



IUCN Red List Index

Guidance for national and regional use

Version 1.1



The IUCN Red List of Threatened Species™





This guidance document to support national and regional use of the IUCN Red List Index is a product of the IUCN Red List of Threatened Species™. It has been developed by IUCN and its partner organizations. Support for the production of this document has been provided by the 2010 Biodiversity Indicators Partnership (www.twentyten.net). It has been written by:

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IUCN intends these guidelines to be a "living document" similar to the *Guidelines for using the IUCN Red List Categories and Criteria* (http://www.iucnredlist.org/static/categories_criteria).

Please send feedback, suggestions for improvement of the guidelines, examples of their use and requests for technical advice in using the RLJ to: redlist@iucn.org

This and other indicator guidance documents supported by the 2010 Biodiversity Indicators Partnership are available from the website www.twentyten.net

Citation: Bubb, P.J., Butchart, S.H.M., Collen, B., Dublin, H., Kapos, V., Pollock, C., Stuart, S. N., Vié, J-C. (2009). *IUCN Red List Index - Guidance for National and Regional Use*. Gland, Switzerland: IUCN.

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ISBN 978-2-8317-1061-7

Purpose and use

PURPOSE

The IUCN Red List Index (RLI) measures trends in the overall extinction risk ('conservation status') of sets of species, as an indicator of trends in the status of biodiversity. Extinction is a key measure of biodiversity loss that has resonance with the public and decision makers, and that has clear relevance to ecological processes and ecosystem function. The RLI is based on movement of species status through the IUCN Red List Categories, and so requires a good knowledge of these Categories and Criteria for assessment of extinction risk.

The RLI can be disaggregated for subsets of data to:

- show trends in extinction risk for particular taxonomic groups;
- show trends in extinction risk for species relevant to particular policy mechanisms;
- identify continents, regions or biogeographic realms where the extinction risk of species is changing most rapidly;
- identify ecosystems and habitats where the extinction risk of species is changing most rapidly;
- explore trends in the importance and impacts of specific threats.

PLACE IN THE 2010 BIODIVERSITY TARGET FRAMEWORK

The RLI falls under the CBD Biodiversity 2010 Target focal area: *Status and Trends of the Components of Biological Diversity*. It is the only indicator that has been adopted for immediate testing under the CBD headline indicator: *Change in status of threatened species*. It complements directly two other headline indicators within this focal area:

- 1: *Trends in extent of selected biomes, ecosystems, and habitats;*
- 2: *Trends in abundance and distribution of selected species.*

The RLI can show trends in the status of all species worldwide

(within taxonomic groups for which extinction risk has been assessed at least twice), and hence is considerably more representative geographically than trends in abundance and distribution of selected species. However, it is a less sensitive measure of status as it is based on the movement of species through IUCN Red List categories (which are broad measures of population size, population trend and range size). In addition, the RLI does not show the population reductions experienced by broad-ranging slowly declining species; however the Red List contains a lot of detailed information that can inform this.

Disaggregations of the RLI are also relevant to three other CBD 2010 target focal areas:

- 1 Under Threats to biodiversity and the headline indicator Trends in Invasive Alien Species, an RLI can be calculated to show trends in the impacts of invasive species and their management on biodiversity;
- 2 Under the focal area Sustainable Use, RLIs showing trends in the impacts of use and its management provide a useful measure;
- 3 Under the focal area Ecosystem integrity and ecosystem goods and services and the headline indicator Biodiversity for food and medicine, an RLI showing trends in the status of species used for food and medicine is relevant.

The RLI also helps to track progress towards Target 7b under Millennium Development Goal 7 by providing the information required for indicator 7.7 ('proportion of species threatened with extinction'). Subsets of the RLI can also provide a basis for tracking progress under various agreements such as the Ramsar Convention and the Convention on Migratory Species (and its subsidiary agreements), as well as assessing the effectiveness of CITES in reducing the impacts of trade on endangered species. At a regional scale it has also been adopted as an indicator within Europe under the SEBI-2010 process.

Data requirements

The RLI uses data from the IUCN Red List of Threatened Species™ (IUCN Red List, <http://www.iucnredlist.org>), widely recognized as the most authoritative, objective and comprehensive approach for evaluating the global conservation status of species and categorising them according to their risk of extinction. The IUCN Red List uses quantitative criteria based on population size, rate of decline, and area of distribution to assign species to one of seven categories of relative extinction risk, ranging from 'Extinct' to 'Least Concern' (or to a 'Data Deficient' category for species that are very poorly known).

In 2008, the IUCN Red List (IUCN 2008) included assessments for 44,838 species, spanning every country of the world, of which 16,928 species were threatened with extinction. This includes species from a broad range of taxonomic groups spanning vertebrates, invertebrates, plants and fungi. At present, it is possible to calculate a RLI for several groups in which all species have been assessed for the IUCN Red List: birds (9,956 species, 12 per cent threatened), mammals (5,416 species, 23 per cent threatened), amphibians (6,119 species, 31 per cent threatened), corals (845 species, 33 per cent threatened) and gymnosperms (primarily conifers and cycads, 980 species, 35

per cent threatened). Further groups will be globally assessed over the next few years. To address the challenge of assessing taxonomic groups which have extremely large numbers of species and/or that are poorly known, a sampled approach has been developed in which 1,500 species are randomly selected and assessed (see Baillie et al. 2008). By 2010 this will expand considerably the breadth of taxonomic groups for which complete or representative RLIs can be calculated.

To calculate the RLI, all species in a group must have been assessed for the IUCN Red List at least twice. By the release of the 2008 IUCN Red List, birds will have been assessed five times (1988-2008) and mammals twice (1996-2008). Amphibians were comprehensively assessed for the first time in 2004 and will be reassessed in 2009. Cycads were assessed for the first time in 2000 and will be reassessed in 2009. Reef building corals have also been assessed comprehensively in 2008 and it will be possible to calculate a RLI. Once groups have been completely assessed, ideally (depending on available resources) they will be reassessed at four-yearly intervals thereafter. The example for birds (Figure 1) shows a steady deterioration in their status over the last 20 years.

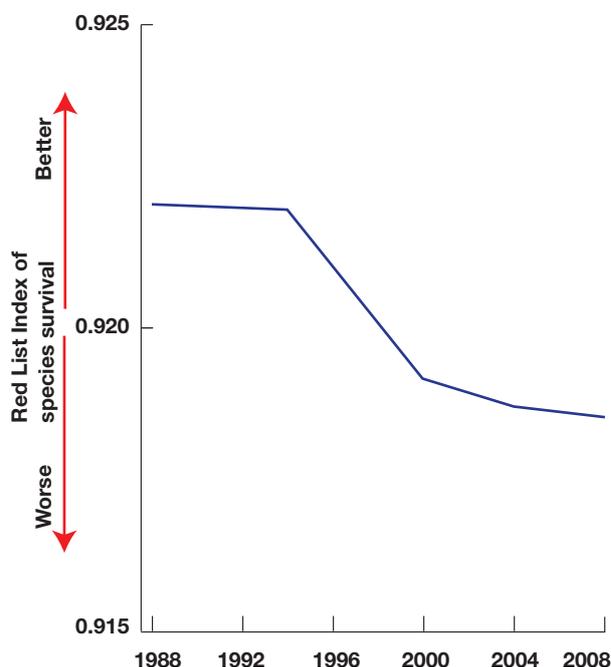


Figure 1: IUCN Red List Index of species survival for all bird species for 1988-2008, showing trends in the proportion of species expected to remain extant in the near future without additional conservation action. An RLI value of 1.0 equates to all species being categorised as Least Concern, and hence that none are expected to go extinct in the near future. An RLI value of zero indicates that all species have gone Extinct. N = 9,922 non-Data Deficient species.

Use at geographical scales

The RLI can in principle be applied at regional, national and, in some cases, sub-national scales. Application of the RLI at national scale is just beginning, and many countries will need to overcome limitations in data and other resources before it can be fully implemented. Application at national scale can be achieved in two ways.

RLI BASED ON GLOBAL EXTINCTION RISK

Global RLIs (i.e. those based on repeated assessments of the global extinction risk of all species within a group) can be disaggregated to show trends at finer scales. An advantage of this approach is that such data are already available for some taxonomic groups (and will be available for others in the near future). National or sub-national indices can therefore be calculated without further data-gathering. To produce an RLI for a country necessitates assessing for each species in the country that underwent a genuine change in its status at the global scale (as measured by movement into a higher or lower IUCN Red List category) whether the processes driving the change from one category to another also occurred within that country. For example, an RLI for a country in the wintering range of a migrant species should not incorporate a genuine category change for that species caused by changes in the conditions in its breeding range elsewhere. Similarly, seabirds may be impacted by invasive species or habitat loss at their breeding colonies, or by fisheries bycatch in their marine range. Producing RLIs for countries falling within one or other of these cases therefore requires careful scrutiny of each genuine status change and the drivers of that change. Freely available documentation associated with the

global assessments on the IUCN Red List should be adequate to facilitate such analyses (see below).

This approach works better for large countries or sub-national units and for those with relatively high levels of endemism (e.g. Madagascar, see Figure 2). However, for smaller countries that share many species with their neighbours, it may be difficult to determine whether a species' global status changed because of factors operating within any one country. Furthermore, the RLI becomes less robust with fewer species driving the index trends. Hence, it is important to consider these limitations when interpreting a national disaggregation of a global RLI.

If a country has many endemic taxa (for which the global and national assessments of extinction risk will be identical), a national RLI can be calculated from the global Red List categories for the endemic species only. This will show national trends in extinction risk for the species in a country that are particularly significant at a global scale.

RLI BASED ON NATIONAL OR REGIONAL EXTINCTION RISK

IUCN have developed guidelines on how to apply the IUCN Red List Categories and Criteria at regional or national scales (IUCN 2003; see http://www.iucnredlist.org/static/categories_criteria).

These guidelines explain how to take into account the possibility of 'rescue effects' by surrounding or adjacent populations of a

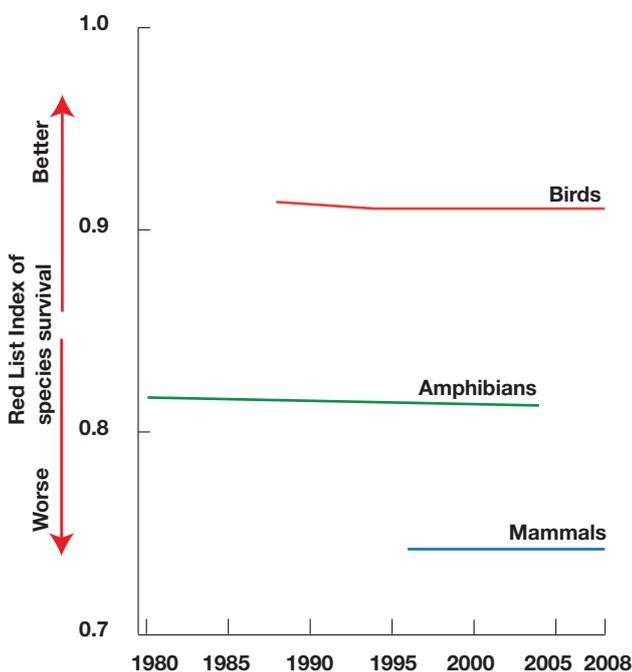


Figure 2: IUCN Red List Index of species survival for bird, mammal and amphibian species in Madagascar, based on appropriate disaggregations of the global RLI showing trends in the proportion of species expected to remain extant in the near future without additional conservation action. An RLI value of 1.0 equates to all species being categorised as Least Concern, and hence that none are expected to go extinct in the near future. An RLI value of zero indicates that all species have gone Extinct. N = 243 bird, 136 mammal and 341 amphibian non-Data Deficient species. Source: Randrianasolo *et al.* unpublished data.

taxon. If all species within a particular region or country have been assessed at least twice using this approach, an RLI can be calculated using these data. For example, an RLI based on the regional extinction risk of birds at the European scale for 1990-2000 has been developed. In some cases, it is possible to apply the RLI method at a sub-national scale, e.g. Quayle *et al.* (2007) present an RLI for the Canadian Province of British Columbia. Note that the RLI should not be calculated from national red lists in which only a subset of species in a particular taxonomic group within the country have been assessed. This is because such a subset is likely to be biased, e.g. in its status, trends or distribution.

Potential data sources

For a national RLI based on global extinction risk, the necessary data can be obtained from the IUCN Red List (<http://www.iucnredlist.org/>), which has an on-line database that can be searched to give the current and past Red List categories for all species that have been assessed in a given country. At present, the data identifying those species that have undergone genuine changes in their conservation status is not available online, and should be requested by contacting the IUCN Species programme. In future, this will be freely accessible through the website, and an online facility is planned for automatically outputting the appropriate data and RLI graph.

Data for developing national or regional RLIs based on national or regional extinction risk will need to come from the groups generating and maintaining these lists. Many countries have initiated programmes to assess the conservation status of their species (or subsets of them), and 122 countries have published one or more national Red Data Books or Red Lists. Of these, 77 countries are using the IUCN Red List Categories and Criteria, and hence their lists may be appropriate for developing RLIs. Other lists may be less suitable for the RLI approach as they may not be based on robust and repeatable criteria, or have categories that can be ranked in terms of relative extinction risk. The results and information about ongoing assessment efforts are often available through national wildlife or conservation authorities,

universities and other research organisations, or national conservation NGOs such as those in the BirdLife International Partnership (contact details available at <http://www.birdlife.org/worldwide/national/index.html>) as well as through the IUCN Species Survival Commission Specialist Groups (contact details available at: <http://www.iucn.org/themes/ssc/sgs/sgs.htm>).

A database of those national and regional red lists using the IUCN Regional Guidelines for Application of the IUCN Red List Categories and Criteria is being developed (www.regionalredlist.org). IUCN continues to support regional and national assessments through the National Red List Working Group of the Species Survival Commission and through IUCN regional programmes. It should be noted, however, that few countries have yet assessed species using the IUCN Regional Guidelines more than once: a minimum of two assessments is required in order to permit an RLI to be calculated.

In principle, for taxonomic groups for which only a subset of species occurring in a country have had their national extinction risk assessed, a sampled approach could be applied. For guidelines on selecting species, stratification, sample size etc, Baillie *et al.* (2008) should be consulted.

Data quality and sample size considerations

For RLIs developed using the sampled approach, analysis of global data indicate that a sample of 1,500 species should be assessed in order to provide sufficiently robust trends. Similar analyses to those presented in Baillie *et al.* (2008) should be carried out if this approach is applied at the regional or national scale.

As with most indicators, the RLI is less robust when it is based on only a few species. Careful consideration needs to be given to the total number of species contributing to the index, and the number that have undergone genuine changes in status (and hence driving trends in the index). With fewer numbers of species, trends are less likely to be representative of individual populations or of other taxonomic groups.

Calculation

The formula for calculating earlier versions of the IUCN RLI (Butchart, S.H.M. *et al.* 2004, 2005) has recently been improved and revised (Butchart, S.H.M. *et al.* 2007). Mathematically the calculation of the RLI can be expressed as:

$$RLI_t = 1 - \frac{\sum W_{c(t,s)}}{W_{EX} \cdot N}$$

where $W_{c(t,s)}$ is the weight of category c for species s at time t , (W_{EX}) is the weight for Extinct, and N is the number of assessed species excluding those considered Data Deficient in the current time period and those considered to be Extinct in the year the set of species was first assessed.

The RLI is calculated from the number of species in each Red List Category (Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered), and the number changing Categories between assessments as a result of genuine improvement or deterioration in status (Category changes owing to improved knowledge or revised taxonomy are excluded).

Put simply, the number of species in each Red List Category is multiplied by the Category weight (which ranges from 0 for Least Concern, 1 for Near Threatened, 2 for Vulnerable, 3 for Endangered, 4 for Critically Endangered and 5 for Extinct in the Wild and Extinct). These products are summed, divided by the maximum possible product (the number of species multiplied by

the maximum weight), and subtracted from one. This produces an index that ranges from 0 to 1 (see below).

The formula for calculating the RLI requires that (a) exactly the same set of species is included in all time steps, and (b) the only category changes are those resulting from genuine improvement or deterioration in status (i.e. excluding changes resulting from improved knowledge or taxonomic revisions). In practice, species lists will often change slightly from one assessment to the next (e.g. owing to taxonomic revisions), and many species change category between assessments owing to improved knowledge of their population size, trends, distribution, threats etc. The conditions can therefore be met by retrospectively correcting earlier Red List categorizations using current information and taxonomy. This is achieved through assuming that the current Red List Categories for the taxa have applied since the set of species was first assessed, unless there is information to the contrary that genuine status changes have occurred. Such information is often contextual, e.g. relating to the known history of habitat loss within the range of the species (see Butchart, S.H.M. *et al.* 2007 for further details).

In general, a conservative approach should be adopted, and genuine status changes should only be identified if adequate supporting evidence and justification can be provided. If there is insufficient information available to determine whether a newly assessed species has undergone a genuine status change since the first assessment, it is not incorporated into the IUCN RLI until it is assessed subsequently for a second time, at which point categories for earlier assessments are assigned by extrapolating recent trends in population, range, habitat and threats, supported by additional information.

Presentation and interpretation

PRESENTATION

Options for visual representation (graphs, maps, statistics)

The most appropriate presentation of RLIs is through line graphs representing change in the index values over time. These will tend to show inflection points at each assessment time. The indices can usefully be disaggregated to show trends that are geographically representative (Figure 3), relevant to particular policy sectors or agreements, or representative of particular ecosystems (Figure 4) or habitat types.

Narratives (and relation to other indicators)

Presentation of national or regional scale RLIs should be part of a wider narrative examining trends in biodiversity according to several different measures. Changes in extinction risk should be discussed in the context of changes in extent of ecosystems and habitats and trends in species populations (e.g. Living Planet Index, Wild Bird Index, IUCN Red List).

MEANING AND CAUSES OF TRENDS:

It is important to present such illustrations with sufficient contextual information to enable users to interpret them. They should be accompanied by analysis of the drivers of change, i.e. which threatening processes have caused most species to be uplisted to higher categories of threat, and which threats have been most effectively mitigated and allowed species to be downlisted to lower categories of threat.

This may come from other biodiversity indicators, such as trends in the extent of different ecosystem types or be

made part of the narrative surrounding the indicator. Thus, for example, the steep decline in birds of the Indomalayan realm during the 1990s shown in Figure 2 has been linked to intensifying deforestation in the Sundaic lowlands of Indonesia. The steep decline in marine bird species in Figure 3 is linked to high rates of incidental mortality arising from the expansion of commercial longline fisheries.

It is also important to recognise the time lags which may occur between changes in habitats and changes in the status of species. Therefore, interpretation needs to take account of changes that may have happened sometime before the calculation of the index.

It is further important to consider the sensitivity of the index and to recognise that if it includes an appropriate number of species to make it a robust reflection of overall biodiversity trends, it may not be sensitive to changes in the status of species that have particular national importance, e.g. for cultural or economic reasons.

IMPLICATIONS FOR POLICY AND MANAGEMENT:

RLIs provide a key measure of the rate of biodiversity loss, and whether this is being reduced or is intensifying. RLI values relate to the proportion of species expected to remain extant in the near future without additional conservation action. An RLI value of 1.0 equates to all species being categorised as Least Concern, and hence that none are expected to go extinct in the near future. An RLI value of zero indicates that all species have gone Extinct.

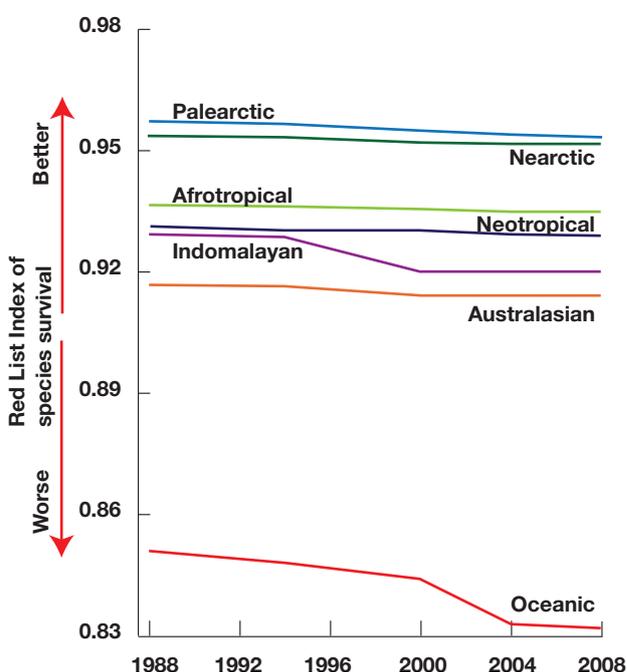


Figure 3: IUCN Red List Index of species survival for bird species in different biogeographic realms for 1988-2008, showing trends in the proportion of species expected to remain extant in the near future without additional conservation action. An RLI value of 1.0 equates to all species being categorised as Least Concern, and hence that none are expected to go extinct in the near future. An RLI value of zero indicates that all species have gone Extinct. N = 1,706 Palearctic, 2,211 Afrotropical, 2,144 Indomalayan, 999 Nearctic, 3,977 Neotropical, 1,765 Australasian and 1,555 Oceanic non-Data Deficient species.

have gone Extinct. A downwards trend in the graph line (i.e. decreasing RLI values) means that the expected rate of species extinctions is increasing i.e. that the rate of biodiversity loss is increasing. A horizontal graph line (i.e. unchanging RLI values) means that the expected rate of species extinctions is unchanged. An upward trend in the graph line (i.e. increasing RLI values) means that there is a decrease in expected future rate of species extinctions (i.e. a reduction in the rate of biodiversity loss).

RLIs provide both a general indication of how effectively policies are reducing the loss of biodiversity, and, in disaggregated form, show more specifically where additional policy or targeted intervention may be needed.

LIMITATIONS:

As with other indicators, the RLI and the trends it shows are only as good as the data that go into them. They are subject to changes in knowledge regarding the status and biology of species, which can affect the estimation of their extinction risk. Owing to the broad nature of the Red List categories, the RLI

must be considered a relatively coarse measure of changes in the status of biodiversity. Its sensitivity may also be limited by the inherent time lags between changes on the ground and their detection and incorporation into the evaluation of a species' status. Although the RLI is geographically representative (because it is based on assessments of all species at the relevant scale), trends shown by the taxa included may not be representative of trends in other taxonomic groups. Additionally, applying the IUCN Red List Categories and Criteria to assess species at the national level requires the building of capacity through dedicated training.

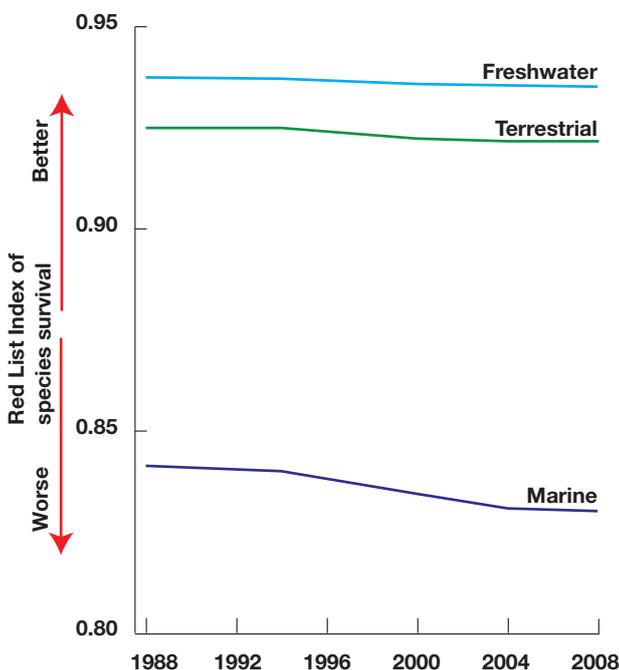


Figure 4: IUCN Red List Index of species survival for bird species in different ecosystems for 1988-2008, showing trends in the proportion of species expected to remain extant in the near future without additional conservation action. An RLI value of 1.0 equates to all species being categorised as Least Concern, and hence that none are expected to go extinct in the near future. An RLI value of zero indicates that all species have gone Extinct. N = 1,308 freshwater, 336 marine and 9,687 terrestrial non-Data Deficient species.

Elements of good practice

- **Collaboration and engagement/building support and sustainability**

It is important to engage fully with the global organisations, groups and programmes responsible for assessing the status of species for the IUCN Red List. These involve thousands of scientists, conservationists and species experts some of whom will be outside the country and may be able to help with repatriation of relevant data for species assessments at the national level.

- **Data quality standards**

Assessments of national or regional extinction risk should if at all possible be based on the IUCN Red List Categories and Criteria and meet the appropriate documentation standards (see IUCN 2001, 2003).

- **Metadata**

It is vital to document thoroughly the species included, dates of assessments, the species undergoing genuine status changes, and the drivers of these changes.

- **Methodological documentation and consistency (cross-calibration)**

Full details should be documented of how the IUCN Red List Categories and Criteria are applied at the national or regional scale, including adjustments to higher or lower categories of threat as a consequence of judgements about rescue effects.

- **Frequency of updating**

A primary constraint on creating and updating RLs is the frequency of re-assessments. Regular assessments are recommended; as an example, all bird species are reassessed every four years. It is likely that assessments at the national level will be repeated less frequently in many countries because of the resources and capacity required, although this will reduce the utility of the indicator.

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THE IUCN RED LIST
OF THREATENED SPECIES®

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