THE TERRESTRIAL MAMMALS, REPTILES AND AMPHIBIANS OF THE UAE – SPECIES LIST AND STATUS REPORT

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Part 1 The Terrestrial Mammals of The UAE

The following list includes all UAE terrestrial mammals classified according to the IUCN Red List 2004 (IUCN 2004) and UAE mammals Red List 1996 (Hornby, 1996).

There are 45 species of terrestrial mammals known to occur either naturally, as introduced species, or to have become extinct within the last 75 years in The UAE. These mammals exist within 18 Families of 8 Orders (Carnivora, Perissodactyla, Artiodactyla, Rodentia, Hyracoidea, Lagomorpha, Insectivora and Chiroptera).

Of these 45 species, 2 species (*Oryx leucoryx* and *Capra aegagrus*) are known to be extinct in the wild. Two further species (*Canis lupus arabs* and *Hyaena hyaena*) are probably extinct in UAE with species from Oman or Saudi Arabia that cross the border being seen occasionally. From the remaining 41 species, 6 species have been introduced (*Felis cattus*, *Herpestes edwardsi*, *Equus africanus*, *Capra aegagrus hircus*, *Procavia capensis*, and *Suncus murinus*).

Most of the species either fall within the Data Deficiency category or are Not Listed on the IUCN Red List. The classifications according to the UAE mammals Red List of 1996 (Hornby 1996a), are shown in Table 1. It should be pointed out that the classification (by Hornby) was based on a consensus of opinions of members of the UAE Biodiversity Conservation Committee rather than on systematic survey data. For an explanation of terms used in the IUCN classification, please see part 4.

During 2005, TERC plans to formally produce a UAE Red List based on data that has been collected by the Wildlife Survey and Monitoring (WSM) team, the Emirates Natural History Group (ENHG) and by other sources.

Species shown in bold type font are known to occur in Abu Dhabi Emirate.

Table 1. Numbers of UAE mammals falling within categories according to the IUCN Red List and according to the UAE Red List

Category	Abbr.	IUCN Red Data List (2004)	UAE Red Data List
Extinct	EX	0	0
Extinct in the Wild	EW	0	4
Critically Endangered	CR	1	4
Endangered	EN	3	3
Vulnerable	VU	4	6
Near Threatened	NT	3	3
Least Concern	LC	2	9
Data Deficient	DD	1	9
Not Listed		31	7

1. Carnivores (Order Carnivora)

a. Cats (Family Felidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Arabian Leopard	*Panthera pardus nimr*	Critically Endangered	CR C2a
Caracal Lynx	***Felis caracal schmitzi***	**Vulnerable**	**Not Listed**
Gordon's Wildcat	***Felis silvestris gordoni***	**Endangered**	**Not Listed**
Sand Cat	***Felis margarita***	**Endangered**	**NT**
Feral Cat (1)	***Felis cattus***	**Not Listed**	**Not Listed**

b. Dogs (Family Canidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Wolf (2)	***Canis lupus arabs***	**Extinct in the Wild**	**LC**
Red Fox	***Vulpes vulpes***	**Least Concern**	**LC**
Blanford's Fox	***Vulpes cana***	**Vulnerable**	**VU C1**
Rüppell's Fox	***Vulpes rueppelli***	**Vulnerable**	**DD**

c. Hyaenas (Family Hyaenidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Striped Hyaena (2)	***Hyaena hyaena***	**Extinct in the Wild**	**NT**

d. Weasels (Family Mustelidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Ratel (3)	***Mellivora capensis***	**Critically Endangered**	**Not Listed**

e. Mongooses (Family Herpestidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
White-tailed Mongoose	*Ichneumia albicauda*	Endangered	Not Listed
Indian Grey Mongoose (4)	*Herpestes edwardsi*	Not Listed	Not Listed

2. Odd-toed Ungulates (Order Perrisodactyla)

a. Horses, Zebras and Asses (Family Equidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Feral Donkey (5)	***Equus africanus***	**Not Listed**	**Not Listed**

3. Even-Toad Ungulates (Order Artiodactyla)

a. Bovids (Family Bovidae)

i. Grazing antelopes (Sub-family Hippotraginae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Arabian Oryx	***Oryx leucoryx***	**Extinct in the Wild**	**EN C1**

ii. Gazelles and dwarf antelopes (Sub-family Antilopinae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Sand Gazelle	***Gazella subgutturosa marica***	**Critically Endangered**	**NT**
Mountain Gazelle	***Gazella gazella cora***	**Vulnerable**	**VU A2ad**

iii. Goat antelopes (Sub-family Caprinae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Arabian Tahr	***Hemitragus jayakari***	**Critically Endangered**	**EN C2a**
Wild Goat (6)	*Capra aegagrus aegagrus*	Extinct in the Wild	VU A2cde
Feral domestic Goat (7)	*Capra aegagrus hircus*	Not Listed	Not Listed

4. Rodents (Order Rodentia)

a. Rats and mice (Family Muridae)

i. Old world rats and mice (Sub-family Murinae)

Common Name	Scientific Name	UAE Category	IUCN Red List
House Mouse	***Mus musculus***	**Least Concern**	**Not Listed**
Brown Rat	***Rattus norvegicus***	**Least Concern**	**Not Listed**
Black Rat	***Rattus rattus***	**Least Concern**	**Not Listed**
Egyptian Spiny Mouse	***Acomys cahirinus***	**Near Threatened**	**Not Listed**

ii. Gerbils (Sub-family Gerbillinae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Wagner's Gerbil	***Gerbillus dasyurus***	**Data Deficient**	**Not Listed**
Baluchistan Gerbil	***Gerbillus nanus***	**Data Deficient**	**Not Listed**
Sundevall's Jird	***Meriones crassus***	**Least Concern**	**Not Listed**
Arabian Jird	***Meriones arimalius***	**Least Concern**	**EN B1 + 2C**
Cheesman's gerbil	***Gerbillus cheesmani***	**Least Concern**	**Not Listed**

iii. Pocket mice, kangaroo rats and kangaroo mice (Sub-family Heteromyinae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Lesser Jerboa	***Jaculus jaculus***	**Near Threatened**	**Not Listed**

5. Hyraxes (Order Hyracoidea)

a. Hyraxes (Family Procaviidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Cape Hyrax (8)	***Procavia capensis***	**Not Listed**	**Not Listed**

6. Lagomorphs (Order Lagomorpha)

a. Rabbits and hares (Family Leporidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Cape Hare	***Lepus capensis***	**Least Concern**	**Not Listed**

7. Insectivores (Order Insectivora)

a. Hedgehogs (Family Erinaceidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Brandt's Hedgehog	***Hemiechinus hypomelas***	**Least Concern**	**Not Listed**
Ethiopian Hedgehog	***Hemiechinus aethiopicus***	**Near Threatened**	**Not Listed**
Long-eared Hedgehog (9)	***Hemiechinus auritus***	**Vulnerable**	**Not Listed**

b. Shrews (Family Soricidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
House Shrew (10)	*Suncus murinus*	Data Deficient	Not Listed
Savi's Pygmy Shrew	*Suncus etruscus*	Not Listed	Not Listed

8. Bats (Order Chiroptera)

a. Flying foxes (Sub-order Megachiroptera)

i. Fruit bats and flying foxes (Family Pteropodidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Egyptian Fruit Bat	***Rousettus aegyptiacus***	**Vulnerable**	**Not Listed**

b. All other bats (Sub-order Microchiroptera)

i. Mouse tailed bats (Family Rhinopomatidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Muscat Mouse-tailed Bat	***Rhinopoma muscatellum***	**Data Deficient**	**Not Listed**

ii. Horseshoe and old world leaf-nosed bats (Family Rhinolophidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Persian Leaf-nosed Bat	***Triaenops persicus***	**Data Deficient**	**Not Listed**
Trident Leaf-nosed Bat	***Asellia tridens***	**Data Deficient**	**Not Listed**

iii. Vespertilionid bats (Family Vespertilionidae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Hemprich's Long-eared Bat	*Otonycteris hemprichii*	Data Deficient	Not Listed
Sind Serotine Bat	***Eptesicus nasutus***	**Data Deficient**	**VU A2c**
Kuhl's Pipistrelle	***Pipistrellus kuhlii***	**Not Listed**	**Not Listed**

iv. Sheath-tailed bats (Family Amballonuridae)

Common Name	Scientific Name	UAE Category	IUCN Red List
Naked Bellied Tomb Bat	***Taphozous nudiventris***	**Data Deficient**	**Not Listed**

Notes

(1) Feral domestic cats are established in many parts of the UAE; the impact on native fauna is not known, but elsewhere, hybridisation with Wild Cats (*Felis silvestris ssp*) is known to be an issue.

(2) There have been several reported sightings of wolves and Hyaenas over the past 10 years, however these are unlikely to be resident in UAE. The EW classification by Hornby, 1996 is therefore likely to remain unchanged when the taxa are re-evaluated.

(3) There have been no confirmed sightings of Ratel in UAE, the species has only ever been identified by tracks.

(4) Indian Grey Mongoose is thought to have established itself in the Northern Emirates as a result of specimens escaping from captivity.

(5) African Donkey (*Equus africanus* syn. *E. asinus*) is critically endangered throughout its original range, however it has been introduced and become feral in many parts of the world. The status and taxonomy of the species in the UAE is unclear. Bones belonging to an Equuid species (identified as *E. africanus*) have been found dating back 7,000 years.

(6) The presence of wild goats in UAE was documented in 1968 (Harrison 1968). However, no sightings of the species have been recorded since this date.

(7) Feral domestic goats (*capra aegagrus hircus*) have been introduced to several parts of UAE.

(8) Cape hyraxes were apparently introduced to Jebel Hafeet in Al Ain during the mid 1990's; however, it is unlikely that they occur naturally in The UAE.

(9) Long-eared hedgehog is listed based on a single record from Abu Dhabi Emirate.

(10) The house shrew, a commensal species, was considered by Duckworth, as likely to occur although there are no formal records of its occurrence.

Part 2 The Terrestrial Reptiles of The UAE

The following list includes all UAE terrestrial reptiles classified according to the IUCN Red List 2004 (IUCN 2004).

There are 54 species of terrestrial reptiles that are known to occur in UAE. These exist in 11 Families within 1 Order (Squamata).

The common names of many of the species have multiple synonyms and should not be used when referring to a species. In some cases over the last 10 years, the scientific names have changed (for example *Agama flavimaculata* has become *Trapelus flavimaculatus*).

During 2004, TERC plans to formally produce a UAE Red List based on data that has been collected by the Wildlife Survey and Monitoring (WSM) team, the Emirates Natural History Group (ENHG) and by other sources.

Species shown in bold type font are known to occur in Abu Dhabi Emirate.

1. Snakes and lizards (Order Squamata)

a. Lizards (Sub-order Sauria)

i. Agamid lizards (Family Agamidae)

Common Name	Scientific Name	IUCN Red List
Arabian Toad-headed Agama	***Phrynocephalus arabicus***	**Not Listed**
Spotted Toad-headed Agama	***Phrynocephalus maculatus***	**Not Listed**
Yellow-spotted Agama	***Trapelus flavimaculatus***	**Not Listed**
Sinai Agama	***Pseudotrapelus sinaitus***	**Not Listed**
Spiny-tailed Lizard	***Uromastyx aegyptia microlepis***	**Not Listed**
Spiny-tailed Lizard	***Uromastyx leptieni***	**Not Listed**

ii. Geckos (Family Gekkonidae)

Common Name	Scientific Name	IUCN Red List
Musandam Leaf-toed Gecko	*Asaccus caudivulvulus*	Not Listed
	Asaccus elisae	Not Listed
Gallagher's Leaf-toed Gecko	*Asaccus gallagheri*	Not Listed
Spatulate-tailed Rock Gecko	*Bunopus spatalurus*	Not Listed
Baluch Rock Gecko	***Bunopus tuberculatus***	**Not Listed**
Wall Gecko	***Cyrtodactylus scaber***	**Not Listed**
Yellow-bellied House Gecko	***Hemidactylus flaviviridis***	**Not Listed**
Persian House Gecko	*Hemidactylus persicus*	Not Listed
Turkish Gecko	***Hemidactylus turcicus***	**Not Listed**
Bar-tailed Semaphore Gecko	***Pristurus celerrimus***	**Not Listed**
Least Semaphore Gecko	***Pristurus minimus***	**Not Listed**
Rock semaphore Gecko	***Pristurus rupestris***	**Not Listed**
Fan-footed Gecko	***Ptyodactylus hasselquistii***	**Not Listed**
Arabian Sand Gecko	***Stenodactylus arabicus***	**Not Listed**
Dune Sand Gecko	***Stenodactylus doriae***	**Not Listed**
Gulf Sand Gecko	***Stenodactylus khobarensis***	**Not Listed**
East Sand Gecko	***Stenodactylus leptocosymbotes***	**Not Listed**
Slevin's Big-headed Gecko	***Stenodactylus slevini***	**Not Listed**
Desert Skink Gecko	***Teratoscincus scincus***	**Not Listed**

iii. Lacertid lizards (Family Lacertidae)

Common Name	Scientific Name	IUCN Red List
Striped Sand Lizard	*Acanthodactylus boskianus*	Not Listed
Fringe-toed Lizard	***Acanthodactylus gongrorhynchatus***	**Not Listed**
Haas's Spiny-footed Lizard	***Acanthodactylus haasi***	**Not Listed**
Spiny-footed Lizard	***Acanthodactylus opheodurus***	**Not Listed**
White spotted Lizard	***Acanthodactylus schmidti***	**Not Listed**
Blue-tailed Lizard	*Lacerta cyanura*	Not Listed
Jayakar's Lacertid	*Lacerta jayakari*	Not Listed
Desert Race-runner	***Mesalina adramitana***	**Not Listed**
Short-nosed Desert Lizard	***Mesalina brevirostris***	**Not Listed**

iv. Skinks (Family Scincidae)

Common Name	Scientific Name	IUCN Red List
Snake-eyed Skink	***Ablepharus pannonicus***	**Not Listed**
Ocellated Skink	***Chalcides ocellatus***	**Not Listed**
Tesselated Mabuya	*Mabuya tessallata*	Not Listed
Eastern Sand Skink	***Scincus mitranus***	**Not Listed**
Common Skink	***Scincus scincus conirostris***	**Not Listed**

v. Varanid lizards (Family Varanidae)

Common Name	Scientific Name	IUCN Red List
Desert Monitor Lizard	***Varanus griseus***	**Not Listed**

b. Amphisbaenids (Sub-order Amphisbaenia)

i. Short-head worm lizards (Family Trogonophidae)

Common Name	Scientific Name	IUCN Red List
Zarudny's Worm Lizard	***Diplometopon zarudnyi***	**Not Listed**

c. Snakes (Sub-order Serpentes)

i. Slender blind snakes (Family Leptotyphlopidae)

Common Name	Scientific Name	IUCN Red List
Hooked Thread Snake	***Leptotyphlops macrorhyncus***	**Not Listed**

ii. Blind snakes (Family Typhlopidae)

Common Name	Scientific Name	IUCN Red List
Flowerpot Snake	*Rhamphotyphlops braminus*	Not Listed

iii. Boas and pythons (Family Boidae)

Common Name	Scientific Name	IUCN Red List
Sand Boa	***Eryx jayakari***	Not Listed

iv. Colubrid snakes (Family Colubridae)

Common Name	Scientific Name	IUCN Red List
Rat Snake	***Coluber ventromaculatus***	**Not Listed**
Wadi Racer	*Coluber rhodorhacis*	Not Listed
Leaf-nosed Snake	***Lytorhynchus diadema***	**Not Listed**
Hooded Malpolon	***Malpolon moilensis***	**Not Listed**
Hissing sand snake	***Psammophis schokari***	**Not Listed**
Arabian Cat Snake	*Telescopus dhara*	Not Listed
Diadem Snake	*Spalerosophis diadema*	Not Listed

v. Vipers (Family Viperidae)

Common Name	Scientific Name	IUCN Red List
Arabian Horned Viper	***Cerastes gasperettii***	**Not Listed**
False Horned Viper	***Pseudocerastes persicus***	**Not Listed**
Saw-scaled Viper	***Echis carinatus***	**Not Listed**
Oman saw-scaled Viper	***Echis omanensis***	**Not Listed**

Part 3 The Amphibians of The UAE

The following list includes all UAE terrestrial amphibians classified according to the IUCN Red List 2004 (IUCN 2004).

There are only 2 species of amphibians recorded in The UAE. The Dhofar toad, *Bufo* dhufarensis has been recorded around plantations in the Al Ain area, although it is possible that they may occur within some of the permanent, inaccessible water pools on Jebel Hafeet.

During 2004, TERC plans to formally produce a UAE Red List based on data that has been collected by the Wildlife Survey and Monitoring (WSM) team, the Emirates Natural History Group (ENHG) and by other sources.

1. Amphibia (Order Anura)

a. True toads (Family Bufonidae)

Common Name	Scientific Name	IUCN Red List
Arabian Toad	*Bufo arabicus*	Not Listed
Dhofar Toad	***Bufo dhufarensis***	**Not Listed**

Bibliography

Arnold, E.N. (1986). A key and annotated checklist to the lizards and amphisbaenids of Arabia. *Fauna of Saudi Arabia*. **8**. 385 - 435.

Balletto, E., Cherchi, M.A. and Gasperetti, J. (1985). Amphibians of the Arabian Peninsula. *Fauna of Saudi Arabia*. **7**. 318 - 392

Duckworth, W. (1996). Land mammals of Abu Dhabi. In: Osborne, P.E. (ed.) *Desert Ecology of Abu Dhabi – a review and recent studies*. Pisces Publications, Newbury, UK.

El Din, S.B. (1996). Terrestrial reptiles of Abu Dhabi. In: Osborne, P.E. (ed.) *Desert Ecology of Abu Dhabi – a review and recent studies*. Pisces Publications, Newbury, UK.

Gross, C. (1987). *Mammals of the Southern Gulf*. Motivate publishing, Dubai.

Harrison, D.L. (1968) *The mammals of Arabia: Carnivora, Hyracoidea and Artiodactyla*. Vol 2. Ernest Benn Ltd. London, UK.

Harrison, D.L. and Bates, P.J. (1991). *The mammals of Arabia*. Harrison Zoological Museum Publications, Sevenoaks, Kent, UK.

Hornby, R. (1996a). A checklist of Amphibians and Reptiles of the UAE. *Tribulus* Vol. **6.1**. 9 -13.

Hornby, R. (1996b). Red list of mammals for the United Arab Emirates. *Tribulus* Vol. **6.1**. 13 – 14.

Hornby, R., ed. (1998). *The Natural History, Geology and Archaeology of Jebel Hafeet*. Emirates Natural History Group, Abu Dhabi.

IUCN. (2004). *2004 IUCN Red List of Threatened Species.* http://www.iucnredlist.org.

Jongbloed, M. (2000). *Wild about reptiles*. ERWDA, Abu Dhabi.

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Part 4 Explanation of terms used in the IUCN Red Data List

EXTINCT (EX)
A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

EXTINCT IN THE WILD (EW)
A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that

future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

THE CRITERIA FOR CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥90% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
   (a) direct observation
   (b) an index of abundance appropriate to the taxon
   (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
   (d) actual or potential levels of exploitation
   (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of □80% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ⩾80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ⩾80% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 100 km², and estimates indicating at least two of a-c:
    a. Severely fragmented or known to exist at only a single location.
    b. Continuing decline, observed, inferred or projected, in any of the following:
        (i) extent of occurrence
        (ii) area of occupancy
        (iii) area, extent and/or quality of habitat
        (iv) number of locations or subpopulations
        (v) number of mature individuals.
    c. Extreme fluctuations in any of the following:
        (i) extent of occurrence
        (ii) area of occupancy
        (iii) number of locations or subpopulations
        (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 10 km², and estimates indicating at least two of a-c:
    a. Severely fragmented or known to exist at only a single location.
    b. Continuing decline, observed, inferred or projected, in any of the following:
        (i) extent of occurrence
        (ii) area of occupancy
        (iii) area, extent and/or quality of habitat
        (iv) number of locations or subpopulations
        (v) number of mature individuals.
    c. Extreme fluctuations in any of the following:
        (i) extent of occurrence
        (ii) area of occupancy
        (iii) number of locations or subpopulations
        (iv) number of mature individuals.

C. Population size estimated to number fewer than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, (up to a maximum of 100 years in the future)

OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):
    (a) Population structure in the form of one of the following:
        (i) no subpopulation estimated to contain more than 50 mature individuals, OR
        (ii) at least 90% of mature individuals in one subpopulation.
    (b) Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a very high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ⩾70% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
   (a) direct observation
   (b) an index of abundance appropriate to the taxon
   (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
   (d) actual or potential levels of exploitation
   (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ⩾50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ⩾50%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1. 4. An observed, estimated, inferred, projected or suspected population size reduction of ⩾50% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 5000 km², and estimates indicating at least two of a-c:
   a. Severely fragmented or known to exist at no more than five locations.
   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.
   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 500 km², and estimates indicating at least two of a-c:
   a. Severely fragmented or known to exist at no more than five locations.

b. Continuing decline, observed, inferred or projected, in any of the following:
(i) extent of occurrence
(ii) area of occupancy
(iii) area, extent and/or quality of habitat
(iv) number of locations or subpopulations
(v) number of mature individuals.

C. Extreme fluctuations in any of the following:
(i) extent of occurrence
(ii) area of occupancy
(iii) number of locations or subpopulations
(iv) number of mature individuals.

C. Population size estimated to number fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, (up to a maximum of 100 years in the future)
OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):
(a) Population structure in the form of one of the following:
(i) no subpopulation estimated to contain more than 250 mature individuals,
OR
(ii) at least 95% of mature individuals in one subpopulation.
(b) Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of $\geqslant$50% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are: clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
(a) direct observation
(b) an index of abundance appropriate to the taxon
(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
(d) actual or potential levels of exploitation
(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of $\geqslant$30% over the last 10 years or three generations, whichever is the longer, where the reduction

or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ⩾30%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ⩾30% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 20,000 km², and estimates indicating at least two of a-c:
   a. Severely fragmented or known to exist at no more than 10 locations.
   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.
   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.
2. Area of occupancy estimated to be less than 2000 km², and estimates indicating at least two of a-c:
   a. Severely fragmented or known to exist at no more than 10 locations.
   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.
   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

C. Population size estimated to number fewer than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, (up to a maximum of 100 years in the future)
OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):
   (a) Population structure in the form of one of the following:

(i) no subpopulation estimated to contain more than 1000 mature individuals,
OR
(ii) all mature individuals are in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

D. Population very small or restricted in the form of either of the following:

1. Population size estimated to number fewer than 1000 mature individuals.
2. Population with a very restricted area of occupancy (typically less than 20 km^2) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.