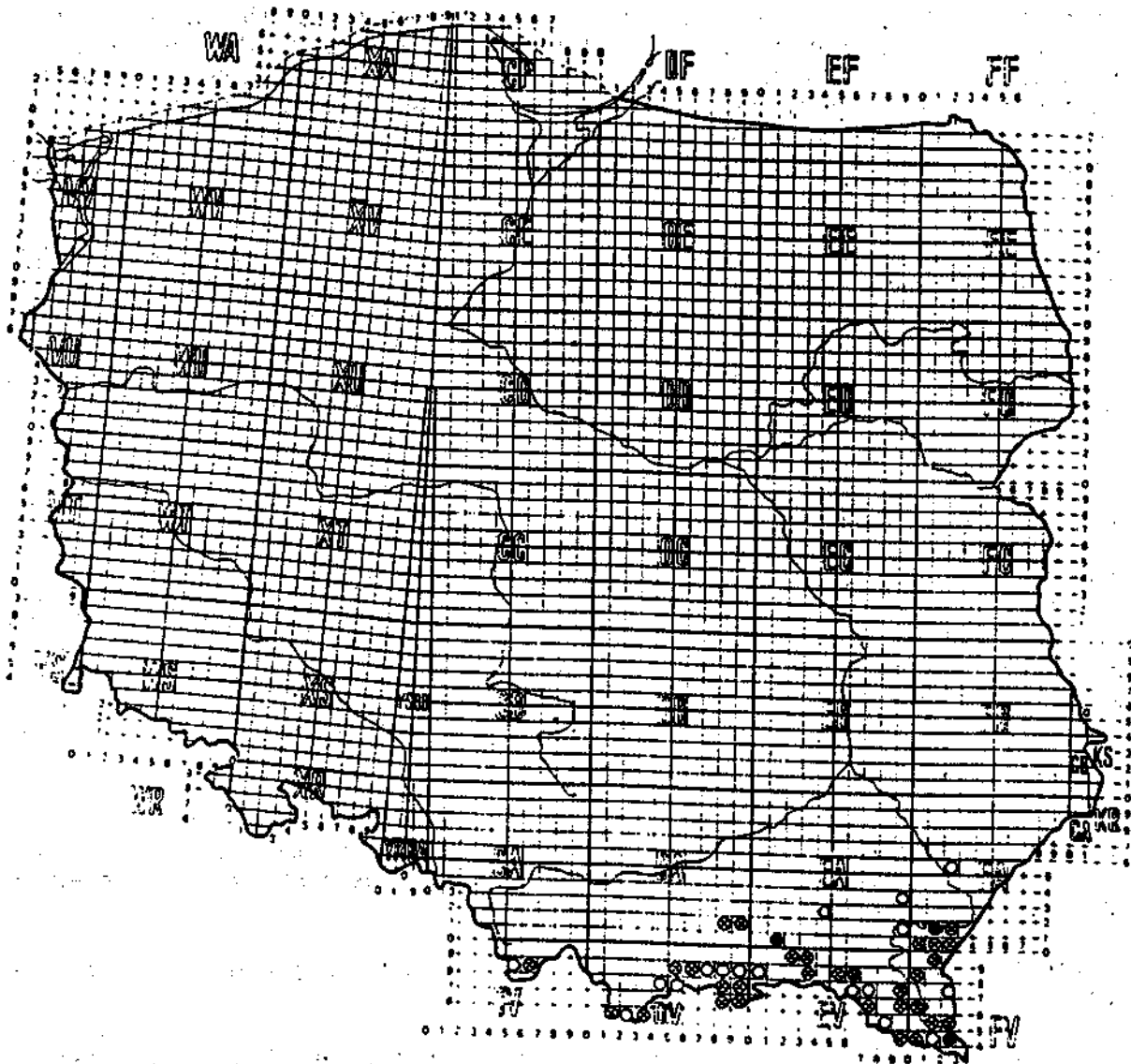


Fig.12: Distribution of *F.s.silvestris* in Poland
(PUCEK & RACZYNSKI 1983) Legal status: Game for which there is no open
hunting season.

Recent developments: In the Red Book of Vertebrates for Portugal, CABRAL et al (1990) are of the opinion that the population is shrinking.

Legal status: protected.

Threats: LOPEZ-FERNANDEZ refers to the disappearance of the forest habitat and changes in it, particularly in the north and centre of the country, as a result of fires and eucalyptus plantations. Division of the wild cat populations can also result from the development of the road network and the unbridled urban development in certain districts. Cross-breeding would also seem to be a serious problem in Portugal, if one considers the field data about the pattern and biometrics. It is also difficult to control illegal kills.

Observations: Various studies are under way or planned: they include two studies on the ecology of the wild cat, including a follow-up of individuals by radio-tracking, which are already in progress, one since 1989 in the Montesinho Wildlife Park (NE Portugal) and the other since 1990 in the Malcata Wildlife Park (central/eastern Portugal). There are plans to undertake a national survey and make a compilation of wild cat sightings.

20. ROMANIA

Person(s) supplying data: P.WEBER

Current distribution: No precise data exist. CALINESCU (1931) and VASILIU (1961) simply make the point that the animal is common. According to the map prepared by PIECHOCKI based on data supplied by WEBER, the distribution area overlaps with the distribution of the pre-alpine and mountainous areas of the eastern and southern Carpathians, with the exception of high altitude areas. (Fig.14). The wild cat is also present in the forests along the river Danube, where it would seem to survive in the form of several distinct nuclei (KALABER 1975, NEGULICI 1978).

Recent developments: According to WEBER, there have been no conspicuous changes in the wild cat's recent distribution--changes which could be detected from hunting statistics.

Legal status: May be hunted all year round, but is protected in nature reserves.

Threats: The wild cat occurs in various protected areas. Hunting statistics indicate a very low index of 200-300 individuals a year. According to WEBER the animal appears to be under no major threat.

21. SPAIN

Person(s) supplying data: J. RUIZ-OLMO.

Current distribution: Precise details for the distribution of the wild cat are not known for the whole of Spain. According to VERICAD (1970), it used to live throughout the Iberian peninsula, and for AYMERICH (1982) it still occurs in almost all of it. For DELIBES (1981), however, it is rare except at a local level. This seems to be confirmed by the recent regional atlases published for Asturias (QUESADA 1986), Catalonia (GOSALBEZ 1987, RUIZ-OLMO 1990) and the Basque country (ALCANDARA et al 1985), where the wild cat appears to be completely non-existent in some parts of these regions. In Catalonia, the wild cat occurs solely in the Pyrenean and pre-Pyrenean areas. The distribution given in fig.1 in the northeastern part of Spain, as drawn up by RUIZ-OLMO

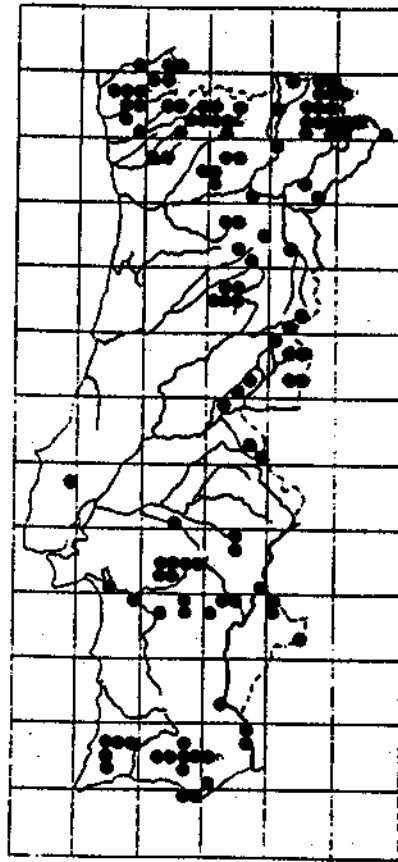


Fig.13: Distribution of *F.s.silvestris* in Portugal
(SANTOS-REIS in PIECHOCKI 1990).

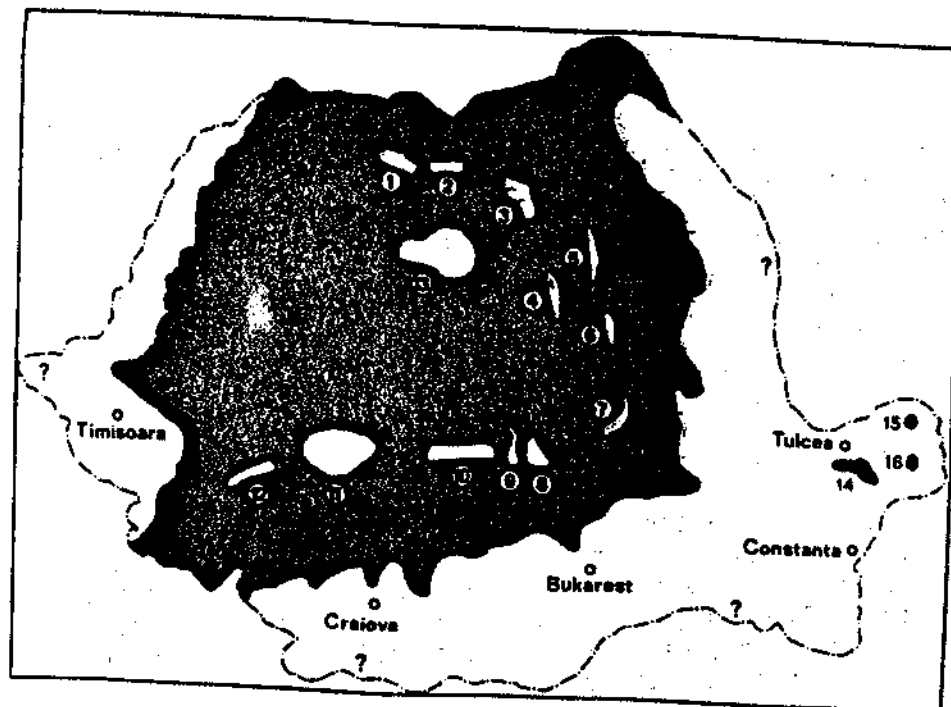


Fig.14: Distribution of *F.s.silvestris* in Romania
(WEBER in PIECHOCKI 1990)

(written comm.) corresponds with mountainous areas with low human population density. In this region, according to RUIZ-OLMO, the wild cat lives in a wide range of habitats, some of them even deforested and degraded areas, when human population density is low.

Recent developments: Distribution developments are only known at a local level. In the "Monte de El Pardo" Royal Hunting Reserve, near Madrid, hunting statistics analysed since the 18th century show that the density of wild carnivores is on the decline, and that the situation of the wild cat is now critical (ALCANDARA & CANTOS 1991). Conversely, the numbers of wandering cats and stray dogs are on the increase. The decline of the wild species is due essentially to the various systems of hunting management, because the habitat itself has undergone little change. In the Doñana National Park, in southeast Spain, wild cats seem to have become rare (DELIBES 1981), in the wake of myxomatosis.

Legal status: completely protected since 1980.

Threats: DELIBES (1981) pointed out that in Andalusia, in certain parts of the Sierra Morena, there seemed to be stable hybrid populations issuing from cross-breeding between domestic and wild cats. Cross-bred specimens have also been observed in the Basque country (ALCANDARA *et al* 1985), and this problem has also been raised in Catalonia (RUIZ-OLMO). According to RUIZ-OLMO, there are few direct kills. Most animals are caught unintentionally. Fewer than ten individuals are shot and killed each year in Catalonia.

Observations: In the Coto Doñana reserve a few individuals have been radio-tracked so as to study their movements and the way their habitat is used (DELIBES, personal comm.), but the results are not known.

22. SWITZERLAND

Person(s) supplying data: M. LIBEREK, P. LÜPS, J.M. WEBER

Current distribution: On the map given to us by LÜPS, the sightings and specimens definitely identified in Switzerland since 1969 are distributed in the Jura, along the border with France (Vaud, Neuchâtel, Berne and Jura cantons). The wild cat is non-existent in the pre-Alps and in the Alps, but this has always been the case (SCHAUENBERG 1970; Fig. 15).

Recent developments: The map drawn up by SCHAUENBERG in 1970 shows that the distribution area occupied by the wild cat shrunk considerably between the pre-1900 period and the 1970s (Fig. 15). The sole distribution area is situated near the French border, and, according to EIBERLE (1980), the wild cat's habitat is not becoming extended, contrary to the situation found in other European countries.

From 1969 on, several new sightings have been recorded in Berne canton (LÜPS 1971, 1976, 1981). The map of sightings recently supplied by LÜPS shows that the distribution area is spreading northwards in Berne and Jura cantons. LIBEREK and WEBER alike point to a rise in the frequency of sightings over the past five years or so, as well as in the number of accidental catches in the Vaudois area of the Jura in traps set to catch lynxes.

Legal status: protected since 1962.

Threats: For EIBERLE, direct kills are the cause of the animal's decline in the Jura. The remaining populations live in habitats where the harsh climate (deep snow cover) offers far from ideal conditions for the wild cat. The

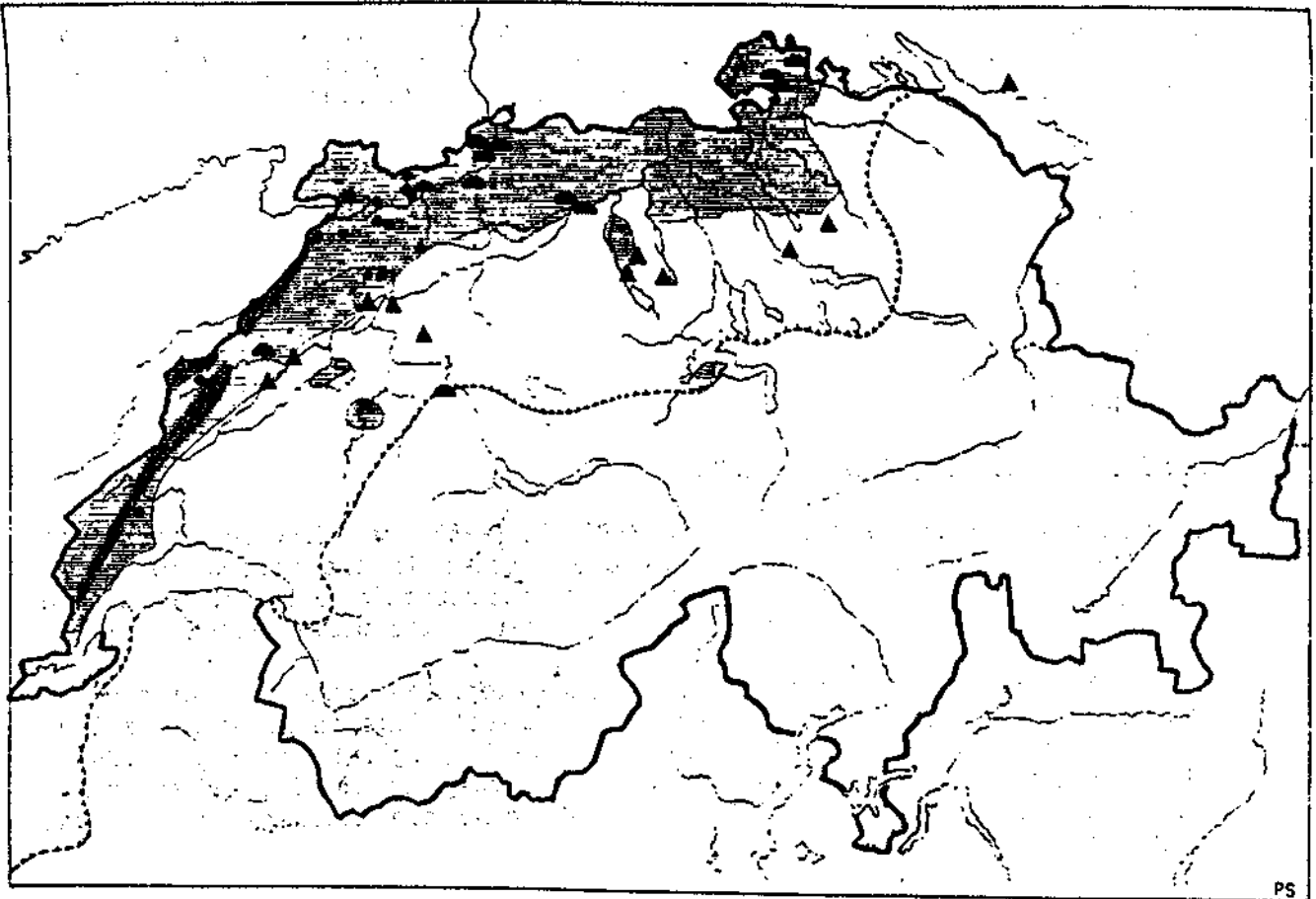


Fig. 15: Distribution of F.s.silvestris in Switzerland, according to SCHAUENBERG 1970.

Remains exhumed in grottoes (■); Neolithic remains (▲); distribution before 1900 (horizontal hatching); distribution in 1970 (vertical hatching).

The dots represent sightings of F.s.silvestris since 1969. Based on LUTZ.

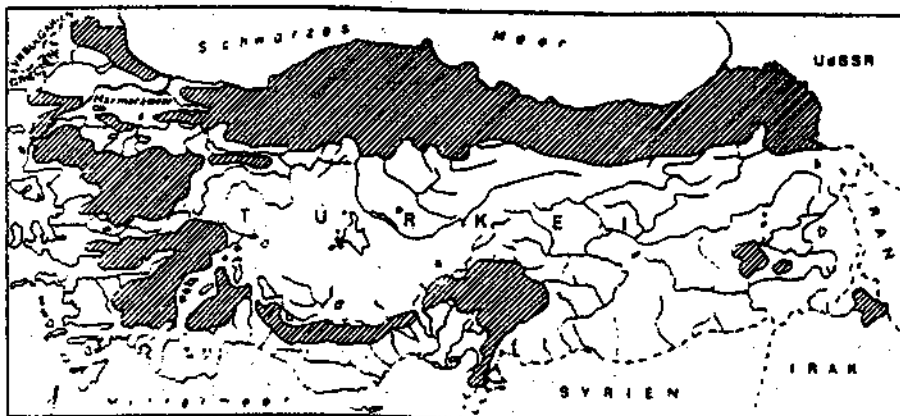


Fig. 16: Distribution of F.s.silvestris in Turkey. After TURAN in PIECHOCKI 1990.

extent and current type of threats to the animal's survival are not known (LIBEREK, LUPS, WEBER), but for Weber the splitting up of population groups and cross-breeding are probably instrumental in Switzerland.

23. SYRIA

No data.

24. TUNISIA

No data.

25. TURKEY

Person(s) supplying data: M. SEREZ.

Current distribution: According to KUMERLOEVE (1967), who drew up a sightings map for the sub-species, wild cats are present in the wooded mountains throughout the northern part of Anatolia, in the mountain ranges of the middle Taurus in the south of the country, and as far as the plains around Adana.

The sub-species also occurs in Thrace, along the border with Greece and Bulgaria, and along the Soviet border (Caucasus). This description tallies with TURAN's map (1984), used by PIECHOCKI (1990) (Fig.16). For SEREZ (1990), the wild cat occurs more or less throughout Turkey, in broadleaved and mixed forests. The only parts where it is not found are southern and central Anatolia.

Recent developments: It is SEREZ's view that the distribution pattern has remained essentially the same.

Legal status: protected since 1976.

Threats: According to SEREZ, the main threats are illegal kills and the decline of suitable habitats throughout Turkey.

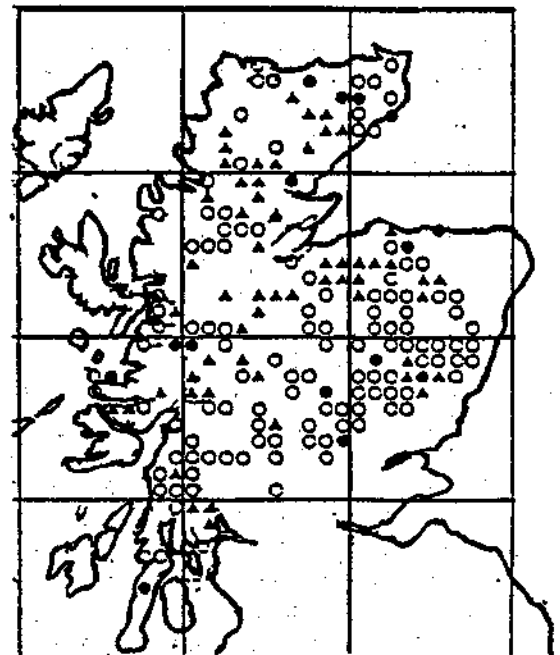
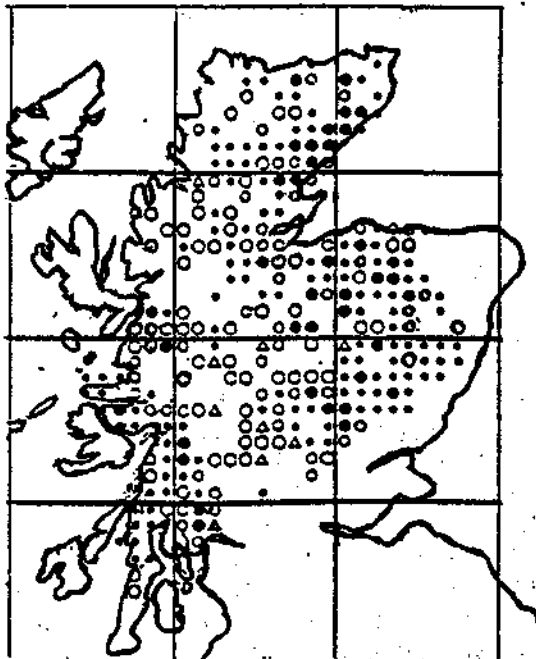
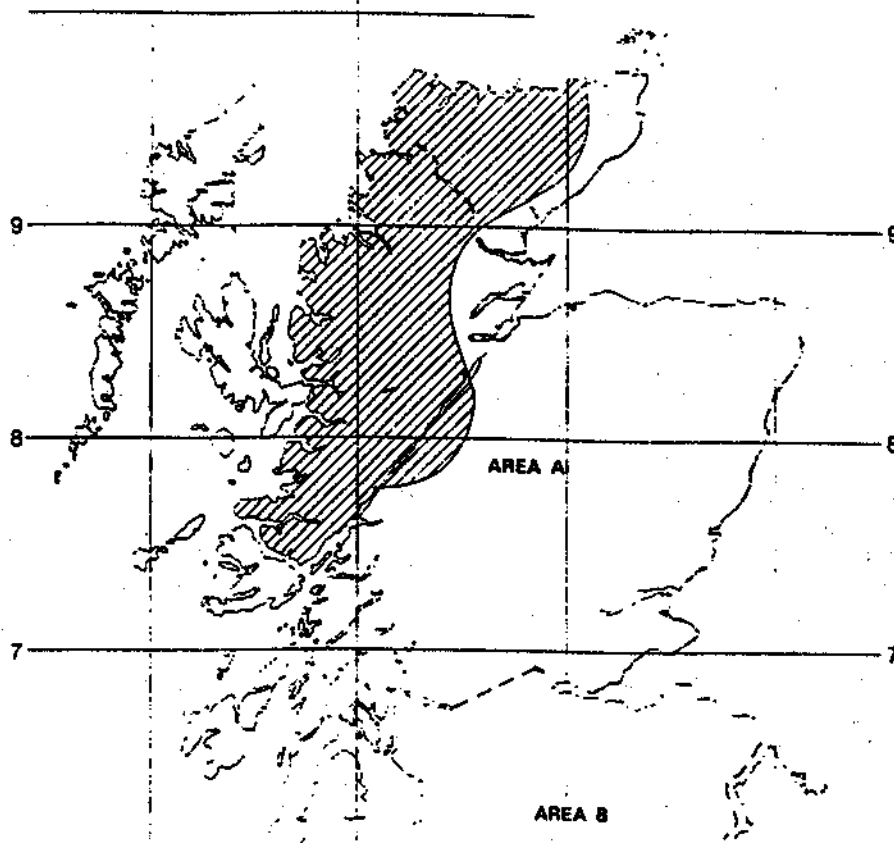
Observations: The wild cat is present in all National Parks, Nature Conservancy sites and hunting reserves (SEREZ).

26. UNITED KINGDOM

Person(s) supplying data: A. KITCHENER, S.MAC ORIST.

Current distribution: A series of different studies has established the specific distribution of the wild cat in Scotland. TAYLOR (1946) reported sightings made in Scottish forests belonging to the Forestry Commission. Later, JENKINS (1962) carried out a survey among the Scottish Sporting Estates. More recently, distribution maps have been drawn up by the Mammal Society (CORBETT 1971) and the Biological Records Centre (ARNOLD 1978, 1984). These maps give accumulated data gathered in a non-systematic manner over a long period of time (1960-1983). In addition, the Forestry Commission produces maps at five-year intervals for forested and wooded areas. From 1983 onward, the Nature Conservancy Council has operated a systematic watchdog programme which covers all habitats suitable for the wild cat in Scotland, the aim of which is to detect any possible changes in distribution and numbers. The basis of this programme consists of interviews with people whose activities (game-keepers, foresters, hunters, sheep-farmers etc.) would tend to acquaint them with the wild cat's habits. The existence and non-existence of the wild cat are recorded in 10 sq.km. / 4 sq.mi. grid units over a total area of about

Fig.17: Distribution of *F.s.silvestris* in Scotland in about 1915, based on LANGLEY & YALDEN (1977), and current distribution (Nature Conservancy Council 1988).



- | | | |
|-------------|---------------|------------|
| • common | • occasional | • increase |
| ○ rare | ▲ rare/absent | ○ stable |
| • undefined | | ▲ decrease |

50,000 sq.km. / 20,000 sq.mi. Additional data on recent developments and kills are also required. This survey shows that the main populations are located in the west of the country and along the coastline in the southwest (Fig.17). The distribution area is limited along the eastern seaboard by lowland regions given over to intensive farming. In the mountainous regions in the west and north distribution is more patchy. Here, wild cats either exist in low density groups, or are altogether absent from very large areas.

Recent developments: The population decrease of the wild cat in Great Britain has been particularly closely studied by LANGLEY & YALDEN (1977). The destruction of the forest habitat in England and Wales, as well as direct kills are the two causes blamed for this decline. The wild cat actually disappeared from southern England from the 16th century onward. By about 1880 it had completely disappeared from England, Wales and southern Scotland. In this latter region, its distribution area shrunk progressively up until the First World War. By this time, the wild cat was restricted to a small area in northwest Scotland (Fig.17). One side-effect of mobilization during the war was a lower incidence of direct wild cat kills. This enabled the wild cat to start regaining abandoned parts of its distribution area. A falling-off in trapping caused by a thinning of the numbers of professional game-keepers after the war further enabled the animal to continue to spread: JENKINS (1962) indicates an extension of the distribution area to the southwest in relation to data presented by TAYLOR (1946). According to the NCC survey (ESTEARBEE 1988, NCC 1988), it would seem that this extension continued in the post-1960 period towards the east and southwest. This survey nevertheless shows that, during this 20-year period, there has also been a regression in the northeast and in the south. As far as the current population trend is concerned, the NCC survey presents data on 189 out of 234 grid squares where there is information about the wild cat's status (present, occasional, rare, rare/absent). In 60% of these squares no change is recorded over the previous five-year period, with a decrease shown in 29% and an increase in 11%. Population increases seem to have occurred particularly in areas where populations are well established (in other words, where wild cats are observed regularly every year), whereas a population decrease is observed in 30% of the squares where the presence of the animal is only occasional (spasmodically sighted cats) or rare (a maximum of one or two sightings during the past five years). This drop in numbers seems to be affecting the northern and western parts of the distribution area in particular.

Legal status: protected since 1988.

Threats: According to the NCC survey, the population decrease may be the result of a variety of factors. Modification of the habitat (for example, ageing coniferous plantations) may play a part. According to CORBETT (1978) wild cats usually frequent forests that are in the early stages of growth. These habitats offer plentiful food resources (rodents, rabbits) and shelter. According to CORBETT, the numerical increase and the spread of wild cats are both linked with the enlargement of this type of habitat and a lower kill rate. According to the NCC survey, however, the kill rate seems to be persisting at a high level. Kills are reported in 68% of the grid squares for which data (negative or positive) have been obtained (n = 163). They are most frequent in areas where grouse and pheasant are intensively hunted. MAC ORIST & KITCHENER are of the view that there is a combination of threats working against the wild cat in Scotland. MAC ORIST refers to the reduction of the forested area in northern Scotland (but an increase in the south), as well as to growing urban development which brings with it the introduction of domestic cats. In the long term, cross-breeding poses a serious problem (FRENCH *et al* 1988). For MAC ORIST, this problem is all the more significant because human population density is high, and because wild cats have only recently appeared

here. In this respect, the most critical situation is to be found in the south-east of the current distribution area. MAC ORIST's observations are based on a study carried out on cross-breeding with the domestic cat. Based on this study, various other reports on the genetic status and the 30 diseases to which the wild cat is vulnerable are currently at the printer's. S. MAC ORIST indicates that cross-breeding has been charted in Scotland by using the coat model, DNA surveys, enzymatic systems and genetic length measurement. The results suggest there are still Felis silvestris silvestris individuals that are genetically distinct from domestic cats. The numbers of thoroughbred wild cats are nevertheless dropping in most parts of Scotland, while hybrid populations are on the rise. The feline leucosis (FeLV) virus has been identified in these populations, whereas the FIV (feline lentivirus) and the FCov have not. A programme for training and rearing wild cats in captivity is in the planning stages.

27. USSR

Current distribution: The wild cat's distribution area covers the west of the country, and is divided into two parts: European and Caucasian. In the European part, the sub-species now only lives in a small area in Moldavia in the forests along the river Prut, on the Romanian border, and in the Carpathian forests, on the border with Czechoslovakia. According to the USSR Red Book (BORODIN et al 1985), the total population in this region is estimated at around 500 individuals, with some 250-300 of these living in the Carpathian region of the Ukraine, and perhaps a further 60 in Moldavia. In the Caucasus, the sub-species spreads northward as far as the river Kuban' and the Terek delta. It is probably also plentiful in some of the southern republics (Azerbaijan, Armenia) and in the northern Caucasus (HEPTNER & NAUMOV 1980).

Recent developments: Over the past few decades the sub-species has disappeared from the forest and banks of the river Dnestr. Further, over the past hundred years, the area can be reckoned to have shrunk by more than one half (BORODIN et al 1985). In the 19th century, the wild cat was present over a much larger area including Byelorussia, the Baltic countries, and as far north as Riga on the shores of the Baltic Sea (HEPTNER & NAUMOV 1980). Nothing is known of developments in the Caucasus.

Threats: The disappearance of the habitat itself appears to have been a significant factor in the western part of the distribution area in the USSR. The effects of modifications undergone by the habitat on the declining numbers of the sub-species have been suggested as a cause in the case of Moldavia (HEPTNER & NAUMOV 1980) and northwest Russia (TSALKINE 1952). In this latter region, the broadleaved forests have been destroyed and replaced by conifers, giving rise to changes in fauna and the enhancement of features typical of the taiga. Trapping for furs to sell has been a major source of wild cat kills. In the USSR in the 1950s, between 9,000 and 11,000 wild cat furs were sold annually, most of them hailing from the Caucasus (HEPTNER & NAUMOV 1980).

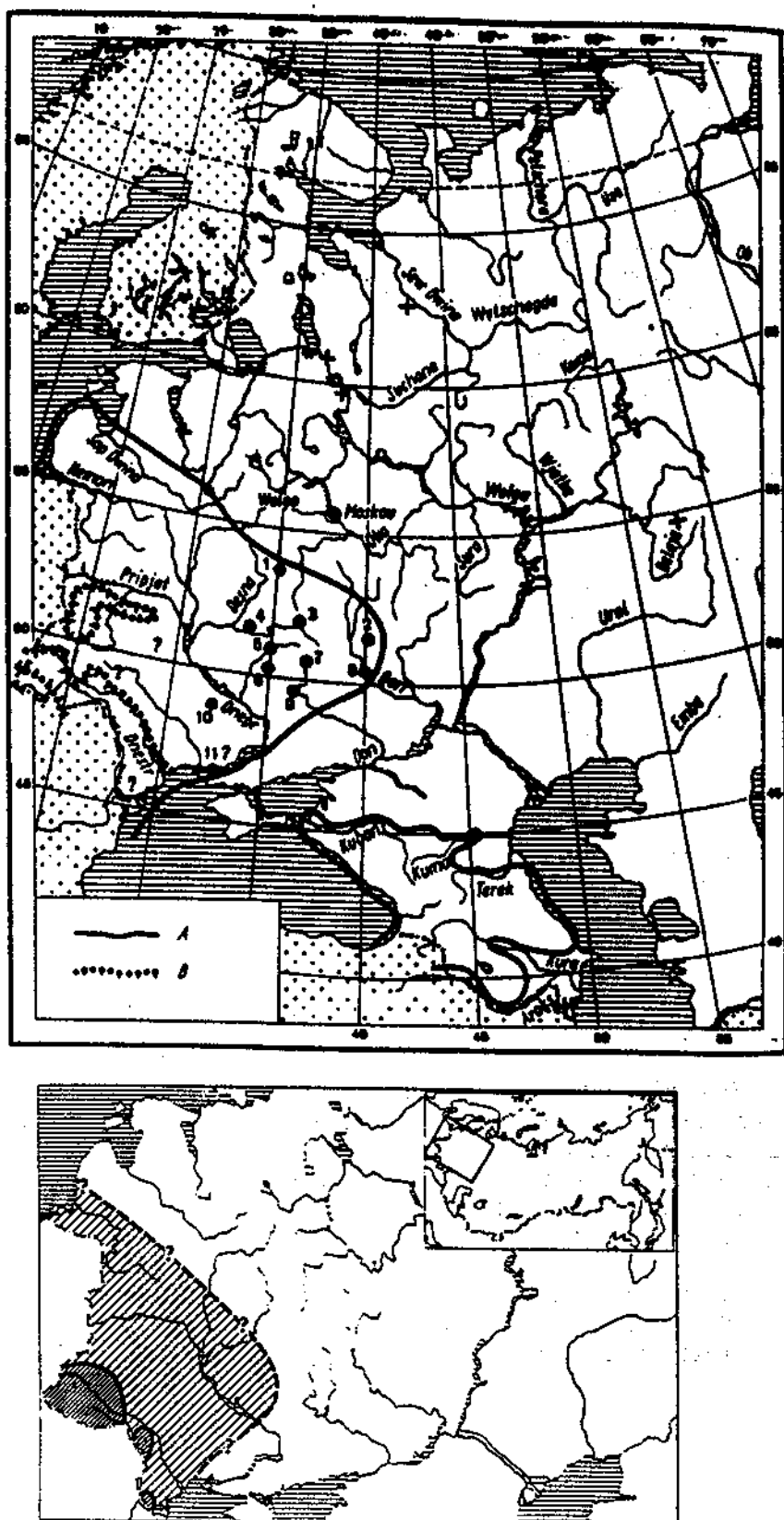


Fig.18: Distribution of *F.s.silvestris* in the USSR.
Based on HEPTNER & NAUMOV (1980)

A = former distribution, B = distribution in about 1970
At bottom: current distribution based on BORODIN et al (1985).

28. YUGOSLAVIA

Current distribution: Very little is known about it. According to DULIC & TORTIC (1960), the sub-species was present in all the republics. More precise data exist for Vojvodina (DIMITRIJEVIC & HABIJAN 1976). As a result of night-time transects carried out between October and April, the total number of individuals present in the region is estimated at 567, and this tallies with estimates obtained on the basis of the number of individuals killed. The wild cat is present along rivers, and its numbers dwindle towards the north. Densities estimated by this method vary between 3.8 individuals per 100 sq.km./40 sq.mi. in the young forests of the Deliblato Desert, and 78.5 individuals per 100 sq.km. / 40 sq.mi. in the mature forests, more than 30 years old, along the river Theiss.

Recent developments: No data have been collected on recent population trends and types of threats.

V. THE FUR TRADE

Data on the Felis silvestris fur trade have been obtained from the World Conservation Monitoring Center. Felis silvestris is listed in Appendix II of the Washington Convention (CITES). The figures do not permit any distinction to be made between the trade as it concerns the European wild cat and the wild cat of Asia and Africa. Between 1977 and 1989, the international trade inventoried by the CITES for Felis silvestris amounted to 108,359 furs. This figure includes exports and re-exports, which can be multiple. What is involved, then, is not a number of different furs. MacMAHAN (1983) observed that because of the rarity of and the ban on the fur trade involving the big cats, there was an increasing shift towards smaller cats. As far as Felis silvestris is concerned, no such trend is in evidence. During the period 1977-1989, the year 1980 alone accounted for two-thirds of all transactions (about 71,000). In the other years the volume was much lower (from 343 to 8,659), and did not appear to increase in the period in question. As MacMAHAN mentions (1983), Europe is the biggest consumer. What was formerly West Germany, in particular, imported four-fifths of the furs. The country of origin of the furs is not always known. The data supplied by the WCMC show that, for transactions whose origins are known, a large percentage issue from the African countries and involve Felis lybica. This is logical enough, given the protected status of Felis silvestris silvestris now existing in most European countries.

VI. REINTRODUCTIONS

Various authors have made reference to breeding in captivity projects (Bulgaria: SPIRIDONOV; Poland: PIELOWSKI; United Kingdom: MAC ORIST & KITCHENER) the purpose of which may be species reintroduction. Various attempts at this have already been made in Europe. In Switzerland, there have been three such projects, as far as we know. Releases were made in the Bernese Oberland (Augstmatthorn) between 1962 and 1969, north of the Briener See (ZOLLINGER 1970). In this Alpine site there had been no known previous presence of wild cat, a fact which earned critical comment (SCHAUENBERG 1970). Nine males and ten females were released, nine of these animals coming from Burgundy in France, and ten from the Bern Zoo. It is not known what became of these cats. LINLAND (1974) nevertheless mentions sightings of two young individuals in early 1974. Another release, the results of which are not known, was made in 1974 (three males and two females) near Saint Brais (Franches-Montagnes in the Swiss Jura), in an area where the wild cat was still present (LINLAND 1974). A third release was made between September 1974 and October 1975 in the Jura Mountains of Vaud canton (11 males, 10 females, and 4 whose gender is not known). Wild cats were subsequently sighted, including two within 15 km./10 miles (HAINARD 1984), but it is not known how successful the operation has been. Mention is also made of a reintroduction project in Bohemia by SLADEK between 1970 and 1972, but again the results are not known by him. PIECHOCKI (1990 p.212) was told by the authors of the project that this reintroduction scheme had failed, in so much as it did not result in the establishment of a population. The reasons for the failure are attributed to not enough animals being released, and the severity of the climate in the forests of northern Bohemia. According to RUIZ-OLMO, a breeding in captivity centre has existed in Catalonia since 1984 (around 10-12 individuals), and two animals fitted with transmitters were at some stage released, only to be lost track of after the first two weeks. These attempts illustrate the problems attaching to these operations. It is in Bavaria that the most successful and data-rich release programme for the European subspecies has been taking place since 1984. (BÜTTNER & WOREL 1990). This project was prepared with great care by the Bavarian Bund Naturschutz (Nature

Conservancy Association). To launch the scheme, a breeding centre was set up in 1984 at Wiesenfelden (Bavaria), starting with four pairs caught in game enclosures or coming from the Bavarian National Park. These numbers were then added to with cats donated by zoos. When the first releases were made there was a major publicity campaign and the animals were released directly into the wild. This was a poor solution for this small cat, and since then releases are made in three stages. In the breeding enclosure, the young cats are taught by their mothers how to catch live prey. At the age of six months at the earliest, the young cats are moved to acclimatization enclosures set up where the releases take place. Here they are fed. After a period of acclimatization, the enclosures are opened but food is still left in them for a certain period to help the animals to feed. Between 1984 and 1989, 129 individuals were released (75 males and 54 females). The releases are made in State-owned forests at three different sites (a fourth site was quickly abandoned). In the Spessart mountains a few cats were fitted with transmitter collars. In addition, questionnaires were distributed with the aim of keeping a closer watch on what would become of the animals released. Over the five-year period there were thus 70 sightings and 18 individuals were found dead. There was evidence of natural reproduction in the three release sites. The authors of this project are adamant about the need to have a large breeding base in order to avoid genetic degeneration. It is also crucial to have a large and immediate stock of animals, because the data gathered by radio-tracking and the discovery of dead cats show that there is a high mortality risk during the initial few weeks. Roads are the main cause of death. A cautious estimate of the survival rate for individuals released is no more than 20-30%. So even with a project of this scope that has been in existence for 10 years, there is no guarantee that wild cat populations capable of survival exist in each release site.

VI. CROSS-BREEDING

This threat has been mentioned as a potential or major danger in 11 out of 17 countries, and would seem to be particularly serious for the African wild cat (see Israel). The spread of wild cats observed in various parts of Europe (see Geographical Distribution) between 1930 and 1960 has been attributed to a drop in the rate of kills, to an increase in the availability of "favourable" habitat space, as well as to interbreeding between wild cats and domestic cats. This cross-breeding is, apparently, a direct consequence of the parcelling out of the distribution area and the drop in the numbers of wild cats in the 19th century. These conditions are in fact thought to have encouraged interbreeding between wild cats and wandering cats because of the shortage of mates. They would also explain why this phenomenon, which was still spasmodic at the turn of the century, despite the presence of the domestic cat in Europe since the Middle Ages, has not continued into the 20th century.

The phenotype and behaviour of hybrid animals of the first and second generations are not easy to identify (RAGNI 1984, PIECHOCKI 1990), which poses a major practical problem. Hybrid animals which are recognized as such are usually so identified as a result of the observation of a set of characteristics halfway between those observed in wild cats and those observed in domestic cats: coat colour, tail shape and physical dimensions, cranial and jaw measurements, length of intestine...

Nobody disputes the reality of this phenomenon, because hybrid animals have been observed in every part of Europe (Scotland: CORBETT 1979; France: personal observations; western Germany: RÖBEN 1974; Czechoslovakia: KRATOCHVIL & KRATOCHVIL 1970; USSR: HEPTNER & MATYUSHKIN 1972; Italy: RAGNI

1981; eastern Germany: PIECHOCKI 1986; Belgium: PARENT 1976; Netherlands: VAN BREE *et al* 1971), and particularly on the edges of or outside main population nuclei (PIECHOCKI 1981, 1986, HEPTNER & NAUMOV 1980). But there has been much debate about the significance of this phenomenon. Apparently contradictory results have been obtained for the European sub-species, which would indicate the need for more detailed examination.

The most extreme view has been put forward by SUMINSKI (1962, 1977). On the basis of biological and morphological criteria, he constructed a key enabling him to appraise the degree of purity in the individuals he examined. The result of this was his assertion that "thoroughbred" wild cats hardly exist any longer in Europe. This opinion and the criteria adopted have been disputed by various authors (KRATOCHVIL & KRATOCHVIL 1970, PARENT 1974, HEPTNER & NAUMOV 1980). For PARENT (1974), less than 2% of the Belgian population can be considered as hybrid animals, and for HEPTNER & NAUMOV (1980), interbreeding probably has a greater influence on the domestic cat phenotype than on the wild cat phenotype, because the possibility of domestic tom cats covering female wild cats is more or less nil in wild cat populations where the numbers and group structure are normal, such as those in the Carpathians or the Caucasus. This might well be the case, too, in Lorraine, where wild cat populations have always been plentiful.

Two recent studies have tried to present accurate measurements of the extent of cross-breeding in wild cat populations. RANDI & RAGNI (1986, 1991) have carried out electrophoretic analyses of enzymatic systems on wild cats, domestic cats and hybrid cats in Italy. At the same time they have gathered data on coat pattern and colour and on cranial measurements. The results obtained lead these authors to conclude that there is little probability of a constant genetic flow between sympatric populations and wild and domestic cats (RANDI & RAGNI 1986). What is more, despite their low genetic variability, the wild cat populations studied are not consanguine (RANDI & RAGNI 1991). In Scotland, on the other hand, where wild cat populations had dropped to very low numbers at the turn of the century, FRENCH *et al* (1988) have compared the craniometric characteristics of wild cats classified as "old" (1900-1940), "recent" (1953-1963) and "modern" (1975-1978) with those of domestic and hybrid cats. They show that recent and modern wild cats differ from "old" cats, which implies significant changes in the rate of cross-breeding during this century. According to these authors, the old populations in Scotland are probably more closely related to those still observed in central Europe, where wild cat populations have always been of a high density. They remark, however, that modern wild cats tend to be distinct from domestic and hybrid cats, and bear a closer resemblance to old wild cats than to recent animals. This might mean that there is a current tendency towards a reduction of cross-breeding in re-established populations. But it will only be by following these developments that it will be possible to assert that the pure form of the wild cat is not once and for all extinct in Scotland. Studies under way in Scotland, Hungary and Bulgaria also seem to show that this is a serious problem. Publication of the results obtained should shed greater understanding about the situations in which cross-breeding becomes of significance. These factors underline the need to further encourage protective measures for the wild cat, if such measures already exist, including restricting the numbers of wandering domestic cats in natural habitats.

VIII. MAJOR PROBLEMS AND IMPLICATIONS FOR CONSERVATION

We should like to wind up this report with a brief discussion of the most pressing problems that have been raised or that have emerged from the survey carried out. Given the country-by-country examination of the situation, it must be said, first and foremost, that it is no longer possible to think in terms of a continuous spread of the European sub-species, and even less so of the African sub-species. For the European sub-species, this idea was still common currency, based on the situation as described in the 1970s in different countries such as Belgium, Czechoslovakia, Scotland and western Germany. Of course, there are still certain countries, or regions, where the distribution area and the wild cat populations appear to be stable (Romania, and north-eastern France, for example). This overview nevertheless shows that the wild cat's progression is at a standstill everywhere (Belgium), or else that the trend has been reversed (Germany, Slovakia, as well as different areas of Scotland). It seems likely that distribution areas are shrinking in other regions where expansion had not been indicated (Greece, Portugal, Spain). Although only sparse data are available for the situation of the African wild cat, the same probably applies in countries where sharp population and industrial growth are occurring. In this respect, the facts attaching to Israel offer a good example. The most alarming situation of all concerns wild cats in the Mediterranean islands. The threats identified on the continent also apply to these islands, but they have probably been exacerbated by endemism and insularity. If general threats do exist, which are applicable to the entire distribution area for the species, their significance changes in relation to national or even specific regional contexts, and appropriate conservation measures must be encouraged. To this end it is worth stressing various points.

8.1 Observation of population distribution and development

Reference must first be made to the major difference in the range of our knowledge on *F.s.lybica* and *F.s.silvestris*. Although data are patchy in different countries, much more is known about the European sub-species than about the African sub-species. For the latter, with just a few exceptions, the data are imprecise not only for this animal's distribution, but also for recent population and distribution area developments, which remain hypothetical. Problems raised by low levels of observation are compounded by the risk of confusion with wandering domestic cats. Major efforts at national level are necessary to draw up current distribution maps, based on observations made over a short period of time. Such efforts are particularly necessary in the Mediterranean islands (Corsica, Crete, Sardinia). Such projects, which would have to be based on surveys (in order to limit the risk of wrongly identifying the animals concerned) should involve qualified observers, which is not easy to organize.

Secondly, very few of the countries where the distribution of one or other of the sub-species is known have set up an observation network to keep an eye on population distribution and development. The examples offered by Great Britain and Hungary show that relatively swift changes can occur with marked regional disparities. Any sound implementation of conservation measures in a regional context must be based on this type of data. These data can be gathered in a variety of different ways, either by setting up networks of local correspondents and associates or by surveys carried out at regular intervals (every five years, for example). In Germany there is a large data bank, and although the data collection does not seem to be planned on a systematic basis at national level, the high incidence of observations makes it eminently possible to detect any changes occurring. The centralization of these data may be another way of developing the data base in such cases.

8.2 Cross-breeding

Studies are currently under way which should make it possible to gain a better understanding, for the European sub-species, of the cross-breeding situation and scope between wild and domestic populations. At the present time, it would seem that the problem is particularly pressing in regions where:

- wild populations have shown a sharp drop in numbers over the past few decades,
- wild cat colonization is recent,
- wild cat populations are small and isolated,
- human population density has increased a lot, involving growth of domestic cat numbers.

In these situations it is necessary to introduce a whole set of measures aimed at limiting the penetration of domestic cats in the natural habitat. This may, of course, take the form of a public information campaign describing the risks threatening the wild cat. But it may also take the form of direct measures restricting the presence of wandering cats in natural habitats. These measures must be applied to large areas, given the low natural population density of wild cats. By way of example, RAGNI (1988) considers that, for the wild cat, the protection of habitats suitable for the species must be applied to areas of a minimum of 100 sq.km./40 sq.mi.

8.3 Break-up, reduction and alteration of the habitat

Together with cross-breeding, these are the major threats to the species. They increase the risk of mortality from other causes (on roads, cross-breeding). These threats do not only apply to the wild cat. they also apply to other species with a wide radius of action. They must of necessity be incorporated within a national land management policy. As far as the wild cat is concerned, however, more specific threats may exist as a result of the animal's typical behaviour patterns:

- the development of road infrastructures represents a major threat which involves the break-up of habitats in industrialized countries. For the wild cat it is likely that major communication routes constitute nothing less than environmental obstacles. Unlike other carnivores (the Canidae in particular), which have "running" habits, it is likely that the locomotive behaviour of the small cats is particularly ill-suited to crossing the broad open spaces represented by roads and highways. It would be useful to draw up regional cartographic inventories of regular exchange possibilities between populations (continuity of forested mountain ranges and linear wooded areas) and to conserve, or re-establish, communication possibilities between populations by adequate infrastructures. Research should be oriented in this direction. The large, bare, treeless expanses created by intensive farming probably play an identical role.

- certain forestry techniques may constitute a major threat for wild cats. The maintenance of a vertical stratification of vegetation is important. Extreme forestry practices, as represented by monospecific plantations of conifers or broadleaved species (eucalyptus, poplar, chestnut) involve a drastic shrinkage of trophic resources, shelter, and hunting-grounds for the wild cat. The large scale transformation of copices with standards into high forest areas is also unfavourable to the species. A positive method of forestry would seem to be to create a patchwork of stands of differing ages including dense regeneration areas covering several hectares. In these areas the development of the shrubby stratum is important, and human penetration can

be restricted in this way. Precautions should also be taken during extraction and logging operations or stump burning operations carried out in spring in areas where the wild cat may breed.

8.4 Direct kills

The share of the mortality rate due to man in the overall mortality graph for wild cats is not easy to assess. In eastern Germany, however, more than 85% of deaths for wild cats reported over 34 years are due to human activity, with 50% of these caused by hunting and 22.7% due to road accidents (PIECHOCKI 1986). In Scotland, 92% of deaths observed are due to man (CORBETT 1979), and in France 46% of individuals examined by RIOLS (1988) had been trapped, 19% shot and 34% hit by vehicles. All these percentages of deaths due to human activities are probably exaggerated because of the great difficulty in listing natural deaths, and, in particular, juvenile deaths and causes of disease, but the fact remains that the share in the death rate, direct or indirect, due to man seems to be considerable. There is a need in areas where the wild cat is present, to reduce these additional causes of death by insistent information campaigns addressed to hunters, trappers and ramblers accompanied by dogs. Wherever the wild cat exists, trapping with traps which kill must be abandoned in favour of other forms of capture which do not harm the animal. It has emerged during the survey carried out for this report that no wildlife reserves have been specifically established for the conservation of the wild cat. But the wild cat is nonetheless present in many national parks and wildlife reserves.

8.5 Reintroductions

The experience of the Bavarian Bund Naturschutz illustrates the difficulty and extent of the effort required to carry out a reintroduction project. The failure of minor projects should encourage the application of greater care before launching any major reintroduction programme. An in-depth appraisal of the causes of disappearance in the region in question and of the possibilities of enlarging the distribution area should be carried out beforehand. In our view, the risks of cross-breeding and the scale of the threats involved by habitat modifications mean that reintroduction schemes cannot be regarded as a priority solution for the conservation of the species.

8.6 The need for studies

As the report shows, the need for research into the wild cat is still considerable. Cross-breeding with the domestic cat population, dispersal of young cats, recent distribution developments, predator-prey relations and social organization are all major themes which should fuel research projects. Because of the recent and extensive break-up of the wild cat's distribution area and the parcelling of appropriate habitats, some populations, whose numbers are too low, cannot survive much longer without some human assistance. In order to maintain these populations at feasible levels, and to safeguard their adaptive potential, the thrust of studies on cross-breeding, genetic variability, demography and dispersal should be to determine, before it is too late, the minimum size of a population necessary to ensure its conservation (SOULE 1987).

IX. BIBLIOGRAPHY

- ADAMAKOPOULOS P. (sous presse).- La distribution du Chat sauvage en Grèce. *Biologia Gallio-Hellenica*.
- AKKERMANS R. and D. CRIEL (1986).- Predatory mammals in Belgium and the Netherlands. A critical look at nine native species. Stichting Kritisch Fannabeheer, Nationale Campagne Bescherming Roofdieren, Graveland and Gavere, pp. 1-63.
- ALCANTARA M. et F.J.CANTOS (1991).- Historical trends in the carnivorous community of "Monte de El Pardo" (Madrid, Sapon), p. 69. in "I. European Congr. Mammal., Lisboa" 1991.
- AL-SAFADI M.M. and Y.A. NADER (1990).- First record of the wild cat, Felis silvestris Schreber, 1771 from the Yemen Arab Republic (Carnivora: Felidae). *Mammalia*, 54: 621-625.
- ALVAREZ J., A. BEA, J.M. FAUS, E. CASTIEN et I. MENDIOLA (1985). Atlas de los vertebrados continentales de Alava, Vizcaya y Guipuzcoa (excepto Chiroptera), Gobierno Vasco ed., 336 p.
- ARIAGNO D. et R. DELAGE (1970).- Oiseaux et mammifères du Haut Vercors. *Alauda*, 38:310-328.
- ARIAGNO D. (1976).- Essai de synthèse sur les mammifères sauvages de la région Rhône-Alpes. *Mammalia*, 40:125-160.
- ARIAGNO D., S. AULAGNIER, J. BROYER et P. BRUNET-LECOMTE (1981). Les mammifères du département du Rhône, Bièvre, 3:191-224.
- ARNOLD H.R. (1978).- Provisional atlas of the mammals of the British Isles. H.R. Arnold Ed, Nat. Env. Res. Council, Abbots Ripton, Huntingdon.
- ARRIGHI J. et M. SALOTTI (1988).- Le Chat sauvage (Felis silvestris Schreber, 1777) en Corse. Confirmation de sa présence et approche taxonomique. *Mammalia*, 52:123-125.
- ARTOIS M. (1985).- Utilisation de l'espace et du temps chez le Renard (Vulpes vulpes) et le Chat forestier (Felis silvestris) en Lorraine. *Gibier Faune Sauvage*, 3:33-57.
- ARTOIS M., M.F.A. AUBERT, J. BLANCOU et J.M. PERICARD (1984). Rage expérimentale du Chat. Sensibilité-Symptômes-Excrétion du virus. *Rev. Med. Vet.*, 135:281-287.
- ASTRE G. (1963).- Ossements de Felis silvestris dans les fissures des calcaires d'Arbon (avec notes sur l'espèce aux Pyrénées). *Mammalia*, 27:136-146.
- ATANASSOV N. et Z. PESCHEV (1963).- Die Säugetiere Bulgariens. *Säugetierk. Mitt.*, 11:101-112.
- AULAGNIER S. (1990).- Zoogéographie et statut des carnivores sauvages du Maroc. *Vie et Milieu*, 40:150-155.
- AULAGNIER S. et M. THEVENOT (1986).- Catalogue des mammifères sauvages du Maroc. Institut Scientifique, Publications Chariaibn Batouta, Rabat-Agdal.
- AYMERICH M., F. PALACIOS, J. GARZON, L. CUESTA et J. CASTROVIEJO (1980). Sobre la alimentación del gato montés (Felis silvestris Schreber, 1777) en España, pp. 543-544, in "Act. I. Reunión Iberoamer. Zool. Vertebr. La Rabida (Huelva)".
- AYMERICH M. (1982).- Etude comparative des régimes alimentaires du lynx pardelle (Lynx pardina Temminck, 1824) et du Chat sauvage (Felis silvestris Schreber, 1777) au centre de la péninsule Ibérique. *Mammalia*, 46:515-521.
- BARTA Z. (1958).- Dva neznámé zástrely Felis silvestris Schr. z Cech. Z. Czech. Zpravy Mammal. Sekie Praha, 10:8-10.
- BAUER K. (1988).- Artenschutz in Österreich. in F. Spitzenberger ed. Grüne R Bundesmin. Umwelt 8:172-173.
- BAUMGART G. (1977).- Densité et distribution de quelques carnivores d'Alsace en zone forestière. Université Louis Pasteur-CPIE Muttersholtz, 9 p.

- BORODIN A.M., A.G. BANNIKOV, V.E. SOKOLOV et al (1985). - Krasnaja kniga UdSSR. pp. 39-39. Mouscou.
- BRUGIERE D. et al (1986). - Atlas de répartition des mammifères dans l'Allier, l'Aveyron, le Cantal, la Haute-Loire, la Lozère et le Puy-de-Dôme. Centre Ornithologique Auvergne, Clermont Ferrand, 182 p.
- BÜTTNER K. et G. WOREL (1990). - Wiedereinbürgerung des europäischen Wildkatze in Bayern - ein Projekt des Bundes Naturschutz in Bayern. Waldhygiene, 18:169-176.
- CAGNOLARO L., D. ROSSO, M. SPAGNESI et B. VENTURI (1976). - Inchiesta sulla distribuzione del Gatto selvatico (Felis silvestris Schreber) in Italia e nei Cantoni Ticino e Grigioni (Svezzer) e del Gatto selvatico sardo (Felis lybica sarda Lataste) in Sardegna con notizie sulla Lince (Lynx lynx L.) 1971-1973. Ric. Biol. Selv., Bologna, n° 64, 109 p.
- CALINESCU R.J. (1931). - Verzeichnis und Bibliographie der Säugetiere Rumaniens. Z. Säugetierk., 6:78-84.
- CANTUEL P. (1955). - Remarques sur le squelette d'un chat sauvage Felis silvestris Schreber. Mammalia, 19:470-477.
- CHEYLAN G. (1979). - Contribution à la répartition des mammifères de Provence. Bull. du C.R.O.P., 1979 (2):37-62.
- CONDE B. et P. SCHAUBENBERG (1969). - Reproduction du Chat forestier d'Europe (Felis silvestris Schreber) en captivité. Rev. Suisse Zool., 76:183-210.
- CONDE B., NGUYEN-THI-THU-CUC, F. VAILLANT et P. SCHAUBENBERG (1972). - Le régime alimentaire du Chat forestier (Felis silvestris Schreber) en France. Mammalia, 36:112-119.
- CONDE B. et P. SCHAUBENBERG (1974). - Reproduction du Chat forestier (F. silvestris Schreber) dans le Nord-est de la France. Rev. Suisse. Zool., 81:45-52.
- CONDE B. (1979). - Le Chat forestier d'Europe, pp. 37-48. in "Mammifères, batraciens et reptiles" J.C. Pihan, M. Artois, B. Condé et J. Glasser Eds., Mars et Mercure, Wettholsheim, 121 p.
- CORBET G.B. (1971). - Provisional distribution maps of British mammals. Mammal Review, 1:95-142.
- CORBET G.B. (1978). - The mammals of the Palaearctic region: a taxonomic review. British Museum (Nat. Hist.) Publ., 788:1-134.
- CORBET G.B. and J.E. HILL (1986). - A world list of mammalian species. British Museum (Natural History), London, 254 p.
- CORBETT L.K. (1978). - Current research on Wildcats: why have they increased? Scottish Wildlife, 14:17-21.
- CORBETT L.K. (1979). - Feeding ecology and social organization of wildcats (Felis silvestris) and domestic cats (Felis catus) in Scotland. Ph.D. thesis, Aberdeen, 296 p.
- DE HAAN J.H.H. (1970). - Beschrijving van een in de kootspeel gevangen wilde kat Felis silvestris silvestris, Schreber, 1777. Natuurhist. Maandblad, 59:151-160.
- DE LEUW A. (1958). - Die Wildkatze. Merkbl. Niederw. Deutsch. Jagdschutz Verb., München, 334 p.
- DELIBES M. (1981). - Distribution and ecology of the Iberian Carnivores: a short revue. XVth Int. Cong. Game Biol., Trujillo, 20 p.
- DIMITRIJEVIC S. and V. HABIJAN (1977). - Spreading and numbers of the wild cat Felis silvestris Schreber, 1777 in Vojvodina. Arh. biol. nauka, Beograd, 29:175-178.
- DOUCET J. et R. LIBOIS (1978). - Un Chat sauvage Felis silvestris, Schreber, 1777 à Cerfontaine. Les Naturalistes Belges, 59.
- DULIC B. et M. TORTIC (1960). - Verzeichnis der Säugetiere Jugoslawiens. Säugetierk. Mitt., 8:1-12.
- EASTERBEE N. (1988). - The wild cat Felis silvestris in Scotland: 1983-1987. Lutra, 31:29-43.
- EIBERLE K. (1980). - Lehren aus des Verbreitungsgeschichte der Mitteleuropäischen Wildkatze. Schweiz. Z. Forstwesen, 131:965-986.

- FAYARD A., J.L. ROLANDEZ et P. RONCIN (1979).- Les mammifères du département de l'Ain. Bièvre, 1:1-26.
- FAYARD A., J.F. NOBLET, G. CHATAIN, F. GIRARD et F. VUILLECARD (1981).- Mammifères du Vercors. Parc Naturel Régional du Vercors et Muséum d'Histoire Naturelle de Grenoble. Imprimerie Guirimard, Grenoble, 40 p.
- FAYARD A. Ed. (1984).- Atlas des mammifères sauvages de France. Société Française pour l'Etude et la Protection des Mammifères, Paris, 299 p.
- FERIANCOVA Z. (von) (1955).- Wohngebiete und Vermehrungsmöglichkeiten einiger seltener Raubtiere in den Westkarpaten. Säugetirk. Mitt., 3:71-76.
- FONS R., M.C. SAINT GIRONS et Y. VIAL (1977).- Liste commentée des mammifères de la Haute-Loire. Bull. Mens. Nat. Hist. Nat. Zool., 322:673-690.
- FÖRSTEL A. (1973).- Wildkatze in Oberfranken. Wild und Hund, 76:273.
- FRENCH D.D., L.K. CORBETT and N. EASTERBEE (1988).- Morphological discriminants of Scottish wildcats (Felis silvestris), domestic cats (F. catus) and their hybrids. J. Zool., 214:235-259.
- GOSALBEZ J. (1987).- Amphibis, reptils i mamífers, pp. 371-394. in "Enciclopèdia calalana", n° 13, Barcelona.
- GRAUL D. (1897).- Systematisches Verzeichnis der Wirbeltier Fauna von Elsass-Lothringen. Jahresber. T.896, Reabschule Rappoltsweiler, S. Braunschweig, Ribeaupvillé: 1-23.
- HAINARD, R. (1984).- Mammifères sauvages d'Europe. I. Insectivores, Chéiroptères, Carnivores. Famille des Félidés. 4ème éd., Delachaux et Niestlé, Neuchâtel.
- HALTENORTH T. (1957).- Die Wildkatze. A. Ziemsen Verlage, Die Neue Brehm - Bücherei, n° 189, Wittenberg Lutherstadt; 100 p.
- HANAK V. (1967).- Verzeichnis der Säugetiere der Tschechoslowakei. Säugetierk. Mitt., 15:193-221.
- HELLER M. (1981).- Wiederentdeckung und Verhalten der Wilkatze (Felis silvestris) in Württemberg. Veröff. Naturschutz Landschaftspflege Bad.-Württ., 53/54:235-244.
- HELLER M. (1983).- Zur Lebensweise der Wildkatze im Stromberg. Wild und Hund, 4:52-56.
- HELLER M. (1987).- Die Wildkatze (Felis s. silvestris) in Baden-Württemberg. Veröff. Naturschutz Landschaftspflege Bad.-Württ., 62:307-323.
- HELLER M. (1988).- Merkblatt zu Schutz und Hege der Wildkatze in Baden-Württemberg. Veröffentlichungen der Aktionsgemeinschaft Natur- und Umweltschutz Baden-Württemberg, n° 16, 16 p.
- HELLER M. (1990a).- Wiederauftreten der Wildkatze im nördlichen Schwarzwald. Wild und Hund, 17:58-61.
- HELLER M. (1990b).- Wildkatze. Heimlicher Waidgesell. Die Pirsch 22:54-55.
- HEMMER H. (19974).- Gestation period and postnatal development in Felids. Carnivore, 3:90-100.
- HEMMER H. (1978).- The evolutionary systematics of living Felidae: present status and current problems. Carnivore, 1:71-79.
- HEPTNER V.G. et E.N. MATYUSHKIN (1972).- Das Volumen der Hirnkapsel bei der Hauskatze und verschiedenen Formen der Wildkatze (Felis silvestris, 1777) und die Kreuzung dieser Formen in der Natur. Zool. Zh., 51:881-890.
- HEPTNER V.G. et E.N. NAUMOV (1980).- Die Säugetiere der Sowietunion. Band III. "Räubetiere" (Feloidea) 2nd ed. V.G. HEPTNER und N.P. NAUMOV Eds., VEB Gustav Fischer Verlag, Jena, 607 p.
- HERMAN M. (1991).- Distribution map of mammals in the Saarland (South-West Germany), p. 58 in "I European Congr. Mammal., Lisboa".
- HOFELD E. (1989).- Untersuchung zum Vorkommen der Wildkatze im Taunus. Refert, Intern. Fachtagung zur Europ. Wildkatze 1989 in Wiesenfelden.
- JENKINS D. (1962).- The present status of the wild cat (Felis silvestris) in Scotland. The Scottish Naturalist, 10:126-138.

- KOKES O. (1974).- Aus der Geschichte des Vorkommens der Wildkatze (Felis silvestris Schreber 1777) in dem böhmisch-mährischen Gebiet. *Lynx* 15:9-21.
- KOWALSKI K. and B. RZEBIK-KOWALSKA (1991).- Mammals of Algeria. Ossolineum, Wroclaw, 370 p.
- KRATOCHVIL J. et Z. KRATOCHVIL (1970).- Die Unterscheidung von Individuen der Population Felis s. silvestris aus den Westkarpaten von Felis s. F. catus. *Zool. Listy*, 19:293-302.
- KRATOCHVIL J. and Z. KRATOCHVIL (1976).- The origin of the domesticated forms of the genus Felis (Mammalia). *Zool. Listy*, 25:193-208.
- KRATOCHVIL J. (1982).- Karyotyp und System der Familie Felidae (Carnivora, Mammalia). *Folia Zool.*, 31:289-304.
- KUMERLOEVE H. (1967).- Zur Verbreitung Kleinasiatiseher Raub und Huftiere sowie einiger Grossnager. *Säugetierk. Mitt.*, 15:337-409.
- KUMERLOEVE H. (1968).- Zum Vorkommen der Wildkatze, Felis silvestris Schreber, 1777, in Sizilien. *Säugetierk. Mitt.*, 16:297-301.
- LANGLEY A.J.W. and D.W. YALDEN (1977).- The decline of the rarer carnivores in Great Britain during the nineteenth century. *Mammal Review*, 7:95-116.
- LAVAUDAN L. (1929).- Sur le Chat sauvage de la Corse. *C.R. Acad. Sci. Paris*, 189: 1023.
- LE BERRE M. (1989).- Faune du Sahara. *Terres Africaines*. R. Chabaud ed., Paris.
- LEYHAUSEN P. (1979).- Cat behavior. The predatory and social behavior of domestic and wild cats. Garland STPM Press, New York, London, 340 p.
- LIBOIS R.M. (sous presse).- Le Chat sauvage Felis silvestris Schreber, 1777. in "Atlas des mammifères de Wallonie" *Cahiers d'Ethologie appliquée*.
- LINAND G. (1974).- Le Chat sauvage Felis silvestris. *Diana*, 12:9-10.
- LINDEMANN (W.) (1953).- Einiges über die Wildkatze der Ostkarpaten (Felis s. silvestris Schreber, 1777). *Säugetierk. Mitt.*, 1:73-74.
- LÜPS P. (1971).- Zwei neue Nachweise der Wildkatze im Kanton Bern (1969, 1970). *Mitt. Naturforsch. Ges. Bern*, 28:71-73.
- LÜPS P. (1976).- Contenu stomacal remarquable d'un Chat sauvage (Felis s. silvestris Schreber, 1777) du Jura. *Mitt. Naturforsch. Ges. Bern*, 33:29-30.
- LÜPS P. (1977).- Luchs und Wildkatze. *Naturhistorisches Museums der Burgermeinde Bern*.
- LÜPS P. (1981).- Nachweis der Wildkatze Felis s. silvestris Schreber, 1777, im Berner Jura. *Jahrbuch des Naturhistorischen Museums Bern*, 5 p.
- MACMAHAN L. (1983).- Cat skin trade shifts to smaller species. *Traffic*, 5:2-3.
- MARTIN R. et R. ROLLINAT (1894).- *Vertébrés sauvages du département de l'Indre*. Sociétés d'éditions scientifiques, Paris, 455 p.
- MATTHEWS L.H. (1941).- Reproduction in the Scottish wildcat, Felis silvestris grampia Miller. *Proc. Zool. Soc. Lond*, 111:59-77.
- MEYER-HOLZAPPEL M. (1968).- Breeding the European wild cat Felis s. silvestris at Berne Zoo. *International Zoo Yearbook*, 8:31-39.
- MORABITO E. (1986).- Distribuzione del gatto selvatico (Felis silvestris Schreber 1777) in Sicilia e sua variabilità nel disegno del mantello (Mammalia, Felidae). *Nat. Sicil.*, 11:3-14.
- NATURE CONSERVANCY COUNCIL (1987).- Survey of the status and distribution of the wildcat Felis silvestris in Scotland, 1983-1987, a summary report. August 1987, 10 p.
- NEGULICI T. (1978).- Rencontres avec le Chat sauvage - Roumanie. *Gaz. Off. Chasse (O.N.I.)*, 715.
- NIEZAVITOWSKI E. (1934).- Bericht über die Säugetiere Polens und ihre geographische Verbreitung. *Z. Säugetierk.*, 9:188-197.
- NOBLET J.F. (1979).- Les carnivores de l'Isère. *Essai de répartition*. *Bièvre*, 1:12-13.

- NOVIKOV G.A. (1962).- Carnivorous mammals of the Fauna of the U.S.S.R. Israël program for Scientific Translations, Jerusalem, 284 p.
- NUSSLEIN F. (1973).- Wildkatze (Felis silvestris) in Nördlichen Bayern. Z. Jagdwiss., 19:212.
- ONDRIAS J.C. (1965).- Die Säugetiere Griechenlands. Säugetierk. Mitt., 13:109-127.
- PARENT G.H. (1974).- Plaidoyer pour le Chat sylvestre ou dix excellentes raisons pour protéger cet animal méconnu en Belgique ... et ailleurs. L'Homme et la Nature, 10:1-15.
- PARENT G.H. (1975).- La migration récente à caractère invasionnel du Chat sauvage Felis silvestris silvestris Schreber en Lorraine belge. Mammalia, 39:251-288.
- PARENT G.H. (1976).- Le Chat sauvage, Felis silvestris silvestris Schreber, dans les réserves naturelles gérées par "Ardenne et Gaume". Parcs Nationaux, 31:70-97.
- PAVAN G. et P. MAZZOLDI (1983).- Banca dati della distribuzione geographica di 22 specie di mammiferi in Italia. Ministero dell'Agricoltura e delle foreste, Collana Verde, 66.
- PIECHOKI R. (1981).- Schutz und Hege der Wildkatze (Felis silvestris Schreber). in "Buch der Hege. Band I. Haarwild." V.E.B. Deutscher Landwirtschaft, Berlin, pp. 342-372.
- PIECHOKI R. (1986).- Ausbreitung, Verluste, Gewichte und Maße der Wildkatze, Felis silvestris Schreber, 1777, in der DDR. Hercynia, 23:125-145.
- PIECHOKI R. et A. STIEFEL (1988).- Über die Alterstrukturen des Wildkatze (Felis s. silvestris Schreber, 1777). Hercynia, 25:235-258.
- PIECHOKI R. (1989).- Beiträge zur Biologie der Wildkatze (Felis silvestris) in der DDR. Milu, Berlin 7:107-115.
- PIECHOKI R. (1990).- Die Wildkatze. Die neue Brehm-Bücherei, A. Ziemsen Verlag, Wittenberg Lutherstadt, 232 p.
- POCOCK R.I. (1951).- Order Carnivora. Suborder Aeluroidea. Family Felidae, pp. 1-53. in "Catalogue of the genus Felis", R.I. Pocock Ed., British Museum, 190 p.
- PUCEK Z. et J. RACZYNSKI (1983).- Atlas of Polish mammals maps, Pucek and Raczyński Eds., Polish Scientific Publishers, Varsovie.
- QUESADA C.N. (1986).- Los mamíferos naturaleza de Asturias p. 105. G.H. Eds., Gijón.
- RAGNI B. (1972).- Il gatto dei boschi, pp. 249-329. in "Una Vita per la natura", Tip. Savini, Mercuri, Camerino.
- RAGNI B. (1981).- Gatta selvatic Felis silvestris Schreber, 1777, pp. 105-113. in "Distribuzione e Biologia di 22 species di mamifezi in Italia", Consiglio nazionale delle Ricerche, Roma.
- RAGNI B. et L. MARIAGNI (1981).- Proposta di revizione sistematica dei gatti italiani. Boll. Zool., 48:92.
- RAGNI B. (1984).- Definizione di modelli morfologici de Felis. Boll. Zool., 51 (Suppl.):91.
- RAGNI B. (1988).- Status e problemi di conservazione dei felidi (Felidae) in Italia. Supl. Ric. Biol. Selv., 14:455-477.
- RAGNI B. and E. RANDI (1986).- Multivariate analysis of craniometric characters in European wild cat, domestic cat and African wild cat (genus Felis). Z. Säugetierk., 51:243-251.
- RAIMER F. et E. SCHNEIDER (1983).- Vorkommen und Status der Wildkatze Felis silvestris silvestris Schreber, 1777 im Harz. Säugetierk. Mitt., 31:61-68.
- RANDI E. et B. RAGNI (1986).- Primi risultati dell'analisi elettroforetica di un campione di popolazioni italiane di gatto selvatico e di gatto domestico. Li Convegno dell'Unione Zool. Italiana, Roma.
- RANDI E. and B. RAGNI (1991).- Genetic variability and biochemical systematics of domestic and wild cat populations (Felis silvestris: Felidae). J. Mamm., 72: 79-88.

- REMY P. et B. CONDE (1962).- Sur la biologie et la répartition actuelle de quelques mammifères du Nord-Est de la France. *Mammalia*, 26:141-160.
- RENZONI A. (1974).- The wildcat in Italy: is the end in sight? *Biol. Cons.*, 6:68-69.
- RIOLS C. (1984).- Le Chat sauvage, Felis silvestris, pp. 134-135. in "Atlas des mammifères sauvages de France" Société française pour l'étude et la protection des mammifères. Paris, 229 p.
- RIOLS C. (1988).- Etude du régime alimentaire du Chat forestier (Felis silvestris) dans l'est de la France. *Bull. Mens. O.N.C.*, 121:22-27.
- RÖBEN P. (1974).- Die Verbreitung der Wildkatze, Felis silvestris Schreber, 1777 in der Bundesrepublik Deutschland. *Säugetierk. Mitt.*, 22:244-250.
- RÖBEN P. (1976).- Veränderungen des Säugetierbestandes der Bundesrepublik Deutschland und deren Ursachen. *Schrift. Vegetationskunde*, 10:239-254.
- RUIZ-OLMO J. (1990).- El poblament dels grans mamífers a Catalunya. 1. Carnívors: Distribució i requeriments ambientals. *Bull. Inst. Cat. Hist. Nat.*, 58:(Sec. Zool., 8): 87-98.
- SALOTTI M. (1984).- Atlas régional des mammifères de Corse. D.R.A.E. Corse, 45 p.
- SAINT GIRONS M.C. (1973).- Famille des Felidae. Genre Felis Linnaeus, 1758, pp. 263-267. in "Les mammifères sauvages de France et du Benelux (Faune marine exceptée)", Doin, Paris, 481 p.
- SCHAUENBERG P. (1970).- Le Chat forestier d'Europe Felis s. silvestris Schreber, 1777, en Suisse. *Rev. Suisse Zool.*, 77:127-160.
- SCHAUENBERG P. (1977).- La stature du Chat forestier Felis silvestris Schreber, et la variabilité morphologique de l'espèce. *Rev. Suisse Zool.*, 84:323-337.
- SCHAUENBERG P. (1981).- Eléments d'écologie du Chat forestier d'Europe Felis silvestris Schreber, 1771. *Terre et Vie*, 35:3-36.
- SELLAMI M., M. BELKACEMI et S. SELLAMI (1989).- Premier inventaire des mammifères de la réserve naturelle de Merguib (M'Sila, Algérie). *Mammalia*, 53:116-119.
- SEREZ M. (von) (1990).- Das Grosswild in der Türkei - Entwicklungszustand und Jagdgesetz, pp. 70-73. in "Trans. XIXth IUGB Congr., Trondheim".
- SLADEK J. (1966).- Verbreitung und Häufigkeit der Wildkatze (Felis silvestris Schreb.) in der Slowakei. *Lynx*: 145-147.
- SLADEK J. (1972a).- Die geographische Verbreitung und Häufigkeit der Wildkatze (Felis silvestris) in der Slowakei. *Lesnický časopis*, 18:49-60.
- SLADEK J. (1972b).- Die in den letzten Jahrzehnten in der Slowakei eingetretenen Veränderungen in der Verbreitung und Häufigkeit der Wildkatze (Felis silvestris). *Folia Venat.*, 2:15-19.
- SLADEK J. (1972c).- Geographical expansion and number of wild cats (Felis silvestris) in Slovakia. *Lesnický časopis*, 18:49-60.
- SLADEK J. (1972d).- Distribution of the wildcat (Felis silvestris, Schreber, 1777) in Europe. *Ochrana Fauny*, 6:65-74.
- SLADEK J. (1989). - Wildcat (Felis silvestris Schreber, 1777), pp. 108-109. in "Red data book of Czechoslovakia" Darus V. (ed.), SZN, Praha.
- SLADEK J. and J. PALASTHY (1979).- Evaluation of the West Carpathian population of the Wild cat (Felis silvestris) as to criteria of distinction from the domestic cat. *Folia Venat.*, 9:193-221.
- SMIT C.J. and A. VAN WIJNGAARDEN (1981).- Threatened mammals in Europe. Council of Europe Ed., Akademische Verlagsgesellschaft, Wiesbaden.
- SOULE M.E. (1987).- Introduction, pp. 1-10. in "Viable populations for conservation" M. SOULE Ed., Cambridge University Press, 189 p.
- STAHL P. (1986).- Le Chat forestier d'Europe (Felis silvestris Schreber, 1777). Exploitation des ressources et organisation spatiale. Thèse Université Nancy I, 357 p.
- STAHL P., M. ARTOIS et M.F.A. AUBERT (1988).- Organisation spatiale et déplacement des chats forestiers adultes (Felis silvestris Schreber, 1777) en Lorraine. *Terre et Vie*, 43:113-132.

- STAHL P. et F. LEGER (in press).- Le Chat forestier (Felis silvestris Schreber, 1777). Ecyclopédie des Carnivores de France.
- SUMINSKI P. (1962).- Les caractères de la forme pure du Chat sauvage Felis silvestris Schreber. Arch. Sci., 15:277-296.
- SUMINSKI P. (1977).- Zur Problematik der Unterschiede zwischen der Wildkatze, Felis silvestris Schreber, 177, und der Hauskatze Felis catus Linné, 1758. Säugetierk. Mitt., 40:236-238.
- SZEMETHY L. (1989).- Occurrences and densities of wild cat and badger in Hungary. Vaobiológia, 3:163-168.
- TAYLOR W.L. The Wild cat (Felis silvestris) in Great Britain. J. Animal Ecol., 15:130-133.
- THEVENIN J.P. (1986).- Mise au point sur la répartition du Chat sauvage (Felis silvestris) en région Centre. Ann. Biol. Centre, 1:85-94.
- TOMEK W. (1958).- A new station of the Wild cat in Poland. Przegląd Zool., 2:197-201.
- TRATZ E.P. (1953).- Wildkatzen in Österreich. Säugetierk. Mitt., 1:180.
- TSALKINE V.I. (1952).- On the distribution of the Wildcat in USSR in historical times. Zool. Z., 31:326-328.
- ULRICH H. (1967).- Une statistique forestière du Massif Vosgien. Bull. Ass. Philom. d'Als. et de Lorr., 13:171-178.
- VAN BREE P.J.H. (1963).- De Wilde kat, Felis silvestris Schreber, 1777, een nieuwe zoogdiersoot voor Nederland, Natuurhist. Maandblad, 52:24-28.
- VAN BREE P.J.H., P.J.A. VAN MENSCH et R.W.M. VAN SOEST (1971).- Nogeens over wilde Katten, verwilderde katen en huiskatten. Natuurhist. Maandblad, 60:36-33.
- VASILIU G.D. (1961).- Verzeichnis des Säugetiere Rumäniens. Säugetierck. Mitt., 9:56-58.
- VERICAD J.R. (1970).- Estudio faunistico y biologico de los mamíferos der Pirineo. P. Cent. Pir. Biol. Exp., Jaca, 4.
- VIAL J. (1988).- Observations d'un Chat sauvage (Felis silvestris) en Ardèche. Bull. Soc. Franc. Etude. Prot. Mamm., 16:49.
- VIGNE J.D. (1988).- Les Félinés in "Les mammifères post glaciaires de Corse. Etude archéozoologique". C.N.R.S. (ed.), Paris.
- VOGT D. (1985).- Aktuelle Verbreitung und Lebensstätten der Wildkatze (Felis s. silvestris Schreber, 1777) in den linksrheinischen Landesteilen von Rheinland-Pfalz und Beiträge zu ihrer Biologie. Beitr. Landespflege Rheinl. Pfaltz; 10:130-165.
- VOLF (J.) (1968).- Breeding the European Wild cat at Prague Zoo. Int. Zoo Yearb., 8:38-42.
- WAECHTER A. (1979).- Notes sur les mammifères d'Alsace: 2. Les Carnivores, Mammalia, 43:479-484.
- WOZENCRAFT C. (1989).- Classification of the recent carnivora, pp. 569-593. in "Carnivore behavior, ecology and evolution", J.L. Gittleman Ed., Chapman and Hall, London.
- ZIMINA R.P. (1962).- The mammals of Bulgaria, their faunal composition and peculiarities of their distribution. Zool.Zh., 41:1226-1237.
- ZIMMERMANN K. (1952).- Die Carnivora von Kreta. Säugetierk., 17:58-65.
- ZOLLINGER H. (1970).- Die Wildkatze in der Schweiz. Naturforsch. Ges., Schaffhausen, Serie III, n° 7.

X. APPENDIX

QUESTIONNAIRE ON THE RECENT STATUS AND CONSERVATION OF THE WILD CAT

Please return this questionnaire to: Philippe STAHL
Office National de la Chasse
Saint Benoist - 78610 AUFFARGIS
FRANCE
Fax: 33 1 30 41 10 37

* For each question, circle the appropriate answer, then add any comments you may have on a separate sheet of paper, giving the number of the question as reference.

* If you are allergic to questionnaires, please just read the questions, then give your view of the development of the wild cat's distribution and what is required for the conservation of the species, in any form that suits you.

* You may answer this questionnaire in French, English, German, Spanish or Italian.

I. YOUR PARTICULARS

Name:

Position:

Address:

IUCN member: yes no

Tel:

Fax:

II. DISTRIBUTION

2.1 Are you familiar with any publications about wild cat distribution not included in the attached list?

yes no

If yes, give:

Author, year of publication, title, journal, volume, page nos. for journals; name of publisher for books.
For publications in regional journals, it would be helpful to have the address of the journal or a copy of the article.

2.2 Work in progress in your country (or just in specific regions) on the distribution and status of the wild cat?

yes no don't know

If you have data on the work in progress, give:

. names, positions and addresses of people preparing the study.

. the objective: (e.g. historical research, establishment of current distribution, observation of population trends).

. methods used: (e.g. bibliographical research, surveys, field studies, dead animals, sightings).

2.3 Do you have any opinion about the recent distribution of the wild cat in your country (or in specific regions)?

yes no

If yes, specify:

. development trend: disappearance - reduction/splitting up - no conspicuous change - growth

. regions referred to in your reply: whole distribution area or specific regions. Please specify (with a map please).

. sources of information

III. THREATS AND CONSERVATION

3.1 What is the wild cat's legal status in your country?

If it is protected give: date of commencement of protected status.

3.2 Is the wild cat an officially endangered species in your country (e.g. is it listed in a red book)?

yes no don't know

3.3 Opinion on the extent of threats to the wild cat

Species	No precise	Certain threats
not endangered	data	do exist

If any specific threats are listed, give your view on their significance, using the list below, giving sources and regions concerned.

3.3.1 Disappearance, change of forest habitat

3.3.2 Splitting up of populations (construction of motorways, urban development...)

3.3.3 Cross-breeding with the domestic cat.

Give indices used: coat, biometry, genetics

3.3.4 Kills

If the species is hunted or can be killed, specify: period of hunting season or kill, means authorized, annual rate.

If the species is protected: effectiveness of protective measures.

3.3.5 Diseases

3.3.6 Other threats

3.4 Have any wildlife reserves been established specifically for the wild cat?

yes no don't know

If yes, give name and date

3.5 Is the wild cat included on the list of species to be protected by the creation of reserves?

yes no don't know

If any such reserves have been set up, give name and date

3.6 Has any information campaign or public awareness programme been launched for the wild cat?

yes no don't know

Give details:

3.7 Other measures: breeding in captivity programme - introductions - research