RAMSAR TECHNICAL REPORT NO. X

Population estimates and 1% thresholds for non-avian wetland-dependant fauna

**Jennifer Luedtke, Abigail Powell & David Stroud**

IUCN Species Survival Commission Gland, Switzerland

striking picture of large numbers of a relevant species needed – ideas?

Ramsar Convention Secretariat

Gland, Switzerland

XXXX 2008

 **TECHNICAL REPORT SAMPLE**

This report should be cited as: Luedtke, J. Powell, A. & Stroud, D.A. 2008. Population estimates and 1% thresholds for non-avian wetland-dependant fauna. Ramsar Technical Report No. X. Ramsar Convention Secretariat, Gland, Switzerland. ISBN 2-940073-30-9.

Series editors: Heather MacKay (Chair of Ramsar Scientific & Technical Review Panel), Max Finlayson (former Chair of Ramsar Scientific & Technical Review Panel), & Nick Davidson (Deputy Secretary General, Ramsar Convention Secretariat).

Editing & layout: Dwight Peck (Ramsar Convention Secretariat).

Ramsar Technical Reports are designed to publish, chiefly through electronic media, technical notes, reviews and reports on wetland ecology, conservation, wise use and management, as an enhanced information support service to Contracting Parties and the wider wetland community in support of implementation of the Ramsar Convention. In particular, the series includes the detailed technical background reviews and reports prepared by the Convention’s Scientific and Technical Review Panel (STRP) at the request of Contracting Parties, which would previously have been made available in most instances only as “Information Papers” for a Conference of the Parties (COP).

 This is designed to ensure increased and longer-term accessibility of such documents. Other reports not originating from COP requests to the STRP, but which are considered by the STRP to provide information relevant to supporting implementation of the Convention, may be proposed for inclusion in the series. All Ramsar Technical Reports are peer-reviewed by the members and observers appointed to the STRP.

Ramsar Technical Reports are published in English in electronic (PDF) format. When resources permit, the reports will also be published in French and Spanish (the other official languages of the Convention) and in printed form.

The views and designations expressed in this publication are those of its author and do not rep­resent an officially-adopted view of the Ramsar Convention or its Secretariat.

This publication may be reproduced for educational or non-profit purposes without special per­mission from the copyright holders, provided acknowledgement of the source is made. The Ramsar Convention Secretariat would appreciate receiving a copy of any publications that use this document as a source.

For further information please contact:

Ramsar Convention Secretariat

Rue Mauverney 28

1196 Gland

Switzerland

Fax: +41 22 999 0169

e-mail: ramsar@ramsar.org

Website: http://www.ramsar.org

Cover photograph courtesy of XXXXXXXXXX

**Contents**

[Summary 4](#_Toc188428091)

[1. Introduction 5](#_Toc188428092)

[2. Methodology and sources 7](#_Toc188428093)

[2.1 Mammals 7](#_Toc188428094)

[2.2 Reptiles 8](#_Toc188428095)

[2.3 Amphibians 10](#_Toc188428096)

[3. Guidance on the use of 1% thresholds 11](#_Toc188428097)

[3.1 Background and update frequency 11](#_Toc188428098)

[3.2 Turnover 12](#_Toc188428099)

[3.3 Treatment of mixed populations 13](#_Toc188428100)

[4. Upcoming assessments: future developments for further versions 14](#_Toc188428101)

[5. Acknowledgements 14](#_Toc188428102)

[6. References 15](#_Toc188428103)

[Annex 1. Red list wetland habitat classifications 16](#_Toc188428104)

[Annex 2. Population estimates and 1% thresholds for non-avian wetland-dependant animal species - for the application of Ramsar Criterion 9 17](#_Toc188428105)

Summary

At its ninth Conference of the Parties (CoP), the Ramsar Convention adopted a new, ninth criterion for the selection of wetlands of international importance. This was first addition to its suite of site selection criteria for almost a decade. Criterion 9 states:

“A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.”

The purpose of this report is to assist Contracting Parties in the application of Criterion 9, by providing a working list of non-avian animal species that are ecologically dependant on a Ramsar wetland type during at least one part of its annual cycle. This report also provides the most recent and most reliable population estimates available for each listed species and their sub-populations.

The Ramsar STRP and the IUCN-SSC have agreed a procedure for further developing and updating this list through IUCN’s Web-based Species Information Service (SIS). It is intended that progressively, as information becomes available, the list will be updated on a triennial basis (prior to each future CoP) and extended to include population estimates for as many other wetland-dependent non-avian species as possible.

The new criterion provides a major opportunity to advance the conservation of many wetland dependant species through use of existing population assessments and count data to highlight the international importance of critical wetland habitats.

1. Introduction

One of the longest standing of the criteria for identifying Ramsar sites is the so-called ‘1% Criterion’ (actually numbered Criterion 6). This indicates that:

*“A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.”*

Since its adoption in 1974, the criterion has applied just to waterbirds. Its application is simple, and it requires just an estimate of numbers of waterbirds at a particular wetland, to be proportionately related to the total numbers of individuals in the relevant biogeographic population. It is also intuitive – easily understood by non-scientific decision makers – and easily applicable: indeed by [September 2005, of the 1,462 Ramsar sites, 516 (>35%) had been designated using Criterion 6 **- update**], more than any other of the ‘specific’ criteria.

The suggestion that the applicability of the waterbird 1% Criterion could be broadened to other taxa is not new, and has been discussed at several previous Ramsar CoPs as far back as CoP 3 in 1987. Indeed, IUCN-SSC had made previous presentations to technical sessions at CoP 4 (1990; Stuart 1990) and CoP 5 (1993; Giménez-Dixon 1993) exploring how such an approach might work for a range of non-avian taxa, and urging its uptake.

In 2004, Ramsar’s Scientific and Technical Review Panel (STRP) once again posed the question as to whether, given the wide application of Criterion 6, a similar approach might be adopted for non-avian wetland animals. This also coincided with a request to Ramsar from the Biodiversity Convention that quantitative approaches to the identification of Ramsar sites might be considered for non-avian taxa. As a result, STRP undertook a wide consultation, with valuable input from several IUCN Specialist Groups.

This review concluded that there seemed to be no fundamental reasons why a 1% criterion should not also be applicable to non-avian taxa. Whilst there will always be limitations on the applicability of a quantitative approach to site selection — for example, data on population sizes that is poor or lacking, and ineffectiveness of application for species which do not aggregate at high densities — these are no different to similar constraints on the application of Criterion 6 for many waterbirds.

In November 2006, Ramsar’s CoP9 formally adopted the new criterion[[1]](#footnote-1), the first addition to its suite of site selection criteria for almost a decade. Criterion 9 states:

*“*A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.”

At the same time the Parties also adopted the long-term target:

“to have included in the Ramsar List all wetlands which regularly support 1% or more of a biogeographical population of one non-avian animal species or subspecies*.”*

Its application will rely on both site-related data (local population assessments) as well as information on the sizes of international or biogeographic populations. The effectiveness of Criterion 5 relies on a triennial publication published by Wetlands International called *Waterbird Population Estimates* (*WPE*) (Wetlands International 2006), and which collates ‘best’ estimates of the sizes of biogeographical population sizes. It does this following consultation with the waterbird Specialist Groups. Ramsar has recommended to its Parties that *WPE* be used as a definitive source of population estimates and 1% thresholds for the application of Criterion 6.

The work already being undertaken by IUCN-SSC Specialist Groups to assess and report estimates of population sizes clearly now also has a major potential role in supporting the application of the new criterion. In this way it will assist in the identification of wetlands of international importance that will qualify for national listing under the Convention. Particular groups to which it is envisaged that Criterion 9 may be applicable include a range of aquatic ‘mega-fauna’ including some crocodiles, river dolphins, turtles, seals and wetland cervids.

Following the formal endorsement of the new criterion at CoP 9, STRP were charged with developing processes to collate the relevant data and information needed to allow its application. This report provides an initial listing of estimates and derived 1% thresholds has been collated from the literature, including from many IUCN Action Plans.

The purpose of this report is to assist parties in the application of Criterion 9, by providing a working list of non-avian animal species that are ecologically dependant on a Ramsar wetland type during at least one part of its annual cycle. This report also provides the most recent and most reliable population estimates available for each listed species and their sub-populations.

The Ramsar STRP and the IUCN-SSC have agreed a procedure for further developing and updating this list through IUCN’s Web-based Species Information Service (SIS). It is intended that progressively, as information becomes available, the list will be updated and extended to include population estimates for other wetland-dependent non-avian species, whether or not they are globally-threatened.

Ramsar envisages the publication of best population estimates of relevant taxa on a triennial basis, probably in a similar format to *WPE*.

The new criterion provides a major opportunity to advance the conservation of many wetland dependant species through use of existing count data to highlight the international importance of critical wetland habitats.

2. Methodology and sources

This list of population estimates was completed from available reliable sources, such as the IUCN Red List database, SSC Action Plans, and other online searchable databases. A complete list of sources is included in Annex 1. Subsequently, the chairs of the relevant IUCN/SSC Specialist Groups were contacted with requests to review the data in the tables relevant to the species under their remit. They were asked for contributions in the following areas:

* + the addition of relevant wetland-dependant species;
	+ the addition of relevant wetland-dependant sub-species;
	+ population names of species according to geographical area;
	+ population estimates and estimate dates;
	+ sources of data (see second sheet in Excel file Labeled "Sources"); and
	+ any additional comments in either email form or in the “Notes” column.

Below is a description of the methods and sources used to compile data for each Order. Note that:

* Species listed as Extinct (EX) by the IUCN Red List were not included,
* Due to the timeframe in which this report was written, correspondence with Specialist Group members was limited.

2.1 Mammals

**IUCN Red List of Threatened SpeciesTM**

The first source used to compile the list of wetland-dependant mammal species was the IUCN Red List of Threatened Species TM, an online species information database. The combined results of two Red List searches were used:

1) ‘Mammalia’ + ‘Freshwater system’ + ‘Species’ + ‘Stocks and Subpopulations’ + ‘Subspecies and varieties’

2) ‘Mammalia’ + ’Marine Intertidal and Coastal habitats’ (see Annex 1 for a complete list of the wetland habitats included) + ‘Species’ + ‘Stocks and Subpopulations’ + ‘Subspecies and varieties’

The first search identified mammals associated with freshwater systems and the second identified mammals associated with coastal habitats. Due to the logic of the Red List search system it was necessary to carry out these searches separately and then combine the results (excluding duplicates) rather than include all the terms in one search. The results of the searches were then exported to Microsoft Excel and Microsoft Access was used to combine the results and eliminate duplicate species.

**Experts**

In addition to data from the IUCN Red List a number of experts where contacted to provide additional information.

**Cetacea (dolphins)**

Source: IUCN/SSC Cetacean Specialist Group (Randall Reeves, Tony Martin, Gill Braulik, Eduardo Secchi, Danielle Kreb and Brian D. Smith)

**Additional Sources**

For a number of species groups additional sources such as Action Plans were used (for complete references see second sheet in Excel file Labeled "Sources").

**Proboscidae (African elephants)**

-IUCN/SSC African Elephant Status Report 2007: an update from the African Elephant Database.

**Cetacea (dolphins)**

-Status assessment of the Indus River dolphin, *Platanista gangetica -minor*, March-April 2001.

-Status and Conservation of Freshwater Populations of Irrawaddy Dolphins, WCS Working Paper Series 31.

-IUCN/SSC Cetacean conservation Action Plan (2003)

**Artiodactyla (hippoptamus)**

-IUCN/SSC Pigs and Peccaries and Hippo Action Plan (1993)

**Carnivora (polar bears)**

-IUCN/SSC Polar Bear Action Plan (2001 & 2006)

**Perissodactyla (tapirs)**

- IUCN/SSC Status and Action Plan of Baird's Tapir (*Tapirus bairdii*) (1997)

**Sirenia (dugongs and manatees)**

-IUCN/SSC Sirenia Action Plan (2002)

2.2 Reptiles

**IUCN Red List of Threatened SpeciesTM**

The methods used to search the Red List database for wetland dependent reptiles was broadly the same as the method for mammals:

1) ‘Reptilia’ + ‘Freshwater system’ + ‘Species’ + ‘Stocks and Subpopulations’ + ‘Subspecies and varieties’

2) ‘Reptilia’ + ’Marine Intertidal and Coastal habitats’ (see Annex 1 for a complete list of the wetland habitats included) + ‘Species’ + ‘Stocks and Subpopulations’ + ‘Subspecies and varieties’

The results of the searches were exported to Microsoft Excel and Microsoft Access was used to combine the results and eliminate duplicate species.

**Experts**

In addition to data from the IUCN Red List a number of experts where contacted to provide additional information.

**Testudines (freshwater turtles)**

Sources: Peter Paul van Dijk and John Iverson.

**CITES**

Additional information was obtained from CITES.

**Testudines (freshwater turtles)**

All species and sub-species from CITES list were included, except species of the families Cheloniidae, Dermochelyidae (marine turtles), and Testudinidae (terrestrial turtles). (http://www.cites.org/common/com/NC/2006/E-NC2006-Fa-05.pdf).

Common names were completed, when available, from John Iverson’s (undated) Checklist (http://www.earlham.edu/biology/documents/Checklist.pdf) and from the IUCN Red List. The IUCN status for each species was completed from the IUCN Red List. However, as not all scientific names from the CITES list match the scientific names on the Red List, many freshwater turtle species are not listed with their IUCN status.

**Additional Sources**

For a number of species groups additional sources such as Action Plans were used (for complete references see second sheet in Excel file Labeled "Sources").

**Crocodylia (alligators, crocodiles and caimans)**

-IUCN/SSC Status Survey and Conservation Action Plan.

-IUCN/SSC Status and conservation of Gharial in Nepal (1994)

-IUCN/SSC Proceedings of the 10th Working Meeting of the Crocodile Specialist Group.

-IUCN/SSC Workshop Report: Crocodile conservation and management in India.

-Webb, G.J.W., Manolis, S.C. & Whitehead, P.J. (eds.) Wildlife Management: Crocodile and Alligators. Surrey Beatty and Sons, Chipping Norton, Australia.

**Testudines (freshwater turtles)**

-CITES Tortoises and turtles checklist. (2006)

-Iverson, J. A checklist of the turtles of the world.

2.3 Amphibians

**IUCN Red List of Threatened SpeciesTM**

The main goal of this report is to identify 1% threshold of population estimates in order to identify potential Ramsar sites. Unfortunately, there are no population estimates for amphibians so it was necessary to use a slightly different method than for the mammals and reptiles. The Red List database was searched for amphibians that occur in freshwater habitats, are either Critically Endangered or Endangered and listed under criterion B, or Vulnerable under criterion D2. These species are all restricted to a small area which means it is highly probable that more than 1% of the population of a specific species occurs in a single site. (The presence of such restricted range species will most probably qualify relevant wetlands under other Ramsar criteria also.)

The information contained in the database on species’ distributions and population was included in the table to facilitate the identification of sites (see Annex 2).

Search: ‘Amphibia’ + ‘Red List status: Critically Endangered and Endangered and Criterion B’ + ‘Red List status: Vulnerable and Criterion D2’ + ‘Freshwater habitats’.

**Experts**

**Amphibia**

Source: Simon Stuart

**Amphibia**

Sources: Global Amphibian Assessment (GAA)

3. Guidance on the use of 1% thresholds

* 1. Background and update frequency

A major aim of this publication is to provide the quantitative information necessary for the use of Criterion 9. The following guidance is adapted, with permission, from Wetlands International’s (2006) *Waterbird Population Estimates* as related to the use of the similarly quantitative Criterion 6 given the similarity of issues.

It is generally accepted that 1% thresholds used to apply Criteria 6 and 9 are most useful if they are not changed too frequently (Stroud 1996), even though the population estimates on which they are based will change (both through improvements in the understanding of the populations and through real changes in population size). It is important that there is a formally agreed mechanism for changing the 1% thresholds for the application of these Criteria. The following guidance has been suggested:

* + 1. Changes to 1% thresholds for application of Ramsar Criteria should not be made for variations on population status within agreed limits of natural fluctuation. In this respect, future analyses should aim to define limits of natural fluctuation.
		2. Published estimates from a technically competent source should be the only justification for changing 1% thresholds suggested in this publication and in subsequent updates.
		3. 1% thresholds for application of Ramsar Criteria should be suggested for populations of unknown or poorly known status as soon as suitable information becomes available, through the triennial update of this publication.
		4. Wherever possible, population estimates and 1% thresholds of well monitored species should be reviewed on a regular (nine yearly) basis.

In Ramsar ResolutionVI.4, the Conference of parties agreed, inter alia, that “unless waterfowl populations are poorly known or are known to be rapidly changing, 1% threshold levels should not be revised more frequently than every third meeting of the Conference of Parties”, and called on Contracting Parties to use these thresholds and estimates as the basis for the designation of Ramsar sites. In the absence of definitions of the terms “poorly known” and rapidly changing” however, it has in practice been difficult to judge when to change 1% thresholds (Wetlands International 2006).

In practice, there are rather few well-monitored populations outside Europe and North America. As has been noted for waterbirds (Wetlands International 2006), there is a general tendency for estimates to increase as knowledge of populations improves, and this can lead to an anomalous situation where a population may be known to be decreasing, but where improved knowledge of numbers leads to an increase in the estimate presented since the previous editions of *Waterbird Population Estimates.*

Application of the 1% criterion has already been extensively discussed by Atkinson-Willes *et al.* (1982) and Stroud *et al.* (1990), and guidelines for the application of the criterion have been agreed by the Conference of Parties. Once a site has been delimited, the number of individuals of each population occurring regularly at the site can be compared with the thresholds given in the tables which form the bulk of this publication. If the site regularly supports more than the given 1% threshold for any population, it is considered to be internationally important for that population.

* 1. Turnover

Migratory species pass through many wetlands en route to their breeding or wintering grounds, so although the number present at any one time may never exceed the 1% threshold, the wetland may still support internationally important numbers of a population because of the total number which use the site during the whole migration period. This can only be substantiated by an estimation of the rate at which the individuals present are changing (turnover rate). Special techniques, such as direct observation of migratory groups, or indirect observation through studies of marked (ringed) individuals, are usually required to measure turnover.

The Ramsar Convention urges the use of turnover estimates, where these data are available, in the application of quantitative site-selection criteria:

“81. Turnover of individuals, especially during migration periods, leads to more waterbirds using particular wetlands than are counted at any one point in time, such that the importance of such a wetland for supporting waterbird populations will often be greater than is apparent from simple census information.

82. However, accurate estimation of turnover and total number of individuals of a population or populations using a wetland is difficult, and several methods (*e.g.* cohort marking and resighting, or summing increases in a count time-series) which have at times been applied do not yield statistically reliable or accurate estimates.

83. The only currently available method which is considered to provide reliable estimates of turnover is that of unique capture/marking and resighting/recapture of individually-marked birds in a population at a migratory staging site. But it is important to recognize that for this method to generate a reliable estimate of migration volume, its application usually requires significant capacity and resources, and for large and/or inaccessible staging areas (especially where birds in a population are widely dispersed) use of this method can present insuperable practical difficulties.

84. When turnover is known to occur in a wetland but it is not possible to acquire accurate information on migration volume, Parties should continue to consider recognizing the importance of the wetland as a migratory staging area through the application of Criterion 4, as the basis for ensuring that their management planning for the site fully recognizes this importance.”

We suggest a similar approach, as relevant, in the context of Criterion 9 (non-avian species).

* 1. Treatment of mixed populations

If, at any time, a site supports two populations of the same species, problems in applying 1% thresholds can arise if individuals of the two populations are indistinguishable. In such cases, every effort should be made to apply the appropriate 1% threshold to each population by investigating the origin and destination of individuals at the site, or through determining the seasonal patterns of occurrence for each population using the site.

Meininger *et al.* (1995) suggested that when two or more populations of a waterbird species occur at a site and separation is impossible, the 1% threshold relating to the largest population should be used for site designation purposes. Such guidance was formalized by CoP 9 for the application of Criterion 6:

“88. At some sites, more than one biogeographical population of the same species can occur, especially during migration periods and/or where flyway systems of different populations intersect at major wetlands. Where such populations are indistinguishable in the field, as is usually the case, this can present practical problems as to which 1% threshold to apply. Where such mixed populations occur (and these are inseparable in the field), it is suggested that the larger 1% threshold be used in the evaluation of sites.

89. However, particularly where one of the populations concerned is of high conservation status, this guidance should be applied flexibly and Parties should consider recognizing the overall importance of the wetland for both populations through the application of Criterion 4, as the basis for ensuring that their management planning for the site fully recognizes this importance. This guidance should not be applied to the detriment of smaller, high conservation status populations.”

Although the situation of mixed populations is expected to be less of an issue for non-avian species, we suggest a similar approach in the context of Criterion 9 (non-avian species).

4. Upcoming assessments: future developments for further versions

Three sources of new data and updates will be available in the near future - the IUCN/SSC Global Mammal Assessment, due to be completed and published in 2008, the IUCN/SSC Global Reptile Assessment, and the IUCN 2008 Red List update, due to appear in October 2008.

In the instances where seemingly obvious species were not included (*i.e.* the Water Chevrotain *Hyemoschus aquaticus* and various marsh rats, etc.), this was for the purpose of maintaining the integrity of the report and remaining consistent with the current Red List Species Information Service (SIS). There sometimes exists a discrepancy between species listed by SIS as living in Freshwater systems and those living in the Wetland habitats (5.0-5.12). A change in the SIS could help to clarify this and help complete further versions of this report.

5. Acknowledgements

The listings here were compiled by Jennifer Luedtke, Abigail Powell and David Stroud with the assistance of: Jean-Christophe Vié – IUCN/SSC; Nicholas Davidson – Ramsar Secretariat; Simon Stuart – IUCN/SSC; Jim Conroy – IUCN/SSC Otter Specialist Group; Randall Reeves, Tony Martin, Gill Braulik, Eduardo Secchi, Danielle Kreb, and Brian D. Smith - IUCN Cetacean Specialist Group; Peter Paul van Dijk – IUCN/SSC Freshwater Turtle Specialist Group; and Jan Schipper – IUCN/SSC Global Mammal Assessment.

Section 3 is adapted, with acknowledgement, from Wetlands International’s *Waterbird Population Estimates*, courtesy of Simon Delany.

We are grateful to all for their time and inputs.

**We strongly encourage the submission of updated population estimates, revisions and/or new data such that future editions of this report can be enhanced. Please send all such feedback to:**

6. References

 Atkinson-Willes, G.L., Scott, D.A. & Prater, A.J. 1982. Criteria for selecting wetlands of international importance. In: Proceedings of the conference on the conservation of wetlands of international importance especially as waterfowl habitat. Cagliari, Italy, 24-29 November 1980, pp. 1017-1042. Supplemento alle Ricerche di Biologia della Selvaggina, 81 (1). [Reprinted as Appendix 1 of this report]

 Giménez-Dixon, M. 1993. The Ramsar Convention and the conservation of non-waterfowl species. In: Proceedings of the fifth meeting of the Conference of the Contracting Parties to the Ramsar Convention, Volume II, Annex 17; Pp. 449-467. Ramsar Bureau, Switzerland.

 Meininger, P.L., Schekkerman, H. & van Roomen, M.W.J. 1995. Populatieschattingen en 1%-normen van in Nederland voorkomende watervogelsoorten: voorstellen voor standaardisatie. [Population estimates and 1%-levels for waterbird species occurring in The Netherlands: suggestions for standardisation.] Limosa 68: 41-48.

 Stroud, D.A., Pienkowski, M.W. & Mudge, G.P. 1990. Protecting internationally important bird sites: a review of the network of EC Special Protection Areas in Great Britain. Nature Conservancy Council, Peterborough. 230 pp.

 Stroud, D.A. 1996. Estimating international waterbird populations: use of Criterion 3(c). Pp. 37-44. In: Proceedings of the 6th Meeting of the Conference of the Contracting Parties to the Convention on Wetlands. Brisbane, Australia, 19-27 March 1996. Technical Sessions E and F. Ramsar Bureau, Switzerland.

 Stuart, S. 1990. Applying the Ramsar criteria for species other than birds. In:Proceedings of the fourth meeting of the Conference of the Contracting Parties to the Ramsar Convention, Volume II, Annex 4; Pp. 124-126. Ramsar Bureau, Switzerland.

Wetlands International 2006. *Waterbird Population Estimates – Fourth Edition.* Wetlands International, Wageningen, The Netherlands. 239 pp.

Annex 1. Red list wetland habitat classifications

**9. Marine Neritic (Submergent Nearshore Continental Shelf or Oceanic Island)**

9.9. Seagrass (Submerged)

**12. Marine Intertidal**

12.1. Rocky Shoreline

12.2. Sandy Shoreline and/or Beaches, Sand Bars, Spits, Etc.

12.3. Shingle and/or Pebble Shoreline and/or Beaches

12.4. Mud Flats and Salt Flats

12.5. Salt Marshes (Emergent Grasses)

12.6. Tidepools

12.7. Mangrove Submerged Roots

**13. Marine Coastal/Supratidal**

13.1. Sea Cliffs and Rocky Offshore Islands

13.2. Coastal Caves/Karst

13.3. Coastal Sand Dunes

13.4. Coastal Brackish/Saline Lagoons/Marine Lakes

 13.5. Coastal Freshwa

 Annex 2. Population estimates and 1% thresholds for non-avian wetland-dependant animal spes - for the application of Ramsar Criterion 9ranges are given, 1% thresholds are derived from the mid-point of the range, other than for globally threatened species where they are derived, on a precautionary basis, from the range minimum.

Criterion 9 should be applied only to those species/populations for which a 1% population threshold is provided, unless other verified sources for a population estimate are provided.

**Spreadsheet to be formatted as single table here**

**Sources**

Anon. 1993. Crocodile conservation and management in India. Report of a Crocodile Specialist Group Workshop, Madras, India; 1-3 March 1993. J. Hutton (compiler). 27 pp.

Blanc, J.J., Barnes, R.F.W., Craig, G.C., Dublin, H.T., Thouless, C.R., Douglas-Hamilton, I.& Hart, J.A. 2007. African Elephant Status Report 2007: an update from the African Elephant Database. Occasional Paper Series of the IUCN Species Survival Commission, No. 33. IUCN/SSC African Elephant Specialist Group. IUCN, Gland, Switzerland. 28 pp, 70 pp, 114 pp, 164 pp.

Braulik, G.T. 2006. Status assessment of the Indus River dolphin, Platanista gangetica minor, March-April 2001. Biological Conservation 129: 579-590.

CITES Nomenclature Committee, Fauna, Lima (Peru), 10 July 2006, Tortoises and turtles checklist [http://www.cites.org/common/com/NC/2006/E-NC2006-Fa-05.pdf]

Eltringham, S.K. 1993a. The Common Hippopotamus (Hippopotamus amphibius). Pp. 43-55. In: Pigs, Peccaries and Hippos. Status Survey and Conservation Action Plan. IUCN/SSC Pigs and Peccaries Specialist Group and Hippo Specialist Group. IUCN, Gland, Switzerland and Cambridge. 202 pp.

Eltringham, S.K. 1993b. The Pygmy Hippopotamus (Hexaprotodon liberiensis). Pp. 55-60. In: Pigs, Peccaries and Hippos. Status Survey and Conservation Action Plan. IUCN/SSC Pigs and Peccaries Specialist Group and Hippo Specialist Group. IUCN, Gland, Switzerland and Cambridge. 202 pp.

Global Amphibian Assessment [http://www.globalamphibians.org]

IUCN Polar Bear Specialist Group 2001. Global review of Polar Bear status. [http://pbsg.npolar.no/new-status.htm]

IUCN Polar Bear Specialist Group 2006. Status of Polar Bear Populations. [http://pbsg.npolar.no/new-status.htm]

IUCN Red List 2007. [http://www.iucnredlist.org]

[Iverson, J. Undated. *A Checklist of the Turtles of the World.* [http://www.earlham.edu/biology/documents/Checklist.pdf]](http://www.earlham.edu/biology/documents/Checklist.pdf)

Kreb, D., Budiono & Syachraini. 2007. Status and Conservation of Irrawaddy Dolphins Orcaella brevirostris in the Mahakam River of Indonesia. In: Status and Conservation of Freshwater Populations of Irrawaddy Dolphins, WCS Working Paper Series 31 (B.D. Smith, R.G. Shore, & A. Lopez, eds.), pp. 53-66, Wildlife Conservation Society, Bronx, NY.

MacDonald, D. (ed.) 2001. *The New Encyclopedia of Mammals.*  Oxford University Press.

Marsh, Helene (compiler & action plan coordinator IUCN/SSC Sirenia Specialist Group), Helen Penrose, Carole Eros & Joanna Hugues. UNEP; IUCN/SSC; James Cook University, AU; Cooperative Research Centre for the Great Barrier Reef World Heritage Area, AU; UNEP-WCMC. 2002. *Dugong: Status Report and Action Plans for Countries and Territories*. UNEP Cambridge.

Masskey, T.M. & Percival, H.F. 1994. Status and conservation of Gharial in Nepal. In: Crocodiles, Proceedings of the 12th Working Meeting of the Crocodile Specialist Group. 1: 77-83. IUCN, Gland, Switzerland.

Matola, S., Cuarn, A.D. & Rubio-Torgler, H. 1997. Status and Action Plan of Baird's Tapir (Tapirus bairdii). Pp. 29-45. In: Brooks, D.M., Bodmer, R.E. & Matola, S. 1997. Tapirs. IUCN Status Survey and Conservation Action Plan. IUCN, Switzerland.

Messel, H. & King, F.W. 1990. The status of Crocodylus porosus in the Solomon Islands. In: Crocodiles, Proceedings of the 10th Working Meeting of the Crocodile Specialist Group. 2: 39-69. IUCN, Gland, Switzerland.

Messel, H. & King, F.W. 1992. Survey of the crocodile populations of the Republic of Palau, Caroline Islands, Pacific Ocean. In: Crocodiles, Proceedings of the 10th Working Meeting of the Crocodile Specialist Group 1: 302-351. IUCN, Gland, Switzerland.

Pattnaik, A., Sutaria, D. Khan, M. & Behera, B.P. 2007. Status and Conservation of Irrawaddy Dolphins Orcaella brevirostris in Chilika Lagoon of India. In: Status and Conservation of Freshwater Populations of Irrawaddy Dolphins, WCS Working Paper Series 31 (B.D. Smith, R.G. Shore, and A. Lopez, eds.), pp. 41-52, Wildlife Conservation Society, Bronx, NY.

Reeves, R.R., Smith, B.D., Crespo, E.A. & di Sciara, G.N. 2003. Dolphins, Whales and Porpoises. 2002-2010 Conservation Action Plan for the World's Cetaceans. IUCN, Switzerland.

Ross, J.P. (ed.) Crocodiles. Status Survey and Conservation Action Plan. 2nd edition. IUCN/SSC Crocodile Specialist Group. IUCN, Gland, Switzerland and Cambridge. 96 pp.

Smith, B.D., Ahmed, B., Ali, M.E. & Braulik, G. 2001. Status of the Ganges river dolphin or shushuk Platanista gangetica in Kaptai Lake and the southern rivers of Bangladesh. Oryx 35:61-72.

Smith, B.D., Braulik, G., Strindberg, S., Ahmed, B. & Mansur, R. 2006. Abundance of Irrawaddy dolphins (Orcaella brevirostris) and Ganges river dolphins (Platanista gangetica gangetica) estimated using concurrent counts from independent teams in waterways of the Sundarbans mangrove forest in Bangladesh. Marine Mammal Science 22(2), 1-21.

Webb, G.J.W., Whitehead, P.J. & Manolis, S.C. 1987. Crocodile management in the Northern Territory of Australia. Pp. 102-124. In: Wildlife Management: Crocodile and Alligators. Webb, G.J.W., Manolis, S.C. & Whitehead, P.J. (eds.). Surrey Beatty and Sons, Chipping Norton, Australia.

1. See http://ramsar.org/res/key\_res\_ix\_01\_annexb\_e.doc for the guidance associated with Criterion 9, and http://ramsar.org/cop9/cop9\_doc17\_e.doc for STRP’s proposal to CoP 9. [↑](#footnote-ref-1)