

**Appendix 1:** Summary of the five criteria (A-E) used to evaluate the risk status of an ecosystem. For details on definitions and methods for estimating the variables described below, please refer to (1, 2) (available at: <http://iucnrle.org/resources/key-documents/>).

| A. Reduction in geographic distribution over ANY of the following time periods: |  | CR    | EN    | VU    |
|---|--|-------|-------|-------|
| A1  | Present (over the past 50 years).                                  | ≥ 80% | ≥ 50% | ≥ 30% |
| A2a   | Future (over the next 50 years).                                   | ≥ 80% | ≥ 50% | ≥ 30% |
| A2b   | Future (over any 50 year period including the present and future). | ≥ 80% | ≥ 50% | ≥ 30% |
| A3  | Historic (since 1750).   | ≥ 90% | ≥ 70% | ≥ 50% |

| B. Restricted geographic distribution indicated by EITHER B1, B2 or B3: |  | CR                      | EN                       | VU                       |
|---|--|-------------------------|--------------------------|--------------------------|
| B1  | Extent of a minimum convex polygon enclosing all occurrences (Extent of Occurrence) <b>AND</b> at least one of the following (a-c):<br>(a) An observed or inferred continuing decline in <b>EITHER</b> :<br>i. a measure of spatial extent appropriate to the ecosystem; <b>OR</b><br>ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; <b>OR</b><br>iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem.<br>(b) An observed or inferred threatening processes that are likely to cause continuing declines in either geographic distribution, environmental quality or biotic interactions within the next 20 years.<br>(c) Ecosystem exists at ... | ≤ 2,000 km <sup>2</sup> | ≤ 20,000 km <sup>2</sup> | ≤ 50,000 km <sup>2</sup> |
| B2  | The number of 10 × 10 km grid cells occupied (Area of Occupancy) <b>AND</b> at least one of a-c above (same subcriteria as for B1).  | 1 location<br>≤ 2       | ≤ 5 locations<br>≤ 20    | ≤ 10 locations<br>≤ 50   |
| B3  | A very small number of locations (generally fewer than 5) <b>AND</b> prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and thus capable of collapse or becoming Critically Endangered within a very short time period (B3 can only lead to a listing as <b>VU</b> ).   |                         |                          | <b>VU</b>                |

| C. Environmental degradation over ANY of the following time periods: |  | Relative severity (%) |           |           |           |
|--|--|-----------------------|-----------|-----------|-----------|
| C1   | The past 50 years based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:  | Extent (%)            | ≥ 80      | ≥ 50      | ≥ 30      |
|  |  | ≥ 80                  | <b>CR</b> | <b>EN</b> | <b>VU</b> |
|  |  | ≥ 50                  | <b>EN</b> | <b>VU</b> |           |
| C2   | The next 50 years, or any 50-year period including the present and future, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table: | Extent (%)            | ≥ 80      | ≥ 50      | ≥ 30      |
|  |  | ≥ 80                  | <b>CR</b> | <b>EN</b> | <b>VU</b> |
|  |  | ≥ 50                  | <b>EN</b> | <b>VU</b> |           |
| C3   | Since 1750 based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:   | Extent (%)            | ≥ 90      | ≥ 70      | ≥ 50      |
|  |  | ≥ 90                  | <b>CR</b> | <b>EN</b> | <b>VU</b> |
|  |  | ≥ 70                  | <b>EN</b> | <b>VU</b> |           |
|  |  | ≥ 50                  | <b>VU</b> |           |           |

| D. Disruption of biotic processes or interactions over ANY of the following time periods: |  | Relative severity (%) |           |           |           |
|---|--|-----------------------|-----------|-----------|-----------|
| D1  | The past 50 years based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:  | Extent (%)            | ≥ 80      | ≥ 50      | ≥ 30      |
|   |  | ≥ 80                  | <b>CR</b> | <b>EN</b> | <b>VU</b> |
|   |  | ≥ 50                  | <b>EN</b> | <b>VU</b> |           |
| D2  | The next 50 years, or any 50-year period including the present and future, based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table: | Extent (%)            | ≥ 80      | ≥ 50      | ≥ 30      |
|   |  | ≥ 80                  | <b>CR</b> | <b>EN</b> | <b>VU</b> |
|   |  | ≥ 50                  | <b>EN</b> | <b>VU</b> |           |
| D3  | Disruption of biotic processes or interactions since 1750 based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:                  | Extent (%)            | ≥ 90      | ≥ 70      | ≥ 50      |
|   |  | ≥ 90                  | <b>CR</b> | <b>EN</b> | <b>VU</b> |
|   |  | ≥ 70                  | <b>EN</b> | <b>VU</b> |           |
|   |  | ≥ 50                  | <b>VU</b> |           |           |

| E. Quantitative analysis ...                                    |  | CR                    | EN                    | VU                     |
|---|--|-----------------------|-----------------------|------------------------|
| ... that estimates the probability of ecosystem collapse to be: |  | ≥ 50% within 50 years | ≥ 20% within 50 years | ≥ 10% within 100 years |

1. Keith DA, Rodríguez JP, Rodríguez-Clark KM, Nicholson E, Aapala K, Alonso A, et al. Scientific Foundations for an IUCN Red List of Ecosystems. PLoS ONE. 2013;8(5):e62111.
2. IUCN. IUCN Red List of Ecosystems Guidebook: Categories, Criteria and How to Apply Them. Gland, Switzerland: Version 1. Ecosystems Red List Thematic Group, Commission on Ecosystem Management (CEM) and Global Ecosystem Management Programme (GEMP), International Union for Conservation of Nature (IUCN); in press.