

# Revision of the Felidae Red List of Threatened Species

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**T**he original system of evaluating species status, in use up to 1994, classified species as Extinct, Endangered, Vulnerable, Rare, Indeterminate or Insufficiently Known. These category definitions were largely subjective; for example, the definition of Endangered in 1993 was: “Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating” (Groombridge 1993). By the 1980s it was becoming evident that a more objective and quantitative method of comparing species extinction risk was needed.

There are five sets of criteria for Critically Endangered, Endangered and Vulnerable. A) is Declining Population, as determined by a threshold rate of taxa total population decline per specified period of time. B) is Small Geographic Range, based on threshold total species range sizes. C) is Small Population Size, with threshold numbers of mature reproductive individuals in the total taxa population. D) is Very Small Population Size, and E) is Quantitative Analysis, an extinction risk analysis such as a PHVA (Population and Habitat Viability Assessment).

In considering the criteria for application to the Felidae, it is apparent that some are not appropriate. Most cats are fairly wide ranging, and do not meet the low thresholds for (B) Small Geographic Range Size. Only the Iberian lynx exists in such low numbers of breeding individuals to meet the thresholds for (D) Very Small Population Size, and it is also the only species for which

range-wide quantitative extinction risk analyses (E) have been carried out (Ferrerias et al 2001, Rodriguez et al 2002). I wanted to avoid the category Data Deficient, following the new guidelines stating that this category was to be assigned only when data are so uncertain that any category of threat is plausible (IUCN 2001: 25). However, for most species quantitative range-wide data is lacking for species population size (C) and rate of change (A), the remaining two criteria.

Increased implementation of species population monitoring systems may in the future allow application of criterion (A) to felids, and arguably population trend is the most important type of data cat specialists should seek to collect, especially for populations at risk of extinction. But given that the most common

**Table 1. IUCN Red List categories applied to the Felidae for the 2002 Red List**

Category	Estimated effective population size ( $N_e$ ) <sup>1</sup>
Critically Endangered	$N_e < 250$ , declining and fragmented
Endangered	$N_e < 2,500$ , declining and fragmented
Vulnerable	$N_e < 10,000$ , declining and fragmented
Near Threatened	Near qualification for Vulnerable ( $N_e$ 10,000-50,000) <sup>2</sup>
Least Concern	Not qualifying for any of the above (yet) <sup>2</sup>

<sup>1</sup>  $N_e$  = estimated number of mature breeding individuals in the wild.  
<sup>2</sup> I used an estimated effective population size of 50,000 as the dividing line between Near Threatened and Least Concern.

**Table 2. Classification of felid species on the 2002 IUCN Red List**

Critically Endangered	Endangered	Vulnerable	Near Threatened	Least Concern
Iberian Lynx	Andean Mountain Cat	African Golden cat	Geoffroy's Cat	Bobcat
	Borneo Bay Cat	Asiatic Golden Cat	Jaguar	Canada lynx
	Snow Leopard	Black-footed cat	Lynx	Caracal
	Tiger	Cheetah	Manul	Jaguarundi
		Chinese Mountain Cat	Oncilla	Jungle cat
		Clouded leopard	Pampas cat	Leopard
		Fishing cat	Puma	Leopard cat
		Flat-headed cat	Sand cat	Margay
		Guigna		Ocelot
		Lion		Serval
		Marbled cat		Wildcat
		Rusty-spotted cat		

data currently available for wild cat species consists of estimates of density and geographic range, I decided to use these as a crude but quantitative basis for estimating species population size, criterion (C). When no density estimates were available from studies, density was estimated from home range size, or from data on other similar-sized felids. The densities used were very low and conservative as they were applied over large areas, and studies have found that there is an inverse relationship between density and size of area surveyed (Schonewald-Cox et al 1991). Estimates of species geographic range size were taken from the Cat Action Plan (Nowell and Jackson 1996). Range area was separated into protected and non-protected. Density in non-protected areas (the majority of most species ranges) was reduced to 20% of the estimated protected range density.

Based on previous studies of reproduction in wild cat populations (Nowell and Jackson 1996: 214), the resulting population size was then halved to represent effective population size. Effective population size is a measure of the genetic or reproductive population, excluding non-breeding adults and juveniles (Kimura and Crow 1963). The Red List categories measure population in terms of "mature individuals," which are "known, estimated or inferred to be capable of reproduction" (IUCN 2001: 10).

The effective population size thresholds for each Red List category are shown in Table 1. Details on the estimation of effective population sizes for each species are in a Microsoft Excel spreadsheet which can be downloaded from the Cat Action Treasury website: <<http://www.felidae.org/REDLIST/2002catsp.xls>>. The figures used are very rough estimates indeed, and are not intended for publication or any other use other than as a basis for Red List classification.

The August 2001 classification, which underwent a limited review among members of the Cat SG Core Group, was just published in October 2002 as the 2002 IUCN Red List (Table 2). Twenty-five species, or almost 70% of the cat family, are included in the online Red List <<http://www.redlist.org/>>. Seventeen, or almost half of the Felidae, are in the top three threatened categories.

Table 3 shows changes in species classification from the previous 2000 Red List (which actually dates from a 1996 evaluation by me and then Cat Specialist Group Chairman, Peter Jackson, carried out as the Cat Action Plan was being published). All changes to this original listing reflect an increasing threat to cat species; no species was downgraded in level of threat. Most taxonomic groups have seen the number of species listed increase since 1996 (<<http://www.redlist.org/info/tables/table2.html>>).

Table 4 compares felid categorization with canids (wild dogs) and the carnivore family as a whole, showing that the cat family contains more species of top conservation concern.

The Red List also includes subspecies and populations. Twenty-three felid subspecies were listed in 1996, and are still included on the 2002 Red List (to see them, click the "Subspecies" box on the lower right of the Red List search page (<<http://www.redlist.org/search/search-basic.html>>)). Subspecies and populations (national and regional) need

**Table 3. Changes in felid species Red List classification**

Species	Red List classification	
	2002	2000
Iberian lynx	Critically Endangered	Endangered
Andean mountain cat	Endangered	Vulnerable
Borneo bay cat	Endangered	Vulnerable
Chinese mountain cat	Data Deficient	Vulnerable
Marbled cat	Data Deficient	Vulnerable
Rusty-spotted cat	Data Deficient	Vulnerable
Black-footed cat	Vulnerable	Least Concern
African golden cat	Vulnerable	Least Concern
Asiatic golden cat	Vulnerable	Near Threatened
Fishing cat	Vulnerable	Near Threatened
Sand cat	Near Threatened	Least Concern
Lynx	Near Threatened	Least Concern
Pampas cat	Near Threatened	Least Concern
Manul	Near Threatened	Least Concern
Puma	Near Threatened	Least Concern
Geoffroy's cat	Near Threatened	Least Concern

**Table 4. Felid, Canid and Carnivore species on the 2002 Red List**

Red List category	Taxa (# and % of species)		
	Felidae (36)	Canidae (35)	Carnivora (270)
Critically Endangered	1 (2.7%)	2 (5.7%)	5 (1.9%)
Endangered	4 (11.1%)	1 (2.9%)	31 (11.5%)
Vulnerable	12 (33.3%)	2 (5.7%)	40 (14.8%)
Near Threatened <sup>1</sup>	8 (22.2%)	3 (8.6%)	20 (7.5%)
Data Deficient	0	9 (25.7%)	19 (7%)
Percent of taxonomic group in top 3 categories	47%	14%	28%

<sup>1</sup> Some canid and carnivore species were evaluated under an earlier version of the Red List which included the category "Conservation Dependent," which has since been scrapped. I included "CD" species in the Near Threatened category for this table.

to be re-evaluated for the next Red List update, in August 2003. In the near future I will be contacting Cat SG members about information needs for this process. Meanwhile, members are invited to contact me or the Cat SG Chairs, Drs Urs and Christine Breitenmoser, with comments on the 2002 Red List, especially if you feel changes should be made for species classification on the next Red List (2003). Please also take time to review the extensive text fields included in the Red List database. The Cat SG is responsible for their accuracy, and they are easy to change and update if you send me revised text.

## References

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“Red List Authorities” are established for all taxonomic groups in the IUCN Red List. No species is included in the IUCN Red List unless it has been evaluated by an appointed Red List Authority and/or by the Red List Standards Working Group (a group established under the Red List Programme Subcommittee). Kristin Nowell was approved as the Felidae Red List Authority in 2001 by the Cat SG’s Core Group.