Felis silvestris. The IUCN Red List of Threatened Species 2022: e.T181049859A181050999.

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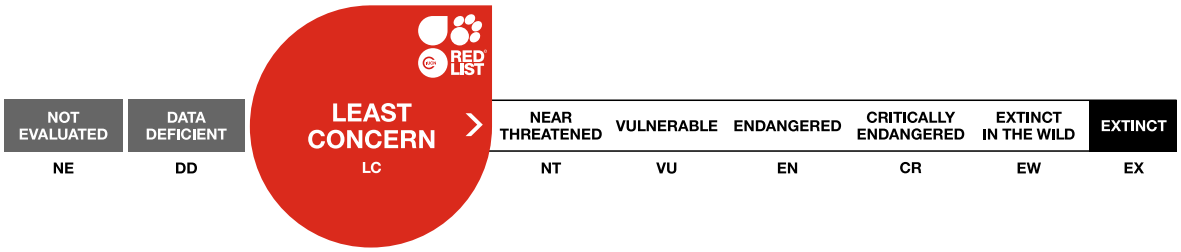
Felis silvestris, European Wildcat

Assessment by: Gerngross, P. *et al.*



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Felidae

Scientific Name: *Felis silvestris* Schreber, 1777

Synonym(s):

- *Felis silvestris* ssp. *grampia* Miller, 1907
- *Felis silvestris* ssp. *silvestris* Schreber, 1777

Regional Assessments:

-

Common Name(s):

- English: European Wildcat, Wildcat
- French: Chat sauvage
- Spanish; Castilian: Gato Montés, Gato Silvestre
- Albanian: Macja e egër
- Arabic: Al qit
- Azerbaijani: Vəhşi pişik
- Basque: Basakatua
- Bosnian: Divlja mačka
- Bulgarian: Европейска дива котка (Evropeĭska diva kotka)
- Catalan; Valencian: Gat fer
- Croatian: Mačka divlja
- German: Europäische Wildkatze/Waldkatze
- Greek, Modern (1453-): Άγρια γάτα (Agriogata)
- Italian: Gatto selvatico
- Macedonian: Дива мачка (Diva machka)
- Portuguese: Gato cabeçanas, Gato-bravo
- Romanian: Pisică sălbatică
- Serbian: Divlja mačka
- Turkish: Yaban kedisi

Taxonomic Notes:

There is a need for a new assessment of the European Wildcat (*Felis silvestris*) as it was recently recognized as a distinct species. In their revised taxonomy of the Felidae, Kitchener *et al.* (2017) consider *Felis silvestris* to comprise two subspecies, *F. s. silvestris* occurring in Europe, and *F. s. caucasica* in Anatolia and the Caucasus.

However, there has been limited information on morphology and genetics of *F. s. caucasica.* In Turkey, *F. s. silvestris* (European part) and *F. s. caucasica* (Anatolian part), individuals are morphologically similar to each other and individual pelt patterns (spots, lines, pale or dark colouration) exhibit high diversity independent of locality, leaving no clear external morphological difference between the proposed subspecies.

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Several wildcat populations occurring in southern and eastern Anatolia and the Lesser Caucasus (Azerbaijan, Armenia and Iran) are *F. lybica* rather than *F. silvestris* and this situation considerably reduces the distribution of *F. silvestris* in Anatolia and Caucasus. A contact zone between the two species is highly possible in southern and eastern Anatolia, and the southern Caucasus (Wuest *et al.* 2021). Therefore, a comprehensive genetic and morphological study covering wildcat populations from eastern Europe, Anatolia and Caucasus is recommended to clarify the status and identity of wildcat populations in the region.

The Afro-Asiatic wildcat (*Felis lybica*), also announced as a distinct species in 2017, has its own Red List assessment.

The domestic cat (*Felis catus*) is not descended from the European Wildcat (*Felis silvestris*), but mostly from a lineage of the Afro-Asian wildcat (*Felis lybica*) from Mesopotamia (Driscoll *et al.* 2007). *Felis silvestris* was never domesticated, but it can hybridise with both *Felis lybica* and *Felis catus*.

Assessment Information

Red List Category & Criteria: Least Concern ver 3.1

Year Published: 2022

Date Assessed: April 30, 2021

Justification:

In spite of the limited reliable information on range-wide population trend and size for European Wildcat (*Felis silvestris*), a decline in population size of 20–30% over the last three generations is not likely, therefore the species does not qualify for Near Threatened under criterion A. Furthermore, the whole population has far more than 1,000 mature individuals, therefore it does not qualify for Near Threatened under criterion D. Therefore, the European Wildcat is assessed as Least Concern (LC).

Robust population density data from different sources and for different locations within one of the large metapopulations are only available for the Western-Central European metapopulation (Supplementary Information: European Wildcat density data). Assuming a low average population density of 0.1 wildcats per km², it is estimated that there are 25,600 wildcats only for the extant area of the Western-Central European metapopulation. This number alone exceeds the minimum number of 1,000 mature individuals (the threshold for Vulnerable under criterion D) by far.

For the European Wildcat, we have some reliable information on population dynamics and change of the distribution range at local or national scale, but no consistent transboundary compilation or scientifically robust information at a metapopulation level. Local observations range from “fast decline” (e.g., in Scotland) to “fast increase” (e.g., in Germany or Switzerland) and are hence not illustrative of the situation for the species as a whole. It is likely that threats and trends differ between metapopulations and that there are even diverse tendencies within a metapopulation, but there is no reliable and consistent information to test this assumption (Breitenmoser *et al.* in prep.).

The focus of wildcat conservation has been largely local. The populations or metapopulations,

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respectively, have received uneven attention, which in the case of Scotland reflects the critical status of the population, but otherwise is not related to range extension or the assumed conservation status of the population (Breitenmoser *et al.* in prep.).

Regarding the distribution of the wildcat in Europe, Anatolia and the Caucasus, there are considerable differences compared to the assessment of 2015 (Yamaguchi *et al.* 2015). The reduced scale of the RLA due to taxonomic splitting allowed compiling of information at a much higher resolution than in the previous assessments. The distribution range is considerably smaller on the Iberian Peninsula and in Scotland. The occurrences in Corsica, Sardinia and southern Turkey refer to the Afro-Asian wildcat and therefore no longer appear on the distribution map. The occurrence on the Ukrainian-Belarusian border in the map from 2015 could not be confirmed and is no longer shown. The distribution range is considerably larger in France, Germany, the Apennine Peninsula, south-east Europe and Ukraine. However, these differences are less due to actual developments than to better data and, above all, improved surveys. Hence, they do not necessarily implicate an increase or decrease in all affected regions.

***Supporting Information: European Wildcat population density data*.**

For further information about this species, see Supplementary Material.

Geographic Range

Range Description:

In Europe the distribution range of *Felis silvestris silvestris* is split into four continental metapopulations: (1) Western-Central Europe, (2) Apennine Peninsula and Sicily, and (3) Eastern-Central, Eastern and Southeastern Europe (4) Iberian Peninsula. Furthermore, there are island populations in Scotland, Sicily (considered together with the Apennine metapopulation), and Crete. The continental metapopulations are in turn fragmented to a certain, partly unknown, degree.

The situation on Crete is uncertain. Crete has been separated from the mainland since the middle Miocene (15,97–11,62 million years ago). Even at the peak of the Pleistocene glaciation there was no permanent land bridge between Crete and the mainland (Kuss 1977). The assumption is that the wildcat was introduced to Crete by humans.

The distribution of *Felis s. caucasica* in Anatolia and the Caucasus is mainly based on generic expert guesses. The contemporary distribution reflects the re-colonisation of the continent from glacial refuges as much as the modern human-made fragmentation of the wildcat habitats (Piechocki 2001; see also Mattucci *et al.* 2015), posing some tricky questions with regard to the "correct" conservation units for the species. While human-made habitat fragmentation should be mitigated, regional phylogenetic adaptation over several thousand years should be conserved.

- Area for category "extant": 1,423,300 km²
- Area for category "possibly extant": 502,500 km²
- Area for category "possibly extinct": 5,650 km²

Western-Central Europe

The western-central population's range is mainly located in the Continental biogeographical region and

a small percentage in the Atlantic region (European Commission DG Environment 2019). Recent records documented the species even in the Alpine biogeographical region. The largest contiguous distribution area includes central and north-eastern parts of France and south-western parts of Germany. This large population area also includes Luxembourg, Wallonia in Belgium, the province of Limburg in the Netherlands as well as the Swiss Jura. In the past 10 years wildcats have extended their range onto the Swiss Plateau and probably even the (Pre-) Alps. An isolated subpopulation survived in central Germany (see distribution map in Yamaguchi *et al.* 2015), but is increasingly merging with the south-western German distribution area as both population parts presently expand. The former isolated occurrence in the southern Massif Central in France (see distribution map in Yamaguchi *et al.* 2015) is now also connected with the main distribution area. The present distribution in France does not go as far south as shown in Yamaguchi *et al.* 2015). However, this does not indicate a range loss, but is due to improved data.

Apennine Peninsula and Sicily

Wildcats are currently expanding their distribution range northward, following the mountain system of the central-north Apennines. The wildcat population is also expanding in Sicily, with verified records from the centre and from the west coast. However, records from newly recolonized areas have clearly shown that hybridisation with domestic cats is a continuing process (Gavagnin *et al.* 2018), and the same is occurring in some areas historically occupied by wildcats (Gaudiano *et al.* 2021 in prep.). These findings call for urgent conservation actions. The lack of standardization in research methodology makes it difficult to draw robust inferences about apparent expansion or demographic trends in Italy.

Eastern-Central, Eastern and Southeastern Europe

This metapopulation alone comprises 20 of the 34 range countries of the European Wildcat. However, data availability and quality vary significantly from country to country. According to the information available, the wildcat is relatively widespread, but is a neglected species in most range countries. Especially further surveys, including standardized monitoring regarding the distribution of the species, are needed for most regions. Even if for large parts of this metapopulation more data regarding a reduction or expansion of the distribution area are still missing, there is evidence of the species' expansion towards the east in Ukraine into steppe-like habitats (Zagorodniuk *et al.* 2014). Similarly, wildcats are also expanding their range in the Italian Alps from east to west.

Iberian Peninsula

The wildcat population extends relatively continuously from the pre-Pyrenees westwards along the Cantabrian Mountain range towards the east of the Spanish autonomous community of Galicia. The westernmost distribution of wildcats in the temperate biome is mostly associated with forested areas around the Minho hydrographic basin towards the Peneda-Gerês National Park (Portugal), and extending from the Montesinho National Park (Portugal) northwards towards the Sanabria and Ancares mountains (Spain).

A thorough inquiry among experts across Iberia has revealed that, in contrast to the former assessment (Yamaguchi *et al.* 2015), the distribution of the wildcat in the Mediterranean region of Spain and Portugal is considerably reduced, highly fragmented and split into apparently isolated populations. The relevant populations are concentrated in the main mountainous systems and in areas where the European rabbit (*Oryctolagus cuniculus*) – as an important prey base - is most abundant. The core wildcat areas in this region consist of the Sierra Morena, the eastern Sierras Béticas, Sistema Central

and Sistema Ibérico mountain chains, the Montes de Toledo, the Eastern Subbetic mountains in Spain, and the lower Guadiana region in Portugal.

Turkey and the Caucasus

In the European part of Turkey, *F. s. silvestris* is common in the north and eastern part of Thrace, such as the deciduous forests of Kırklareli and wetlands and forest patches of Edirne, Tekirdağ and Istanbul. *F. s. caucasica* is distributed throughout maquis, deciduous and mixed-deciduous vegetation and around wetland habitats of western, north-western and northern Anatolia in Turkey and the southern and western slopes and lowlands of the Caucasus Mountains in Georgia, Azerbaijan, Armenia and Russia. According to Kitchener *et al.* (2017) the status of the subspecies *F. s. caucasica* is unclear. In Anatolia, Caucasian wildcat populations occur continuously in the humid, relatively less fragmented, temperate mixed-deciduous forests of northern Anatolia, comprising the provinces of Balikesir, Bursa, Yalova, Sakarya, Düzce, Bilecik, Bolu, Zonguldak, Karabük, Bartin, Kastamonu, Sinop, Samsun, Ordu and the northern parts of Cankiri, Corum and Amasya. Towards the north-east, the wildcat is present on the northern slopes of the eastern Black Sea mountains covered by mixed-deciduous forests and locally in the inland coniferous forests of Giresun and Gumushane. It is also present in fragmented forests of Ardahan and Kars provinces and where highland grassland and steppe vegetation is tall enough to provide cover. *F. silvestris* is also present as fragmented populations in the forests of Eskisehir, Kutahya, Usak, Manisa, Izmir and Canakkale provinces and north of Aydin in western Anatolia, in forest and wetland habitats. Although, some populations in the mid-south and eastern Mediterranean part of Turkey were previously mentioned as European Wildcat, recent camera-trapping studies indicate that these populations rather belong to *F. lybica* based on phenotype. In inner Eastern Anatolia, *Felis silvestris* is rarely present in the region comprising Tunceli, Bingol and Bitlis provinces in suitable habitats and where Caucasian lynx interference might be lower (i.e. valley bottoms and close to human settlements). However, this population might be also hybridising with *F. lybica* towards the south in Diyarbakir, Mardin, Siirt, Sirnak and Hakkari provinces. The wildcat populations in western, north-western and northern Anatolia are supposed to belong to *F. silvestris*. In the rest of Anatolian part of Turkey *F. lybica* or hybrid populations between *F. silvestris* and *F. lybica* are present in fragmented populations.

In Georgia, Caucasian wildcat populations occur in the foothills of the Lesser and Greater Caucasus, where habitat is suitable.

In Armenia the wildcat occurs in deciduous forests and arid sparse forests in Ararat, Vyots Dzor, Syunik, Tavush and Lori provinces at 700 to 2,500 m (Khorozyan 2010).

In Russia, the wildcat occurs in the foothills of the Greater Caucasus and eastern Black Sea in deciduous forests and around wetland habitats. Although the majority of the Greater Caucasus ecosystem was not surveyed for this species, its distribution is supposed to be continuous throughout forest habitats up to 1,800-2,000 m (V. Lukarevskiy pers. comm.).

Supporting Information: Distribution range overlap of Felis silvestris and Felis lybica

Scotland

In Scotland the relict range of the wildcat is thought to encompass the mainland north of the Highland Boundary fault. However, the range has contracted further with little recent evidence since c. 2010 of

pure wildcats remaining in the far north of the range (north of Lairg) and few records from the west. This is likely to be due in large part to better information on the extent of hybridisation with domestic cats and increased use of camera trapping to assess presence of wildcats. This recent contraction in range is not evident in Mathews *et al.* (2018) and the UK Red List (2020), because these publications include records from before 2010. Furthermore, the criteria for accepting a wildcat record have been tightened following recognition of widespread introgressive hybridisation, so that only photographic evidence or very clear descriptions from a 'good' eye-witness are accepted as "confirmed". However, the range decrease is also likely to reflect some real changes in the distribution, with improved surveys between 2006–2014 (Davies and Gray 2010, Hetherington and Campbell 2012, Kilshaw 2015, Littlewood *et al.* 2014) showing decreasing numbers of cats of any type across their previous known range (Easterbee *et al.* 1991, Balharry and Daniels 1998). However, we note that methods differ across some of these surveys in both technique and identification criteria.

Clarity on the current range is not possible owing to widespread hybridisation. In the past five years up to 2020 all individuals sampled for genetic analysis have shown genetic signs of hybrid ancestry. Furthermore, very few individuals in the wild have been found to pass the genetic threshold set out in Senn *et al.* (2019), with some evidence that most hybridization is recent (Howard-McCombe *et al.* 2021). Notable areas in Scotland for individuals with wildcat phenotypes include Aberdeenshire, Angus, Lochaber (including Morvern) and Inverness-shire.

Mediterranean Islands

The European Wildcat is only found in Sicily and Crete, although it was probably introduced by humans in Crete. *Felis silvestris* is not found in Sardinia or Corsica. There are occurrences of *Felis lybica* on these two islands, although they were also introduced there by humans. There are no wildcats in Cyprus and the Balearic Islands.

For further information about this species, see Supplementary Material.

Country Occurrence:

Native, Extant (resident): Albania; Andorra; Austria; Azerbaijan; Belgium; Bosnia and Herzegovina; Bulgaria; Croatia; Czechia; France; Georgia; Germany; Greece; Hungary; Italy; Luxembourg; Moldova; Montenegro; Netherlands; North Macedonia; Poland; Portugal; Romania; Russian Federation; Serbia; Slovakia; Slovenia; Spain; Switzerland; Turkey; Ukraine

Native, Possibly Extant (resident): Armenia

Native, Possibly Extinct: United Kingdom

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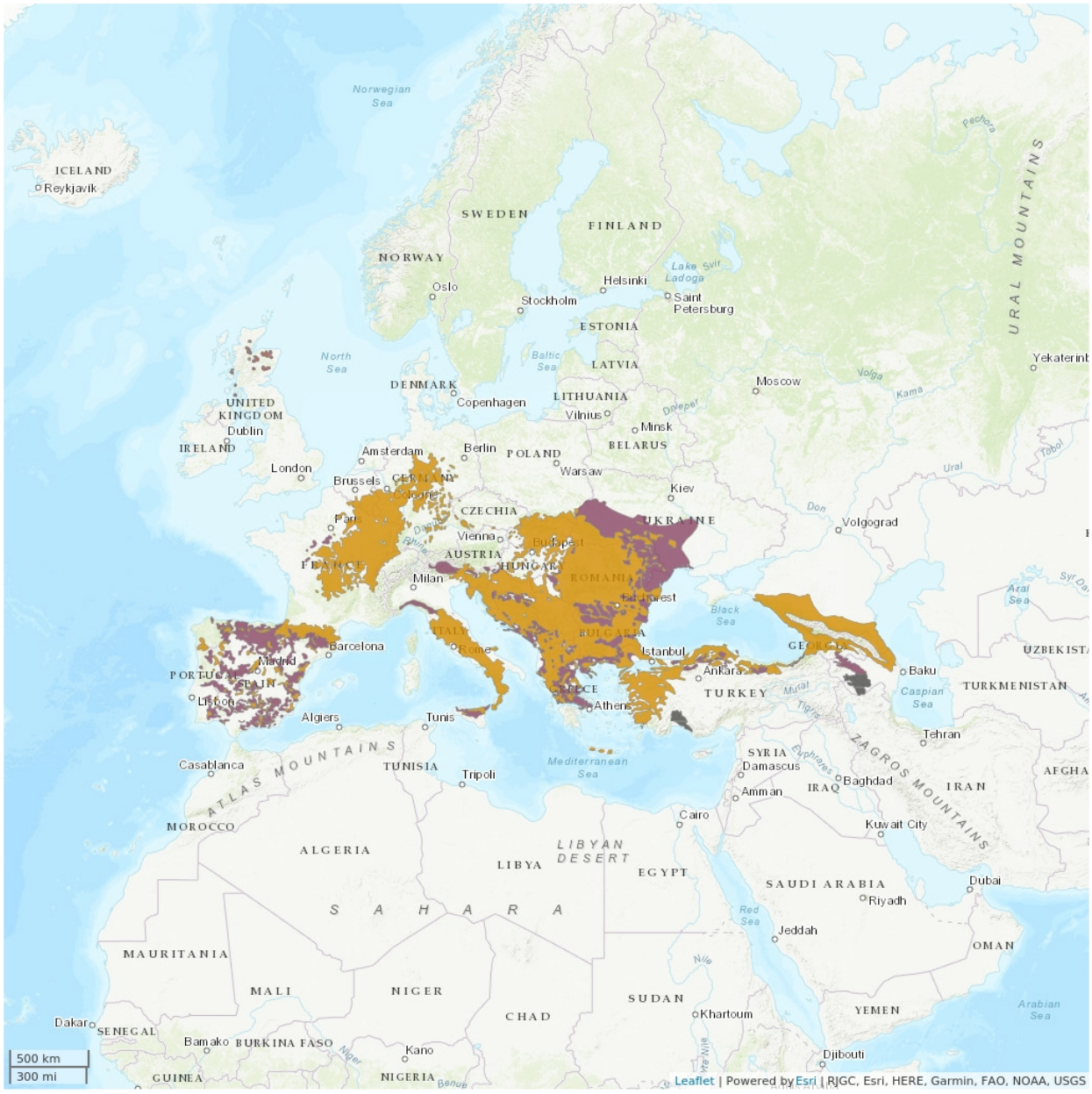
Distribution Map



Legend

- EXTANT (RESIDENT)
- POSSIBLY EXTANT (RESIDENT)
- POSSIBLY EXTINCT
- PRESENCE UNCERTAIN

Compiled by:
Gerngross et al. 2022

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

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Population

Current Population Trend

The European Wildcat is a widespread species and the most numerous indigenous/native felid in Europe. The remarkable renaissance of the wildcat in north-western Europe must not distract from evidence that the species is not doing so well everywhere. The Italian population is thought to be increasing (A. Angelici, pers. comm.). The status and trend of the very widespread eastern and south-eastern European metapopulation is largely unknown, although at least stable in Bulgaria (D. Zlatanova, pers. comm.). The Iberian population is declining (P. Monterroso, pers. comm.). The Scottish wildcat is virtually extinct (Breitenmoser *et al.* 2019). However, over large parts of the European Wildcat's range, we simply lack robust information to assess its conservation status. The opposite trends in certain metapopulations and the lack of information from others make it presently impossible to assess the trend of the global population of *F. silvestris*.

Assuming a low average density value of 0.1 wildcats per km^2, the result is 140,000 wildcats only for the extant area of approximately 1,400,000 km^2. However, this is a rough population estimation based on the AOO and a low average density based on the robust data available.

Supporting Information: Table 1 - Estimation of European Wildcat population size per metapopulation

Western-Central Europe

Trend: The central-western population is genetically divided into two subpopulations, the Western-Central-Europe subpopulation and the Central-Germany subpopulation (Pierpaoli *et al.* 2003, Steyer *et al.* 2016, Tiesmeyer *et al.* 2020). In both subpopulations expansion was documented in the last two to three decades. The Western-Central-Europe subpopulation has been expanding its range in recent years in nearly all directions. In France wildcats expanded from their north-eastern range to the west and southwest and to the north (Say *et al.* 2012, Nussberger *et al.* 2018, S. Ruette, pers. comm.). In Switzerland the Jura and the edge of the Plateau has been repopulated (Nussberger *et al.* 2018) and even casual detections of wildcats in Alpine regions have occurred (Maronde *et al.* 2020). In the south of Germany, a current expansion of wildcats coming from France was documented (Streif *et al.* 2016). The increasing distribution in the Benelux countries represents a population expansion to the north. In Belgium the wildcat appears to be spreading from Wallonia towards Flanders (V. Schockert pers. comm.). Only a slow expansion of the wildcat's range is observed in the Netherlands in the German border region, probably due to a lack of forest habitats (J. Mulder, pers. comm.). The wildcat was extinct in the Netherlands until it was recorded in late 2013 in the Province of Limburg (Janssen *et al.* 2016). In Germany clear trends of an expanding range over the last decades were observed in both subpopulations (Balzer *et al.* 2018), resulting in a merging of the western-central-Europe and the central-German subpopulation (Steyer *et al.* 2016, Tiesmeyer *et al.* 2018). The central-German subpopulation is also expanding, particularly in the southeast and north. In Austria an increasing number of records in the northeast (Lower Austria, along and north of the Danube river) indicate small, partly isolated populations that are slowly spreading. Immigration from neighbouring countries is very likely. Habitat for wildcats is abundant in Austria and its quality has also increased in recent years (Slotta-Bachmayr *et al.* 2016).

Size:

For Germany the population size was estimated at 5,000 to 10,000 individuals (National Report of the

Article 17 Habitats Directive 2019).

In France wildcats have extended their range (in both populations!) by *ca* 30 % in the last 30 years (Say *et al.* 2012).

Assuming a conservative average population density of 0.1 wildcats per km², it is estimated that there are 25,600 wildcats only for the extant area of the Western-Central European metapopulation.

Eastern-Central, Eastern and Southeastern Europe

This is potentially the largest and most widespread metapopulation of the species. A rigorous review of the distribution as done for other metapopulations would probably show that the wildcat is less widespread than assumed, and that the fragmentation in south-east Europe is probably larger than shown in the current distribution map.

Austria: There is an increasing number of records in the south of Austria (Carinthia), indicating a spreading population due to immigration from Italy and probably also from Slovenia (Slotta-Bachmayr *et al.* 2016).

Albania: There is no reliable quantitative information on population size and trends of the wildcat population, but the species is considered fairly widespread (with exception of the more urbaniused coastal area), but with low population density in the mountainous and hilly areas of the country (Prigioni 1996, Trajçe et. al. 2008, Trajçe and Hoxha 2011). Experts estimate that there are <400 mature individuals with an unknown current population trend, but with a perceived decline of 30-40% since 1950.

Bosnia and Herzegovina: There are no quantitative data on population size, but the species is widespread (Štrbac et. al. 2020). Experts estimate more than 2,000 individuals. The population trend is unknown.

Bulgaria: The European Wildcat is considered widespread throughout the country (Spassov et. al. 1997). The population size was estimated by extrapolation from a limited amount of data as 1,610-4,375 individuals. The population trend is thought to be stable to decreasing, and the species has an Unfavourable - Inadequate (U1) population conservation status (Art. 17 Habitat Directive Report - Bulgaria). The population density in two mountains in Bulgaria (Vitosha and Pirin Mtn.) was estimated by camera traps to vary between 6 and 79 individuals per 100 km^2 (Zlatanova 2014a, 2014b).

Croatia: The European Wildcat is widespread throughout the country. The population size was estimated by extrapolation from limited data as 2,216-2,683 individuals. The population trend is unknown and the species has an Unknown (XX) population conservation status (Art. 17 Habitat Directive Report - Croatia).

Czech Republic: The wildcat is restricted to some isolated pockets along the border with Germany and to the western Beskid Mountains, which are connected to the distribution in the Carpathians. However, records have increased in recent years in various regions.

Greece: The species is widespread, inhabiting most of the forested mountainous areas and many

wetlands, in continental Greece and on the island of Crete, with the exception of the Peloponnese. There are insufficient or no data available to assess population size. The population trend is unknown and the European Wildcat has an Unknown (XX) population conservation status (Art. 17 Habitat Directive Report - Greece).

Hungary: According to the new distribution map, the wildcat occurs in many different parts of the country, though within a more closed distribution in the Northeast.

Italy (north-east): According to the data compiled for the new distribution map, the wildcat is expanding westward from the region Friuli Venezia Giulia into the regions of Veneto and Trentino-South Tyrol.

Moldova: The species occurs across the country, especially in the forested areas. There are no data on population size.

Montenegro: The species is considered common and abundant in the country (Perović and Đurović 2013), but there are no quantitative data on population size or any population estimate. Also, the population trend is unknown.

North Macedonia: The European Wildcat is widely distributed, but population size and trend are unknown.

Poland: The species is restricted to the Polish part of the Carpathian Mountains in the south-east of the country.

Romania: The species is widespread throughout the country. The population size is estimated at 8,005-9,150 individuals. The population trend is stable and the species has a Favourable (FV) population conservation status (Art. 17 Habitat Directive Report - Romania)

Serbia and Kosovo: The species is distributed throughout both countries, with the exception of the north-east, but it is not considered abundant.

Slovakia: The species is widespread across the country except for the western parts.

Slovenia: The wildcat is widespread in the southern two-thirds of the country, especially in the Dinarics, but it also occurs in parts of the Slovenian Alps.

Turkey (European part): The wildcat is widespread in this part of the country, except for the more densely populated and agricultural areas close to the Marmara Sea area. There are no data on population size.

Ukraine: The wildcat is widespread in the Carpathians and, according to the data compiled for the new distribution map, the species extends to the east into the steppe region between rivers Dniester (Dnister) and Dnieper (Dnipro). There are no data on population size.

Iberian Peninsula

Portugal: The European Wildcat is considered Vulnerable at the national level, on the basis of suspected declines reaching 30% over three generations in the past or future (Cabral *et al.* 2005).

Spain: The species is considered Near Threatened at the national level (López-Martín *et al.*2007). A population size estimate is only available for the Andalusia region (South Spain, 88.000 km^2), where 860 (794–926) adult individuals were estimated (Gil-Sánchez *et al.* 2020).

The Iberian metapopulation of the European Wildcat is divided into two highly distinct biomes: i) the 'Mediterranean Forests, Woodlands and Scrub' biome, occupying ca. 2/3 of the Iberian land area; and ii) the 'Temperate Broadleaf and Mixed Forests' biome, occurring at the northern Iberian fringe (including the Pyrenees) and occupying ca. 1/3 of Iberia's area. The ecological differences of the European Wildcat occurring in each of these biomes is striking, which is reflected in suspected different population trends.

The European Wildcat populations occurring in the Mediterranean region are estimated to be declining, with an overall fragmented distribution and occurring at low population densities. Estimated European Wildcat population densities are as low as 6.9 ± 0.19 (Gil-Sánchez *et al.* 2020), 3.8 ± 1.7 (Ferreras *et al.*2021) or 3.2±1.2 wildcats per 100 km^2 (Matias *et al.* 2021). The estimated baseline probability of occupancy throughout Iberian protected areas is 11% (Monterroso *et al.* 2020). The only quantitative assessment of population trends, in Sierra Arana (Andalucía, Spain), indicates a 67% decrease in breeding females from 2004 to 2017 (J. M. Gil-Sánchez, pers. comm.). Although a general quantitative assessment of the extent of decline is not possible with the available data, both an observed decline and replacement by domestic cats in areas once occupied by wildcats (Sarmento *et al.* 2009, Sobrino *et al.* 2009) support a hypothesis of generalised population fragmentation and reduction due to the decreasing availability of rabbits as staple prey caused by rabbit haemorrhagic disease (Sobrino *et al.* 2009).

Conversely, the population in the temperate region of Iberia appears to be stable (H. Ruiz and F. Urra, pers. comm.), and occurs at relatively high population densities in some places of 60-70 individuals per 100 km^2 (H. Ruiz, pers. comm.) and 20-40 individuals per 100 km^2 (Sayol *et al.* 2018).
Given that most of the Iberian land area is included in the Mediterranean biome, it is likely that the wildcat populations in this metapopulation have suffered from a population reduction during the period under analysis (2005-2020). The causes of reduction have not ceased and may not be understood (including density-dependent hybridisation effects, roadkills, diseases (especially diseases of the main prey), and competition with dominant competitors).

Therefore, the wildcat population on the Iberian Peninsula can be considered to be severely fragmented. Most of its total area of occupancy is in habitat patches with such low wildcat numbers that, based on the species' ecology, it is unlikely that they can support viable wildcat population nuclei (Gil-Sánchez *et al.* 2020).

France (southern part): According to the "Système d'Information sur la Nature et les Paysages (SINP)" and the Office National de la Chasse et de la Faune Sauvage (ONCFS), the wildcat is found in a large part of the French Pyrenees.

Turkey and Caucasus

There is currently no available population size estimate for *Felis silvestris* in Turkey nor any other range country in the region.

In northern Anatolia-Turkey Can *et al.*(2011) estimated that there were 11 (9-23) wildcats in Yaylacik Research Forest (40 km^2), a strictly protected old-growth forest in Bartin in the Western Black Sea Region.

In the European part of Turkey, a camera-trapping survey in the deciduous forests of Kirklareli-Demirkoy (870 km^2) recorded a capture rate of 13.3 wildcat pictures per 100 trap days, indicating a high wildcat population density and size (D. Mengüllüoglu, unpub. data).

Scotland

Harris *et al.* (1995) estimated in 1987 a population size of 3,500 wildcats. However, the population size was later re-estimated at 400 individuals based on the likely proportion of hybrid cats in the 1990's (Macdonald *et al.* 2004). For 2016 Mathews *et al.* (2020) estimated a population size of 200 (30-420) using a similar method to Harris *et al.* (1995). In 2018, using data from Scottish Wildcat Action, the wildcat population was estimated at only 40 individuals. This represents a 90% decline in 25 years. The UK Mammal Society Mammal Atlas shows a decline in occupancy of 68% from 1960-1992 to 2000-2016 (Mathews *et al.* 2019). There are very high levels of introgressive hybridisation with domestic cats *F. catus* as indicated by a combined genetic and pelage test (Senn *et al.* 2019). Despite efforts to neuter hybrid and feral cats in discrete areas in Scotland, many more fertile hybrids than wildcats remain (Campbell *et al.* 2022a,b). Moreover, other factors for the decline have not been removed.

The European Wildcat is considered as Critically Endangered in Scotland. The population is undergoing an extinction, with all individuals recently sampled exhibiting genetic evidence of high levels of introgressive hybridisation. Camera-trap surveys since 2010 across the known range of the wildcat in Scotland (Hetherington and Campbell 2012, Littlewood *et al.* 2014, Kilshaw 2015, Kilshaw *et al.* 2016) have found few individuals and widespread visible signs of introgressive hybridisation.

Apennine Peninsula and Sicily

Reliable estimation of wildcat population densities of ~0.30 km^2 was provided by Anile *et al.* (2010, 2012, 2014), but only for optimal habitats on Sicily and hence cannot be extrapolated to the metapopulation level. In Sicily a decreasing trend for the wildcat population found on Mt. Etna has been observed (Anile unpublished data). The crash of the rabbit population (*Oryctolagus cuniculus*) on Sicily (likely due to repeated outbreaks of RHDV-rabbit haemorrhagic disease virus; Anile *et al.* 2019) might have further depressed this wildcat population. The threat of disease transmission between domestic cats and wildcats requires further study.

Estimates of wildcat population density from other areas of Italy are unpublished. An unpublished study (Gaudiano *et al.* in prep.) estimated the wild-living cat (both wildcats and hybrids) population density (~0.30 km^2) for Gargano National Park. Recent guidelines for the monitoring of wildlife have questioned the reliability of the identification process of individual wildcats through camera-trapping images, hence the application of this methodology over more study areas was discouraged (Fusillo *et al.* 2016).

For further information about this species, see Supplementary Material.

Current Population Trend: Unknown

Habitat and Ecology (see Appendix for additional information)

Western-Central Europe

The European Wildcat in central-western Europe mostly inhabits the wooded low mountain regions with its large, temperate deciduous and mixed forests. Although wildcats occur in all forest types, studies in Central Europe have shown a clear preference for structurally rich forests with a high proportion of tree hollows, piles of dead wood at ground level and rejuvenation patches, as well as wind-thrown areas (Klar 2003, Hötzel *et al.* 2007, Liberek 1999, Dietz *et al.* 2015, Jerosch *et al.* 2010). However, fragmented landscapes, with a mixture of forests, agricultural fields and grasslands, are also inhabited by the wildcat (Beugin *et al.* 2019, Germain *et al.* 2008). Recent studies documented resident wildcats also in rich, structured agricultural landscapes (Jerosch *et al.* 2018, Streif *et al.* 2016). Wildcats occur especially in the summer months also at subalpine altitudes. With increasing snow levels in the winter, wildcats moved to lower less snowy locations (Liberek 1999, Raimer 2001). Rodents are the main diet of the central-western Europe population, with voles (ca. 75% frequency) representing the highest proportion (Götz 2015, Lang 2016, Germain *et al.* 2009). Other small mammals, insects, birds, reptiles and amphibians are also represented as smaller percentages. Resting sites and even dens are characterised by dense vegetation or deadwood structures, such as blackberry (*Rubus*) thickets, piles of brushwood, tilted rootstocks and rejuvenation thickets. Also burrows of foxes or badgers are used as den sites (Hötzel *et al.* 2007, Jerosch *et al.*2010, Götz and Roth 2006, Hupe 2002). In habitats dominated by forest, average annual home-range size for males in Germany was 12 km^2 (95% Kernel-Method) and 5 km^2 (95% Kernel-Method) for females (Götz *et al.* 2018). In more fragmented landscapes home ranges were smaller (Jerosch *et al.* 2017, Germain *et al.* 2008, Streif *et al.* 2016). According to Götz *et al.* (2018) the average annual home-range size for females was 60% smaller in a rich structured agricultural landscape than in forested habitats.

Iberian Peninsula

In Iberia European Wildcats are primarily associated with areas with natural vegetation, such as native oak forests or Mediterranean scrublands. Wildcats tend to establish their home ranges in areas close to deciduous forests and far from human habitation, and females select mid-range elevations with some topographic complexity (Oliveira *et al.* 2018). Females tend to be more strongly associated with habitat features than males, suggesting a tendency to select higher quality habitats that give them enhanced access to shelter and feeding resources (Oliveira *et al.* 2018). In the Iberian Mediterranean region wildcats tend to select areas with oak forests, around water bodies and at mid-range elevations, and to avoid agricultural lands and urban areas (Gil-Sánchez *et al.* 2020), or mosaics of scrublands and agricultural areas where European rabbit is most abundant (Lozano *et al.* 2003, Monterroso *et al.* 2009). Patch complexity, rabbit abundance, slope and cover of dense scrub were the most influential variables on wildcat presence in a core region of south-east Spain, but the effects of some environmental variables are scale-dependent (Martín-Díaz *et al.* 2018). Rodents and European rabbits are the staple prey for European Wildcats in Iberia across their range, with birds, reptiles and invertebrates of secondary importance (Monterroso *et al.* 2020). However, relative importance of rodents and European rabbits for European Wildcats follows a biogeographical gradient, such that rodent consumption is negatively related to rabbit consumption or presence (Lozano *et al.* 2006). This indicates that rabbits are the preferred prey in the Iberian Mediterranean biome (Malo *et al.* 2004). Currently,

most of the Iberian wildcat distribution range is Mediterranean mountains (see above), where rabbits today are scarce or absent (Gil-Sánchez *et al.*2020) and rodents play a key role in their feeding ecology (Moleón and Gil-Sánchez 2003). Indeed, Iberian wildcat populations inhabiting good rabbit areas are nowadays very scarce (Lower Guadiana and some very restricted areas of eastern Sierra Morena, eastern Sierras Béticas and Levante range), and could be related to this species' decline, especially owing to rabbit haemorrhagic disease. Home-range size varies considerably across Iberia, fluctuating from 1,22 to 59,78 km^2, with a median of 13,68 km^2. Males tend to have larger home ranges than females (male median = 14,68 km^2 vs. female median = 4,59 km^2; Oliveira *et al.* 2018).

Turkey and Caucasus

The Caucasian wildcat inhabits deciduous and mixed-deciduous forests, forest-agricultural land mixtures, maquis and wetland habitats in western, north-western and northern Anatolia in Turkey and the southern and western slopes and lowlands of the Caucasus Mountains that are covered with forests in Georgia, Azerbaijan, Armenia and Russia.

In south-western Anatolia wildcat populations occur either at low population densities or in very fragmented populations. Here, wildcat distribution is thought to be limited by Caracal (Caracal caracal) presence as this species occur in high population densities in Muğla province (Ilemin and Gürkan 2010).

Although it inhabits some coniferous forests locally in western Anatolia, it is not present in the majority of this habitat type in the rest of Anatolia, probably due to high Caucasian Lynx (*Lynx lynx dinniki*) population density and interference competition. In southwestern Anatolia, where the Caracal population density is high, the wildcat is also found locally close to human settlements or where caracals do not occur, such as thick maquis vegetation. The wildcat is a common species in the wetlands of north-western Anatolia. However, in some wetlands and river basins in western and towards inner Anatolia it does not occur due to the presence of the jungle cat (*F. chaus*). Therefore, its distribution in Turkey is thought to be highly influenced by competition with and avoidance of larger species of felid and it occurs in sympatry in habitat types where it can take refuge from them.

Rodents and lagomorphs are the staple of the wildcat's diet across its range in Turkey, with birds of secondary importance, although a variety of small prey is taken, and wildcats also scavenge (Piechocki 1990). Camera-trap photographs and videos from both the European and Anatolian parts of Turkey also support this general diet and show many individuals carrying mice (*Apodemus* spp.), voles (*Microtus* spp.) and squirrels (*Sciurus* spp.).

Scotland

In Scotland wildcats use deciduous and coniferous woodland, scrub, rough grassland, the margins of agricultural land and, during summer, open heath. Deciduous woodland is preferred over conifer plantation, but the latter is particularly suitable after clear-felling and when planted trees are young and where the habitat resembles grassy scrub. Dens and resting places include stone cairns, wood/brash piles, timber stacks, dense scrub, burrows made by other mammals and agricultural buildings. The main prey is European rabbit, where available, and small mammals, including voles (*Microtus agrestis* and *Myodes glareolus*), wood mice (*Apodemus sylvaticus*) and possibly water voles (*Arvicola amphibius*), which may encourage wildcats to forage in wetland and upland bog habitats. Birds usually make up <10% of the diet, but ground-nesting species may be seasonally important.

Continued human population growth and urban/industrial development in Scotland will continue to fragment and encroach on wildcat habitat. Possible improvements in habitat, with increased deciduous woodland planting (depending on planting scheme), sympathetic farming and land management, may help mitigate further losses.

Apennine Peninsula and Sicily

Wildcats in Italy are mainly found in mountainous areas in habitats characterised by large tracts of natural forest cover, usually of deciduous trees, even though coniferous forests can be also used to a lesser extent (Anile *et al.* 2019). However, wildcats in Italy can also occur in areas with limited forest cover and close to the sea (i.e. Maremma, Tuscany and on the west coast of Sicily, Riserva dello Zingaro). Wildcats are also frequently found along riparian habitats in agricultural areas in north-east Italy, sometimes also in close proximity to small towns and villages (Lapini 2006).

On Mt. Etna, fragmentation of mixed forest, elevation and the co-occurrence of mushroom hunters and cattle (Bos taurus) negatively affected wildcat occupancy. Wildcat detectability was positively affected by distance to major roads, but negatively by humans and feral pigs (*Sus domesticus*) (Anile *et al.* 2019, 2021). Overall, the studies conducted on wildcats on Mt. Etna indicated that wildcats can be particularly sensitive to anthropogenic disturbance.

Home ranges of wildcats in Italy follow the general pattern found for other cat species, with males and adults having larger home ranges than females and juveniles, respectively (Anile *et al.*2017). In addition, a marked difference between the home ranges of two wildcat populations was found (Maremma vs. central Apennines), likely reflecting a density-dependent effect on home-range size modulated via food abundance. Home ranges for males vary from 3 to 40 km², whereas female home ranges vary from 1,6 to 10,9 km^2.

Parasites of wildcats have been studied in three distinct areas of Italy (Falsone *et al.* 2014, Veronesi *et al.* 2016) and suggest a positive relationship between parasite load and wildcat population density (Napoli *et al.* 2016).

Wildcats consume a wide variety of prey, mainly small mammals, with rodents and rabbits (when available) constituting the bulk of their diet (Apostolico *et al.* 2015). Wildcats tend to increase in body mass with elevation (Ragni 1981) and wildcats in north-east Italy appear to be larger than those in the Apennine population. However, both suggestions need to be verified using larger sample sizes (Ragni 1981).

Systems: Terrestrial

Use and Trade

In the past wildcats were trapped (in the Balkans) for their fur. At present there is no interest in their fur with an exception as hunting trophies.

In Albania wildcats are poached or captured alive and kept in captivity as pets.

The European Wildcat is not traded or consumed in Iberia. However, it is directly illegally persecuted as a vermin species in predator control activities by hunters and game managers.

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Illegal persecution as a vermin species in predator-control activities by hunters and game managers is also known in Scotland.

Threats (see Appendix for additional information)

Roads

Nowadays road mortality is the most important cause among the human-related recorded mortalities for European Wildcats (Birlenbach and Klar 2009, Klar *et al.* 2009, Lüps *et al.* 2002, Schulenberg 2005). As for most wildlife species, the sample of wildcats with known causes of mortality is strongly biased and the real causes of mortality are not known.

The highest source of mortality for wildcats in Italy appears to be road kills, with the majority of deaths occurring during the mating season and involving males (Falsone *et al.* 2014). However, the quantification of the impact of this mortality source would require a nationwide monitoring system, which Italy lacks.

Hybridisation

Introgressive hybridisation is considered a serious threat in some parts of its distribution, but in general, except for the Scottish population, other European populations had low to medium levels of hybridisation, with the lowest levels in central and south-east Europe (Tiesmeyer *et al.* 2020). However, in areas of population expansion an increased risk of hybridisation may be expected due to a presumably lower wildcat population density and a prevalent domestic cat population density (Nussberger *et al.* 2018).

Except for Scotland, in other European populations the proportion of hybrids among pure wildcats varied between 3 and 21% (Tiesmeyer *et al.* 2020), suggesting that hybridisation could be an important conservation threat, probably driven by wildcat population fragmentation and reduction (Oliveira *et al.* 2018). Systematic camera-trapping surveys carried out at large scale in south Spain have shown a very low rate of putative hybrids (3 out 47: 6.4%; Gil-Sánchez *et al.* 2020), and ecological and behavioral barriers to hybridisation have been suggested for persistence of genetically sound wildcat populations (Gil-Sánchez *et al.* 2015, Oliveira *et al.* 2018). The causes and dynamics of introgressive hybridisation are still poorly understood.

In Scotland, the main current threat is introgressive hybridisation with domestic cats and hybrids as a result of low wildcat numbers. Wildcats in Scotland are part of a complex hybrid swarm (Senn *et al.* 2018), so that very few cats show no genetic signature of hybridisation.

Diseases

Domestic cats can pose an increased risk of disease infection, which is considered as an additional human caused threat. All pathogens of infectious diseases relevant to domestic cats such as Feline Immunodeficiency Virus (FIV) and Feline Leukemia Virus (FeLV) already occur in the German wildcat population (Volmer and Steeb 2016). Infections in general appear to have an impact on mortality beside collisions on roads (Steeb 2015). In Scotland FIV and FeLV have been recorded in wild-living hybrids (Bacon *et al.* 2020). However, it is not known if the incidences of these are a threat to the viability of wildcat populations.

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In Turkey, due to high population density of domestic and feral cats in and around human settlements, disease outbreaks are very common (Yilmaz *et al.* 2002, Tekeoglu *et al.* 2015) and regularly kill significant proportions of domestic cat populations (Erol and Pasa 2013). An extensive camera-trapping study in northern Anatolia reported that 52.5% of camera-trap stations that captured wildcats also captured domestic cats (Soyumert 2020). Therefore, it is highly probable that diseases are easily spread by domestic cats to wildcats and affect populations.

Climate change

Another ambiguous question is the impact of climate change on wildcats (e.g. Stefen 2015). In the northern part of its distribution range, milder winters and reduced duration of snow coverage seem to encourage further the spread of wildcats even into areas where they were not historically documented, such as the northern Alps. During the camera trapping of lynxes, several photographs of phenotypic wildcats were made by KORA (unpubl. data), but milder climate may also further the spread and prevalence of pathogens from domestic cats, to which wildcats may be particularly vulnerable.

A considerable risk is also the assumed increased survival of feral cats due to climate change, which may exacerbate several threats to wildcats, such as hybridisation, disease transmission, and competition.

However, the effect of climate change in different parts of the wildcat's range may be different, as the species occurs across a considerable variety of climate zones and ecotones.

General

There is very little robust information that confirms the importance of many repeatedly mentioned threats, especially with regard to hunting, forestry and agriculture. Studies at population level on the demography (e.g., significance of specific causes of mortality) are urgently needed.

Also, the effect of habitat loss, the decrease of ecological connectivity and the isolation of habitats due to barrier effects of roads and settlements need to be further investigated.

Incidental persecution during the control of feral domestic cats and other predators can also pose a threat. However, the levels of persecution are not known.

The exposure to poisons, such as rodenticides, may be an additional threat to wildcats. A study of the livers of 49 cat carcasses collected from roads in Scotland between 2010 and 2018 found 27% had rodenticide concentrations at levels that would cause morbidity in other species (Bacon *et al.* 2020), though effects of exposure on wildcat mortality is not yet established.

Supporting Information: The most important threats to the wildcat in EU member states – according to the Article 17 of the Habitats Directive (reporting period 2013-2018)

For further information about this species, see Supplementary Material.

Conservation Actions (see Appendix for additional information)

The European Wildcat is protected by several international treaties (EU Habitat Directives, Bern Convention, CITES) and accordingly by national legislation in the Range Countries. The protected status

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has led to considerable public attention and conservation projects in several countries, most prominently in Scotland and Germany, but overall, the wildcat has received little international or multi-national attention (Breitenmoser *et al.* 2021).

In most of the range countries, there is a lack of conservation efforts and research at the population level.

Furthermore, there are no conservation action plans at a global or at least at a metapopulation level.

Further research is strongly recommended to quantify the level of hybridisation between wildcats and domestic cats, disease transmission and disease, human-caused mortality, influence of habitat fragmentation on populations and consequently identification and protection of primary wildcat habitats and main populations.

European Union

The current conservation status of the European Wildcat in biogeographical regions according to the Article 17 of the EU-Habitats Directive (reporting period 2013-2018):

- Favourable: Steppic
- Unknown: Mediterranean
- Unfavourable-Inadequate: Alpine, Black Sea, Continental
- Unfavourable-Bad: Atlantic, Pannonian

https://www.eionet.europa.eu/article17/species/summary/?period=5andgroup=Mammalsandsubject=Felis+silvestrisandregion=

The reporting within the framework of the EU Habitats Directive should allow a comparable assessment of the conservation status and the development of the national occurrences, but the tabular compilation is very cryptic and not comprehensible with regard to the listed relative data and is therefore difficult to interpret. In addition, sources of information and monitoring methods on which the data are based are not mentioned (Breitenmoser *et al.* 2021).

Iberian Peninsula

No specific conservation actions are in place for European Wildcat conservation in Iberia.

Important conservation actions for this species at the Iberian metapopulation level would need to include an integrated and comparable assessment of the remaining wildcat population nuclei and their genetic integrity, to guide empirically informed conservation actions, as well as a systematic monitoring scheme based on validated methods to assess population trends and detect and stop/prevent possible causes of decline. However, it is important to recover the prey base (European rabbits), recover suitable corridors allowing connectivity among existing nuclei, and implement actions focused on decreasing direct and indirect mortality.

Turkey and Caucasus

Felis silvestris is protected by law in Turkey and any form of hunting or killing is prohibited, and poaching is not a serious threat to the species in Turkey and Caucasus. It is also fully protected in the Caucasus region, Georgia, Armenia and Russia. However, immediate action is needed to assess the

status and conservation needs of all populations in Turkey and the Caucasus as the number of studies is very limited in this region. Domestic/feral cat removal in primary wildcat habitats would be an important step to ensure the viability of the species. Human-caused mortality in primary wildcat habitats should also be minimised by habitat corridors.

There is also a need to identify *F. silvestris* - *F. lybica* contact zones and assess the level of competition and hybridisation between the two species in Turkey and the Caucasus. Modelling the future distribution trends of both species under different climate scenarios is also needed to set appropriate conservation actions for *F. silvestris*.

Scotland and Britain

The Scottish Wildcat Action project was important in identifying the extent of the hybridisation threat and provided a more realistic assessment of the status of the wildcat in Scotland. Using these data, an independent review (Breitenmoser *et al.* 2019) concluded there are now too few wildcats remaining in Scotland to form a viable population, even if current threats were removed. The considerable efforts that had been made were not able to halt the decline. The EU LIFE project "Saving Wildcats" has been established in 2020 with the aim of breeding Scottish wildcats for population reinforcement into suitable area(s) following threat removal / reduction.

Saving Wildcats is time-limited and geographically restricted. There are also plans for the reintroduction of the wildcat in England and Wales. For the long-term conservation of wildcat in Great Britain, an over-arching strategy would be helpful. To allow the future expansion of wildcats across Scotland and the entire Great Britain, the omnipresent risk of hybridisation with free-ranging domestic cats must be mitigated.

Apennine Peninsula and Sicily

No specific conservation actions are in place specifically for European Wildcats in Italy.

Eastern-Central, Eastern and Southeastern Europe

The European Wildcat is fully protected in range countries with the exception of Bosnia and Herzegovina, Serbia and Montenegro.

It is necessary to develop a conservation strategy for the European Wildcat to help propagate, coordinate and implement conservation efforts for the species and thereby provide a strategic guideline for the development of national and international wildcat projects. A national action plan, in which the general recommendations of the strategy are translated into practical measures at national level, is a practical instrument for specifying an overarching plan (Breitenmoser *et al.* 2021).

There is a pan-European cooperation between scientists such as the EUROWILDCAT-Network and the genetic working group. However, there is a need for an improved cooperation between the range countries sharing a metapopulation.

Credits

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External Resources

For Supplementary Material, and for Images and External Links to Additional Information, please see the Red List website.

Appendix

Habitats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Habitat	Season	Suitability	Major Importance?
1. Forest -> 1.4. Forest - Temperate	Resident	Suitable	Yes
1. Forest -> 1.5. Forest - Subtropical/Tropical Dry	Resident	Suitable	Yes
3. Shrubland -> 3.4. Shrubland - Temperate	Resident	Suitable	Yes
3. Shrubland -> 3.8. Shrubland - Mediterranean-type Shrubby Vegetation	Resident	Suitable	Yes
4. Grassland -> 4.4. Grassland - Temperate	Resident	Marginal	-
5. Wetlands (inland) -> 5.3. Wetlands (inland) - Shrub Dominated Wetlands	Resident	Suitable	No
5. Wetlands (inland) -> 5.4. Wetlands (inland) - Bogs, Marshes, Swamps, Fens, Peatlands	-	Unknown	-
14. Artificial/Terrestrial -> 14.1. Artificial/Terrestrial - Arable Land	Resident	Marginal	-
14. Artificial/Terrestrial -> 14.2. Artificial/Terrestrial - Pastureland	Resident	Marginal	-
14. Artificial/Terrestrial -> 14.3. Artificial/Terrestrial - Plantations	Resident	Marginal	-

Use and Trade

(http://www.iucnredlist.org/technical-documents/classification-schemes)

End Use	Local	National	International
13. Pets/display animals, horticulture	No	Yes	No
15. Sport hunting/specimen collecting	No	Yes	No
17. Other (free text)	No	Yes	No

Threats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		

2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.1. Shifting agriculture	Past, likely to return	Unknown	Unknown	No/negligible impact: 0
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.2. Small-holder farming	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.3. Agro-industry farming	Ongoing	Unknown	Causing/could cause fluctuations	Unknown
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.2. Wood & pulp plantations -> 2.2.2. Agro-industry plantations	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.2. Small-holder grazing, ranching or farming	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.3. Agro-industry grazing, ranching or farming	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.2. Species disturbance		
3. Energy production & mining -> 3.3. Renewable energy	Ongoing	Majority (50-90%)	Causing/could cause fluctuations	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.2. Species disturbance		
4. Transportation & service corridors -> 4.1. Roads & railroads	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.3. Indirect ecosystem effects 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.3. Indirect species effects		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.1. Intentional use (species is the target)	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.3. Indirect species effects		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.2. Unintentional effects (species is not the target)	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.3. Indirect species effects		

5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.3. Persecution/control	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.3. Unintentional effects: (subsistence/small scale) [harvest]	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 1. Ecosystem stresses -> 1.3. Indirect ecosystem effects 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects		
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.5. Motivation Unknown/Unrecorded	Ongoing	Unknown	Causing/could cause fluctuations	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
6. Human intrusions & disturbance -> 6.1. Recreational activities	Ongoing	Minority (50%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 1. Ecosystem stresses -> 1.3. Indirect ecosystem effects 2. Species Stresses -> 2.2. Species disturbance		
7. Natural system modifications -> 7.1. Fire & fire suppression -> 7.1.3. Trend Unknown/Unrecorded	Unknown	Unknown	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.10. Large dams	Past, unlikely to return	Minority (50%)	Causing/could cause fluctuations	Past impact
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.3. Indirect species effects		
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.2. Named species (Felis catus)	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects		
8. Invasive and other problematic species, genes & diseases -> 8.3. Introduced genetic material	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects		
9. Pollution -> 9.2. Industrial & military effluents -> 9.2.3. Type Unknown/Unrecorded	Unknown	Unknown	Unknown	Unknown
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.3. Herbicides and pesticides	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
11. Climate change & severe weather -> 11.2. Droughts	Future	Unknown	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.5. Other impacts	Future	Unknown	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects		
12. Other options -> 12.1. Other threat	Ongoing	Unknown	Causing/could cause fluctuations	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality		

Conservation Actions in Place

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: Yes
Systematic monitoring scheme: No
In-place land/water protection
Conservation sites identified: Yes, over part of range
Area based regional management plan: No
Occurs in at least one protected area: Yes
Invasive species control or prevention: Yes
In-place species management
Harvest management plan: No
Subject to ex-situ conservation: Yes
In-place education
Subject to recent education and awareness programmes: Yes
Included in international legislation: Yes
Subject to any international management / trade controls: Yes

Conservation Actions Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action Needed
1. Land/water protection -> 1.1. Site/area protection
1. Land/water protection -> 1.2. Resource & habitat protection
2. Land/water management -> 2.2. Invasive/problematic species control
3. Species management -> 3.3. Species re-introduction -> 3.3.1. Reintroduction
3. Species management -> 3.4. Ex-situ conservation -> 3.4.1. Captive breeding/artificial propagation
4. Education & awareness -> 4.2. Training
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.1. Legislation -> 5.1.1. International level

https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T181049859A181050999.en

Conservation Action Needed
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level
5. Law & policy -> 5.1. Legislation -> 5.1.3. Sub-national level
5. Law & policy -> 5.2. Policies and regulations
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.1. International level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level
6. Livelihood, economic & other incentives -> 6.4. Conservation payments

Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.5. Threats
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
2. Conservation Planning -> 2.2. Area-based Management Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km²): 1925800
Continuing decline in area of occupancy (AOO): Unknown
Extreme fluctuations in area of occupancy (AOO): No
Estimated extent of occurrence (EOO) (km²): 6015635
Continuing decline in extent of occurrence (EOO): Unknown
Extreme fluctuations in extent of occurrence (EOO): No
Continuing decline in number of locations: Unknown
Extreme fluctuations in the number of locations: Unknown
Lower elevation limit (m): 0
Upper elevation limit (m): 2,250

https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T181049859A181050999.en

Population
Continuing decline of mature individuals: Unknown
Extreme fluctuations: No
Population severely fragmented: No
No. of subpopulations: 6-8
Extreme fluctuations in subpopulations: No
All individuals in one subpopulation: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Unknown
Generation Length (years): 8

The IUCN Red List Partnership

The IUCN Red List of Threatened Species™ is produced and managed by the IUCN Global Species Programme, the IUCN Species Survival Commission (SSC) and The IUCN Red List Partnership.

The IUCN Red List Partners are: ABQ BioPark; Arizona State University; BirdLife International; Botanic Gardens Conservation International; Conservation International; Missouri Botanical Garden; NatureServe; Re:wild; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.