conservation process wherever outside facilitation is considered important.

We thank the Junta de Andalucía for the hospitality in Andújar. The Andújar seminar took place in a very open-minded and self-critical spirit, demonstrating the eagerness of all participants to co-operate for the sake of the lynx. We hope that this spirit can be put into conservation action, and that Andújar will be remembered as the turning point in recovering the Iberian lynx from the brink of extinction.

Signed by
- The Co-Chairs of the IUCN/SSC Cat Specialist Group: Christine Breitenmoser-Würsten and Urs Breitenmoser; and

Andújar, Spain, 1 November 2002

Revision of the Felidae Red List of Threatened Species
by Kristin Nowell, IUCN/SSC Red List Felidae Authority*

The 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 rangewide quantitative extinction risk analyses (E) have been carried out (Ferreras 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>
<thead>
<tr>
<th>Category</th>
<th>Estimated effective population size (N_e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critically Endangered</td>
<td>N_e &lt; 250, declining and fragmented</td>
</tr>
<tr>
<td>Endangered</td>
<td>N_e &lt; 2,500, declining and fragmented</td>
</tr>
<tr>
<td>Vulnerable</td>
<td>N_e &lt; 10,000, declining and fragmented</td>
</tr>
<tr>
<td>Near threatened</td>
<td>Near qualification for Vulnerable</td>
</tr>
<tr>
<td>(N_e 10,000-50,000)</td>
<td></td>
</tr>
<tr>
<td>Least Concern</td>
<td>Not qualifying for any of the above (yet)!</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Critically Endangered</th>
<th>Endangered</th>
<th>Vulnerable</th>
<th>Near Threatened</th>
<th>Least Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iberian Lynx</td>
<td>Andean Mountain Cat</td>
<td>African Golden cat</td>
<td>Geoffroy's Cat</td>
<td>Bobcat</td>
</tr>
<tr>
<td>Bonito Bay Cat</td>
<td>Asiatic Golden Cat</td>
<td>Jaguar</td>
<td>Canada lynx</td>
<td></td>
</tr>
<tr>
<td>Snow Leopard</td>
<td>Black-footed cat</td>
<td>Lynx</td>
<td>Caracal</td>
<td></td>
</tr>
<tr>
<td>Tiger</td>
<td>Uneath</td>
<td>Manul</td>
<td>Jaguarundi</td>
<td></td>
</tr>
<tr>
<td>Chinese Mountain Cat</td>
<td>Oncilla</td>
<td>Jungle cat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clouded leopard</td>
<td>Pampas cat</td>
<td>leopard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing cat</td>
<td>Puma</td>
<td>Leopard cat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flat-headed cat</td>
<td>Sand cat</td>
<td>Margay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guina</td>
<td></td>
<td>Ocelot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lion</td>
<td></td>
<td>Serval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marbled cat</td>
<td></td>
<td>Wildcat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rusty-spotted cat</td>
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</tr>
</tbody>
</table>

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

Autumn 2002
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 similarly 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 (Schowenwald-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/REDL IST/ 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 canida (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 to be re-evaluated for the next Red List update, in August 2003. In the 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


The IUCN Red List is the world’s most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity.

The overall aim of the Red List is to convey the urgency and scale of conservation problems to the public and policy makers, and to motivate the global community to try to reduce species extinctions.

Who uses the Red List?
The Red List is used by government agencies, wildlife departments, conservation-related non-governmental organizations (NGOs), natural resource planners, educational organizations, and many others interested in reversing, or at least halting the decline in biodiversity.

Uses of the Red List:
- Draws attention to the magnitude and importance of threatened biodiversity
- Identifies and documents those species most in need of conservation action
- Provides a global index of the decline of biodiversity
- Establishes a baseline from which to monitor the future status of species
- Provides information to help establish conservation priorities at the local level and guide conservation action
- Helps influence national and international policy, and provides information to international agreements such as the Convention on Biological Diversity (CBD) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The Red List can answer commonly asked questions such as:
- How threatened is a particular species?
- How important is this species to conservation?
- What are the threats to a species?
- How many threatened species occur in a given country?
- How many known extinctions have there been?

How the Red List is compiled: The categories and their application
There are nine categories in the IUCN Red List system: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient, and Not Evaluated. Classification into the categories for species threatened with extinction (Vulnerable, Endangered, and Critically Endangered) is through a set of five quantitative criteria that form the heart of the system. These criteria are based on biological factors related to extinction risk and include: rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.

For more detail see the Red List Categories and Criteria booklet Version 3.1:
<http://iucn.org/themes/ssc/redlists/RLeats2001booklet.html>

The Red List is based on information supplied by IUCN's Species Survival Commission (SSC), a network of 7,000 experts on plants, animals and conservation issues, and data from a number of partner organizations. All bird data is supplied by BirdLife International. Collectively, this network holds what is the most complete scientific knowledge base on the biology and current conservation status of species.

Major analyses of the Red List were produced in 1996 and 2000. The 1996 List revealed that one in four mammal species and one in eight bird species face extinction, while the 2000 List confirmed that the global extinction crisis is as bad or worse than believed. Dramatic declines in populations of many species, including reptiles and primates were reported.

Numbers of threatened species on the Red List change from year to year, not only because new species are added to the list. Research scientists working around the world bring a constant flow of new information and this improved knowledge can result in species being upgraded to a higher threat category or, in cases where the situation is more optimistic than previously realised, downgraded to a lower threat category (see examples below). Other changes may be the result of taxonomic revisions, such as a species being re-classified as a subspecies and vice-versa. However, some species have moved into a different category as a result of a genuine change in conservation status (see examples below).

The IUCN Red List includes extinctions that have occurred since 1500 AD. For the 2002 Red List, a revision of the extinctions list resulted in 15 species being removed because they are con-
Background to the
IUCN Red List of Threatened Species

Biodiversity loss is one of the world’s most pressing crises and there is growing global concern about the status of the biological resources on which so much of human life depends. It has been estimated that the current species extinction rate is between 1,000 and 10,000 times higher than it would naturally be.

Many species are declining to critical population levels, important habitats are being destroyed, fragmented, and degraded, and ecosystems are being destabilised through climate change, pollution, invasive species, and direct human impacts. But there is also growing awareness of how biodiversity supports livelihoods, allows sustainable development and fosters co-operation between nations. This awareness is generated through products such as the IUCN Red List.

Governments, the private sector, multilateral agencies responsible for natural resource use, and environmental treaties all need access to the latest information on biodiversity when making environment-related decisions. Information about species and ecosystems is essential for moving towards more sustainable use of our natural resources.

In 2000, the Red List combined animal and plant assessments into a single list for the first time (containing 18,000 species assessments). This, together with improved documentation for each species, means that the Red List is now too large to publish as a book. Instead, it is available in electronic format, on a specially designated, searchable website <www.redlist.org>. Updates to the Red List will be made every year from now on, and an updated analysis will be published in hard copy at least once every four to five years. A CD-ROM of the Red List will be produced probably every two years from 2003.

The Red List is produced by the IUCN Species Survival Commission (SSC) – a network of some 7,000 species experts working in almost every country in the world, and data from a number of partner organizations. Collectively, this network holds what is probably the most complete scientific knowledge base on the biology and current conservation status of species.