

DOC. SC42-19-01, Addendum 2

Agenda item 10.3

Review and streamlining of procedures for describing Ramsar Sites at designation

Working Explanatory Notes

1. Field numbers, etc., that are highlighted in **yellow** are either internal cross-references or cross-references to the RIS: these are highlighted for future checking purposes only. Also flagged in yellow highlight are a few sections which need further elaboration or text to be added for finalisation. All yellow highlights will be removed in the final draft for COP11.
2. No attempt has yet been made to apply permanent paragraph numbering – this will be done in preparing the final draft for COP11.

DRAFT

Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands (Ramsar, Iran, 1971) – 2012 revision

[adopted by Resolution XI.xx (COP11, 2012)]

Contents

1. Summary
 2. Introduction
 3. The vision, objectives and short-term target for the List of Wetlands of International Importance (the Ramsar List)
 4. Site identification
 5. General issues and guidance for Ramsar Site description
 6. Ramsar Site description: Why is the wetland internationally important?
 7. Ramsar Site description: guidance on describing the site at designation
 8. Ramsar Site description: updating the Ramsar Information Sheet
 9. Understanding Ramsar Site designation processes
 10. References and sources of further information
- Appendix A Ramsar Information Sheet
Appendix B Ramsar Classification System for Wetland Type
Appendix C Additional guidelines for the provision of maps and other spatial data for Ramsar Sites
Appendix D Criteria for Identifying Wetlands of International Importance
Appendix E Guidelines for identifying and designating specific wetland types
Appendix F Glossary of terms used in the Strategic Framework
Appendix G Additional useful sources of Ramsar guidance

Where to go for guidance on drafting Ramsar Information Sheets	
RIS Part 1	Section 7.2 of this Strategic Framework
RIS Part 2	Section 6 of this Strategic Framework
RIS Part 3	Section 7.3 of this Strategic Framework
RIS Part 4	Section 7.4 of this Strategic Framework

Contents

1. SUMMARY	6
2. INTRODUCTION	7
What does this section do? Explains the need for Ramsar Site designation, giving necessary background and context.....	7
3. THE VISION, OBJECTIVES AND SHORT-TERM TARGET FOR THE LIST OF WETLANDS OF INTERNATIONAL IMPORTANCE (THE RAMSAR LIST)	8
What does this section do? Explains the purpose of the List of Ramsar Sites.....	8
3.1. The Vision of the Ramsar List	8
3.2 Objectives for the Ramsar List	8
3.3 Short-term target for the Ramsar List to the year [2015]	10
3.4 Wetlands of International Importance and the Ramsar principle of Wise Use	10
4. ESTABLISHING A NATIONAL NETWORK OF RAMSAR SITES	12
4.1 Networks of sites and what they are for	12
4.2 The process of undertaking a national review of potential Ramsar Sites	12
4.3 Ramsar Site networks and climate change	Error! Bookmark not defined.
5. GENERAL ISSUES AND GUIDANCE FOR RAMSAR SITE DESCRIPTION	14
5.1 Definition of a wetland	14
5.2 Ramsar wetland classification system	14
What does this section do? Explains Ramsar’s wetland classification system, how it was derived and what it is for	14
5.2.1 Wetland type(s) in the Ramsar Site	14
5.3 Biogeographic regionalizations	15
What does this section do? Explains Ramsar’s approach to biogeographic regionalizations	15
5.3.1 Marine bioregionalization schemes	15
5.3.2 Terrestrial bioregionalization schemes	16
5.4 Representation	17
5.5 Legal status and complementary conservation frameworks	18
5.6 Site delineation and boundary definition	19

5.7	Species	20
	What does this section do? Emphasises general considerations about species (including alien invasive species)	20
5.7.1	Flagship and keystone species	20
5.7.2	Contexts for species	20
5.7.3	Non-native species	21
5.7.4	Species taxonomy	21
5.8	Wetlands in the landscape: connectivity and site clusters	21
5.9	Hydrology	22
5.10	Social and cultural values	22
5.11	Sites on borders	22
5.11.1	Internationally shared sites.....	22
5.11.2	Trans-provincial sites	23
6.	RAMSAR SITE DESCRIPTION: WHY IS THE WETLAND INTERNATIONALLY IMPORTANT?	23
	What does this section do? Provides an introduction to the Criteria. What they are for and how to apply them. How to document them in a Ramsar Information Sheet.	23
6.1	Assessing the site against Ramsar’s criteria	23
6.1.1.	Criterion 1:	24
	Criteria based on species and ecological communities.....	27
6.1.2	Criterion 2:	27
6.1.3	Criterion 3:	32
6.1.4	Criterion 4:	34
	Specific criteria based on waterbirds	36
6.1.5	Criterion 5:	36
6.1.6	Criterion 6:	39
	Specific criteria based on fish.....	41
6.1.7	Criterion 7:	41
6.1.8	Criterion 8	44
	Specific criterion based on other taxa.....	48
6.1.9	Criterion 9	48
6.2	Documenting selected Criteria in the Ramsar Information	49
7.	RAMSAR SITE DESCRIPTION: GUIDANCE ON DESCRIBING THE SITE AT DESIGNATION	50
7.1	The Ramsar Site Information Sheet	50
7.1.1.	The history of the Ramsar Site Information Sheet	50
7.1.2	General guidance about Ramsar Information Sheets	50
7.2	Recording administrative and locational details	52
7.2.1	Name and address of the RIS compiler	52
7.2.2	Key dates	52

7.2.3	Country.....	52
7.2.4	Name of the Ramsar Site	52
7.2.5	Designation of new Ramsar Site or update of existing site.....	53
7.2.6	Updating the RIS: recording changes to the site since its designation or earlier update	53
7.2.7	Map of the Ramsar Site.....	54
7.2.8	Geographical co-ordinates	54
7.2.9	General location	54
7.2.10	Area	55
7.2.11	Biogeography	55
7.3	Ecological Character Description.....	55
7.3.1	The key ecological components that determine the ecological character of the site	56
7.3.2	Climate	56
7.3.3	Geomorphic setting.....	56
7.3.4	Plant communities	57
7.3.5	Plant species.....	57
7.3.6	Animal communities	58
7.3.7	Animal species.....	58
7.3.8	Soil.....	59
7.3.9	Water regime	59
7.3.10	Sediment regime	59
7.3.11	Water pH.....	59
7.3.12	Water salinity	59
7.3.13	Dissolved or suspended nutrients in water.....	60
7.3.14	Physical features of the catchment area.....	60
7.3.15	Ecological processes.....	60
7.3.16	Ecosystem services.....	60
7.3.17	Social or cultural values	61
7.4	Conservation and management	61
7.4.1	Land tenure/ownership	61
7.4.2	Management authority	61
7.4.3	Factors adversely affecting the site's ecological character.....	61
7.4.4	Conservation measures taken.....	62
7.4.5	Management planning.....	63
7.4.6	Restoration planning.....	63
7.4.7	Conservation measures proposed but not yet implemented	63
7.4.8	Bibliographic references	64
8.	RAMSAR SITE DESCRIPTION: UPDATING THE RAMSAR SITE INFORMATION SHEET	64
	What does this section do? Gives specific guidance on updating Information Sheets for already designated Ramsar Sites	64
9.	UNDERSTANDING RAMSAR SITE DESIGNATION PROCESSES.....	65
10.	REFERENCES AND FURTHER SOURCES OF INFORMATION	65
APPENDIX A:	RAMSAR INFORMATION SHEET.....	70

APPENDIX B: RAMSAR CLASSIFICATION SYSTEM FOR WETLAND TYPE.....	70
APPENDIX C: ADDITIONAL GUIDELINES FOR THE PROVISION OF MAPS AND OTHER SPATIAL DATA FOR RAMSAR SITES.....	73
APPENDIX D: CRITERIA FOR IDENTIFYING WETLANDS OF INTERNATIONAL IMPORTANCE	77
APPENDIX E: SUPPLEMENTARY GUIDELINES FOR IDENTIFYING AND DESIGNATING PARTICULAR WETLAND TYPES.....	78
E1. Karst and other subterranean hydrological systems	78
Geographic distribution and extent	78
Ecological role and functions	78
Values, importance and provision of ecosystem services.....	78
Position within Ramsar’s classification system	78
Applying the Ramsar Criteria	79
Boundaries and size	79
Other considerations.....	79
E2. Peatlands	80
Geographic distribution and extent	80
Ecological role and functions	80
Values, importance and provision of ecosystem services.....	80
Position within Ramsar’s classification system	81
Applying the Ramsar Criteria	81
Boundaries and size	82
Further sources of information on peatlands	82
E3. Wet grasslands	82
Geographic distribution and extent	82
Ecological role and functions	83
Values, importance and ecosystem services.....	83
Position within Ramsar’s classification system	84
Applying the Ramsar Criteria	84
Boundaries and size	85
Further sources of information on wet grasslands	85
E4. Mangroves.....	85
Geographic distribution and extent	85
Ecological role and functions	85
Values, importance and ecosystem services.....	86
Position within Ramsar’s classification system	87
Applying the Ramsar Criteria	87
Boundaries and size	88
Further sources of information on mangroves	88
E5. Coral reefs.....	88
Geographic distribution and extent	88
Ecological role and functions	89

Values, importance and provision of ecosystem services.....	89
Position within Ramsar’s classification system	90
Applying the Ramsar Criteria	91
Boundaries and size	92
Further sources of information on coral reefs	92
E5. Temporary pools	92
Geographic distribution and extent	93
Ecological role and functions	93
Values, importance and provision of ecosystem services.....	94
Position within Ramsar’s classification system	94
Applying the Ramsar Criteria	94
Boundaries and size	95
E6. Shell-fish reefs	95
Geographic distribution and extent	95
Ecological role and functions	96
Values, importance and provision of ecosystem services.....	96
Position within Ramsar’s classification system	97
Applying the Ramsar Criteria	97
Boundaries and size	97
Further sources of information on shell-fish reefs.....	98
E7. Artificial wetlands	98
Position within Ramsar’s classification system	98
Applying the Ramsar Criteria	98
APPENDIX F. GLOSSARY OF TERMS USED IN THE STRATEGIC FRAMEWORK	99
APPENDIX G. ADDITIONAL SOURCES OF USEFUL RAMSAR GUIDANCE	112

1. Summary

1. This document is intended to provide the necessary guidance for Contracting Parties to identify Wetlands of International Importance and describe these at the time of their designation as Ramsar Sites. It builds upon a range of former guidance adopted by meetings of the Conference of the Contracting Parties and consolidates this information into one coherent guidance document. In particular, it:
 - outlines the rationale for the selection of Ramsar Sites;
 - presents the Convention’s vision for the international network (or List) of Ramsar Sites and presents targets for the development of this network;
 - presents and explains the Convention’s criteria by which Ramsar Sites can be identified;
 - describes the Convention’s official Information Sheet through the use of which Contracting Parties describe sites at the time of their designation; and
 - provides guidance on the preparation of the official map of Ramsar Sites required to be produced at the time of designation.

2. The document builds on earlier guidance adopted by the Ramsar Parties, most substantively the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance*, adopted by COP7 in 1999, and guidance on the completion of Ramsar Information Sheets first adopted by COP4 in 1990. Although formatted somewhat differently (as a consequence of merging these two guidances into one document), much of the content is unchanged, but it has been re-ordered and edited to improve its accessibility to users.

2. Introduction

What does this section do? Explains the need for Ramsar Site designation, giving necessary background and context

3. At the time of signing, or when depositing their instrument of ratification or accession to the Convention on Wetlands (Ramsar, Iran, 1971), sovereign states are required under Article 2.4 to designate at least one site as a Wetland of International Importance. Thereafter, as prescribed by Article 2.1, each “Contracting Party shall designate suitable wetlands within its territory for inclusion in the List of Wetlands of International Importance”.
4. Assistance with interpreting the key word “suitable”, as used in Article 2.1, is provided in part by Article 2.2, which states that “wetlands should be selected for the List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology. In the first instance wetlands of international importance to waterfowl at any season should be included”.
5. Throughout its evolution, the Convention on Wetlands has developed Criteria for the designation of Wetlands of International Importance (Ramsar Sites) which have been kept under constant review. It has supplemented these with regularly updated Guidelines to assist Contracting Parties in their interpretation and application of the Criteria reflecting the development of conservation science.
6. The strategic direction given to the development of the List of Wetlands of International Importance has previously been rather limited. Most notably, the 6th meeting of the Conference of the Contracting Parties (COP6) urged Parties through the Convention’s Strategic Plan 1997-2002 to “increase the area of wetland designated for the List of Wetlands of International Importance particularly for wetland types that are under-represented either at the global or national levels”.

Purpose

7. At the time of COP7 in 1999, as the number of designated Ramsar Sites was fast approaching 1,000, the Convention on Wetlands first adopted this *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* and has amended and added to it regularly since then. Its purpose is to provide a clearer view, or vision, of the long-term targets or outcomes which the Convention is seeking to achieve through the Ramsar List. Guidance is also provided to assist Contracting Parties in taking a systematic approach to identifying their priorities for future designations, in order to create

comprehensive national networks of Ramsar Sites, which, when considered at the global level, fulfil the stated vision for the Ramsar List.

3. The Vision, objectives and short-term target for the list of Wetlands of International Importance (the Ramsar List)

What does this section do? Explains the purpose of the List of Wetlands of International Importance (Ramsar Sites)

3.1. *The Vision of the Ramsar List*

8. The Convention on Wetlands has adopted the following vision for the List of Wetlands of International Importance (as amended by Resolution IX.1 Annex B, 2005):

The Vision

To develop and maintain an international network of wetlands which are important for the conservation of global biological diversity and for sustaining human life through the maintenance of their ecosystem components, processes and benefits/services.

(In this context, ‘ecosystem benefits’ are defined in accordance with the Millennium Ecosystem Assessment definition of ecosystem services as “the benefits that people receive from ecosystems”.)

9. Such an international network of wetland sites has to be built from coherent and comprehensive networks of Wetlands of International Importance established within the territory of each Contracting Party to the Convention.

3.2 *Objectives for the Ramsar List*

10. In order to realise the vision for the Ramsar List, the Contracting Parties, the Convention’s International Organization Partners, local stakeholders, and the Ramsar Secretariat will work cooperatively towards accomplishing the following four objectives (not necessarily in priority order).

Objective 1

To establish national networks of Ramsar Sites in each Contracting Party which fully represent the diversity of wetlands and their key ecological and hydrological functions.

11. 1.1) To have included in the Ramsar List at least one suitable (i.e., internationally important) representative of every natural or near-natural wetland type present in each ‘biogeographic region’ (see Glossary in Appendix F). These biogeographical regions are as defined globally, supranationally/ regionally or nationally and applied by the Contracting Party in a form appropriate to that Party.

12. 1.2) To give priority in determining suitable sites in relation to wetland type to those wetlands that play a substantial ecological or hydrological role in the natural functioning of a major river basin, lake, or coastal system.

Objective 2

To contribute to maintaining global biological diversity through the designation and management of appropriate wetland sites.

13. 2.1) To review the development of the Ramsar List and further refine the Criteria for identification and selection of Ramsar Sites, as appropriate, to best promote conservation of biological diversity and wise use of wetlands at the local, subnational, national, supranational/regional, and international levels.
14. 2.2) To include in the Ramsar List wetlands that support threatened ecological communities or are critical to the survival of endemic species identified as vulnerable, endangered or critically endangered under national endangered species legislation or programmes or within international frameworks such as the IUCN Red List or Appendix I of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and the Appendices of the Convention on Migratory Species (CMS or Bonn Convention).
15. 2.3) To include in the Ramsar List wetlands critical to the conservation of biological diversity in each biogeographic region.
16. 2.4) To include in the Ramsar List wetlands that provide important habitat for plant and animal species at critical stages in their life cycle or during adverse conditions.
17. 2.5) To include in the Ramsar List wetlands that are of significance for waterbird and fish species or stocks, as well as other taxa, as determined by the relevant Ramsar Site selection Criteria (see section 6).

Objective 3

To foster cooperation among Contracting Parties, the Convention's International Organization Partners, and local stakeholders in the selection, designation, and management of Ramsar Sites.

18. 3.1) To pursue opportunities between two (or more) Contracting Parties for Ramsar Site "twinning" or cooperative management agreements for wetlands along migratory species routes, across common borders, or with similar wetland types or species (Resolution VII.19).
19. 3.2) To undertake other forms of cooperative venture between two or more Contracting Parties that can demonstrate or assist in achieving long-term conservation and sustainable use of Ramsar Sites and wetlands in general.
20. 3.3) To encourage and support, where appropriate, a stronger role for and contribution from non-government and community-based organizations in the strategic development of the Ramsar List and subsequent management of Ramsar Sites locally, subnationally, nationally, supranationally/ regionally, and internationally (Resolution VII.8).

Objective 4

To use the Ramsar Site network as a tool to promote national, supranational/regional, and international cooperation in relation to complementary environment treaties.

21. **4.1)** To use Ramsar Sites as baseline and reference areas for national, supranational/regional, and international environmental monitoring to detect trends in the loss of biological diversity, climate change, and the processes of desertification.
22. **4.2)** To implement conservation and sustainable use demonstration projects at Ramsar Sites, which will also provide tangible illustrations of cooperation with appropriate international environment treaties.¹

3.3 Short-term target for the Ramsar List to the year 2015

23. The Convention stresses the importance of wetlands as rich centres of biological diversity and productivity and as life support systems for human populations, and the Parties are concerned at the continuing loss and degradation of wetlands in many parts of the world. In response to this concern, the Parties have set the following short-term target for the Ramsar List.

Target for the Ramsar List in 2015

To ensure that the List of Wetlands of International Importance contains at least 2,500 sites covering 250 million hectares by 2015.

3.4 Wetlands of International Importance and the Ramsar principle of Wise Use

24. Under the Ramsar Convention on Wetlands the two concepts of wise use and site designation are fully compatible and mutually reinforcing. Contracting Parties are expected to designate sites for the List of Wetlands of International Importance “on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology” (Article 2.2), **AND** to “formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory” (Article 3.1).
25. The Strategic Plan adopted at COP6 (1996) equates “wise use” with sustainable use. Contracting Parties to the Convention also recognize that wetlands, through their

¹ Among such MEAs are the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change, the Convention to Combat Desertification, the Convention on International Trade in Endangered Species of Wild Flora and Fauna, the World Heritage Convention, and the Convention on Migratory Species and its Agreements such as the African-Eurasian (Migratory) Waterbirds Agreement, and regional agreements and cooperative initiatives such as the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, the Asia-Pacific Migratory Waterbird Conservation Strategy 2001-2005, the Mediterranean Wetlands Initiative (MedWet), South Pacific Regional Environment Programme (SPREP), Southern Africa Development Community (SADC), Association of the South East Asian Nations (ASEAN), the European Union’s Natura 2000 network, the Emerald Network of the Bern Convention on the Conservation of European Wildlife and Natural Habitats, the Pan-European Biological and Landscape Diversity Strategy, the Wetlands Programme for the High Andes, the Treaty on Amazon Cooperation, the Central American Commission on Environment and Development (CCAD), etc.

ecological and hydrological functions, provide invaluable services, products and benefits enjoyed by, and sustaining, human populations. Therefore, the Convention promotes practices that will ensure that all wetlands, and especially those designated for the Ramsar List, will continue to provide these functions and values for future generations as well as for the conservation of biological diversity. Ramsar COP9 (2005) updated the definition of wise use of wetlands as “the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development”.

Note: Two footnotes were attached to the above definition:

Including *inter alia* the Convention on Biological Diversity’s “Ecosystem Approach” (CBD COP5 Decision V/6) and that applied by HELCOM and OSPAR (Declaration of the First Joint Ministerial Meeting of the Helsinki and OSPAR Commissions, Bremen 25-26 June 2003).

The phrase “in the context of sustainable development” is intended to recognize that whilst some wetland development is inevitable and that many developments have important benefits to society, developments can be facilitated in sustainable ways by approaches elaborated under the Convention, and it is not appropriate to imply that ‘development’ is an objective for every wetland.

Ramsar Sites and the wise use principle

The act of designating (listing) a wetland as internationally important under the Convention is an appropriate first step along a conservation and sustainable use pathway, the endpoint of which is achieving the long-term wise (sustainable) use of the site.

26. Article 3.2 of the Convention determines that “each Contracting Party shall arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List has changed, is changing or is likely to change”. Pursuant to this the Ramsar Convention has developed the concept of “ecological character” for wetlands, which is defined as:

“Ecological character is the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time.”

(Resolution IX.1 Annex A, 2005)

(In this context, ‘ecosystem benefits’ are defined in accordance with the Millennium Ecosystem Assessment definition of ecosystem services as “the benefits that people receive from ecosystems”.)

27. Contracting Parties are expected to manage their Ramsar Sites in such a way as to maintain the ecological character of each site and, in so doing, retain those essential ecological and hydrological functions which ultimately provide its ecosystem services. Ecological character is therefore an indication of the ‘health’ of the wetland, and Contracting Parties are expected to describe the site at the time of designation using the approved Ramsar Site Information Sheet (Appendix A) in sufficient detail to provide a baseline for subsequent monitoring to detect any changes to these ecological and hydrological attributes. Changes

to ecological character outside the natural variations may signal that uses of the sites, or externally derived impacts on the sites, are unsustainable and may lead to the degradation of natural processes and thus the ultimate breakdown of the ecological, biological and hydrological functioning of the wetland.

28. The Ramsar Convention has developed tools for monitoring ecological character and also for the development of management plans for Wetlands of International Importance. In preparing such management plans, which all Contracting Parties have been strongly urged to do, issues such as the impact of human activities on the ecological character of the wetland, the economic and socio-economic values of the site (especially for local communities), and the cultural values associated with the site need to be considered. Contracting Parties have also been strongly encouraged to include within management plans a regime for regular and rigorous monitoring to detect changes in ecological character (Resolution VII.10).

4. Establishing a national network of Ramsar Sites

4.1 *Networks of sites and what they are for*

[Text to be added introducing concepts of:

- Networks at different scales
- Network coherence
- Network function

Wetland inventory as a key element]

4.2 *The process of undertaking a national review of potential Ramsar Sites*

29. This section provides guidance to assist Contracting Parties in taking a systematic approach to identifying priorities for future designations, in order to create coherent, comprehensive national networks of Ramsar Sites which, when considered as a global network, will help to fulfil the vision for the Ramsar List. When developing and implementing a systematic approach to identifying the priority wetlands for designation as Ramsar Sites, Contracting Parties are urged to consider the following issues.
30. **Review national objectives.** As a precursor to developing a systematic approach for identifying future Ramsar Sites, Contracting Parties are urged to give careful consideration to the Objectives described in **Section 3** of this Strategic Framework. When considered within the context of the vision for the List of Wetlands of International Importance, these objectives provide a basis for all subsequent considerations in this area.
31. **Territory of the Contracting Parties and transfrontier situations.** Wetland inventories should be certain to take into consideration all parts of the territory of the Contracting Party. In accordance with Article 5 of the Convention and the *Guidelines for international cooperation under the Ramsar Convention* (Resolution VII.19, 1999), special consideration should be given to identifying and designating transfrontier sites.
32. **Inventories and data.** Contracting Parties are urged to establish the extent and quality of information that has been collected on wetlands within their territory and take steps to

complete an inventory if this has not been done. Inventories should be undertaken using accepted models and standards as advocated by the Ramsar Convention (see Resolutions VII.20 and VIII.6). The lack of an inventory should not, however, prevent designations where adequate information is already available for some sites.

33. Consistent with the developing scientific knowledge of the status and distribution of wetlands, their associated plants and animals, and their functions and values, national wetland inventories and/or lists of potential Ramsar Sites should be subject to periodic review and updating (Action 1.2.1 of the Ramsar Strategic Plan 2003-2008).
34. **Supranational/regional level guidance.** Contracting Parties should also be aware that in some instances they may require more detailed guidance at the supranational/regional level in establishing the relative importance of sites for possible designations. This may apply in the following situations:
 - i) where plant or animals species do not occur in large concentrations (such as migratory waterbirds in northern latitudes) within the country; or
 - ii) where collection of data is difficult (particularly in very large countries); or
 - iii) where there may be a high degree of spatial and temporal variability of rainfall – particularly in semi-arid or arid zones – resulting in dynamic use of complexes of temporary wetlands within and between years by waterbirds and other mobile species and where the patterns of such dynamic use are insufficiently known; or
 - iv) where, for certain types of wetland such as peatlands, coral reefs, karst and other subterranean hydrological systems, there may be limited national expertise as to the range and significance of international variation (see Appendix E for additional guidance for the identification and designation of specific wetland types); or
 - v) where several biogeographic regions come together and the transition zones may have high levels of biological diversity.
35. **Considering all of the Ramsar Criteria and all species.** Contracting Parties are urged to consider all of the Criteria fully when developing a systematic approach. Article 2.2 of the Convention indicates that sites should be considered on the basis of their “ecology, botany, zoology, limnology or hydrology”. Under the Ramsar Criteria, this is further clarified in terms of wetland type and conservation of biological diversity.
36. Contracting Parties should also aim to use the Criteria appropriately, meaning that although specific criteria have been developed for waterbirds (Criteria 5 and 6) and for fish (Criteria 7 and 8), these are not the only wetland taxa for which Ramsar Sites can and should be listed (see Criterion 9). Waterbirds and fish are simply the ones for which specific guidance has been most fully developed. Criteria 2, 3 and 4 provide latitude to identify sites for any other wetland species, but also for waterbirds and fish, where appropriate. There is also a risk that less obvious species and the microbiota may be overlooked in these considerations and care should be exercised to ensure that all components of biological diversity are taken into consideration.
37. **Prioritising.** Having systematically applied the Criteria to develop a list of wetlands that qualify for designation, Contracting Parties are encouraged to identify priority candidate sites. Particular weight should be given to designating sites which include wetland types, or wetland species, that are either unique/endemic to the Contracting Party (found nowhere

else in the world) or for which that country holds a significant proportion of the total global extent of a wetland type or population of a wetland species.

5. General issues and guidance for Ramsar Site description

5.1 *Definition of a wetland*

38. For each Contracting Party it is important to reach an understanding at the national level of how the Ramsar definition of a wetland is to be interpreted and of the biogeographic regionalization to be applied. The Ramsar definition of “wetland” is very broad, reflecting the global scale of the Convention, and gives Contracting Parties great scope and flexibility for ensuring compatibility between national, supranational/regional, and international wetland conservation efforts.

The Ramsar definition of “wetland”

“Wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres” (Article 1.1). In addition Ramsar Sites “may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands” (Article 2.1).

39. Importantly, the Convention aims at the listing of natural or semi-natural wetlands, but also allows for the designation of purpose-built, or human-made, wetlands, assuming they satisfy at least one of the Criteria specified in [Appendix D](#). The Convention’s classification system for wetland type (see [Appendix B](#)) indicates the full range which Contracting Parties are urged to consider in relation to possible listing under the Ramsar Criteria related to representative, rare or unique wetlands (see [Section 6.1.1](#), Criterion 1).

5.2 *Ramsar wetland classification system*

What does this section do? Explains Ramsar’s wetland classification system, how it was derived and what it is for

[Text to be added outlining basis of Ramsar wetland classification system]

40. The following sections give guidance on completing certain parts and fields of the RIS. Each is cross-referenced accordingly.

5.2.1 Wetland type(s) in the Ramsar Site

RIS field 18

- ◆ See also: [Appendix B, Ramsar classification system for wetland type](#)
- ◆ See also: [Section 7.2.7, Map of the Ramsar Site](#)
- ◆ See also: [Section 7.2.8, Geographical co-ordinates](#)
- ◆ See also: [Section 7.2.10, Area](#)

41. In this section first list, by circling or underlining, the full range of wetland types occurring within the site, and then list the wetland types selected in order of their dominance (by area) starting with the wetland type with the largest area. The Ramsar Classification System for Wetland Type (see [Appendix B](#)) provides the description of what types of wetland are covered by each of the wetland type codes. Note that the wetland types are grouped in three major categories: marine-coastal, inland, and human-made wetlands, and that wetland types under two or more of these categories may be present within a Ramsar Site, particularly if it is large.
42. Since some Marine/Coastal wetland types (e.g., Estuarine waters (type *F*) or Intertidal Forested Wetlands (type *I*)) can occur far inland from the coastline, and conversely Inland Wetlands types can occur close to the coastline, please also indicate with additional text in this section the general geographical location of the site relative to the coastline, as either inland or marine/coastal.
43. When listing the areal dominance of the wetland types, if possible provide the area or percentage of the total area of the designated site composed of each wetland type, although it is recognized that this may be difficult for large sites with a wide variety of wetland types. If the site is composed of more than one discrete unit and different wetland types or different dominance of types occur in different site units, also list the wetland type dominance for each unit.
44. If the designated site includes areas of non-wetland habitat, for example where such parts of a catchment are included, it is helpful here to also list the area, or percentage of the total area, of the site formed of these habitats.

5.3 *Biogeographic regionalizations*

RIS field 11

What does section do? Explains Ramsar's approach to biogeographic regionalizations

45. Under Criterion 1, Contracting Parties are expected to identify sites of international importance within an agreed biogeographic regionalization. The Glossary ([Appendix E](#)) defines this term as “a scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc.” Note that for many Contracting Parties, biogeographic regions will be transboundary in nature and will require collaboration between countries to define those wetland types which are representative, unique, etc. In some regions and countries, the term “bioregion” is used as a synonym for “biogeographic region”.

5.3.1 Marine bioregionalization schemes

46. The major assessment of Marine Ecoregions of the World (MEOW) (Spalding *et al.* 2007) has developed a new global system of biogeographic regionalization for coastal and shelf areas. It presents a nested system of 12 realms, 62 provinces, and 232 ecoregions (see www.nature.org/tncscience/news/meow.html and <http://conserveonline.org/workspaces/ecoregional.shapefile/MEOW/view.html>). This system provides considerably better spatial resolution than earlier global systems, yet it preserves many common

elements from earlier global and regional systems, so it can be cross-referenced to many existing regional biogeographic classifications.

47. As the MEOW classification has been developed through wide international consensus, has received broad international acceptance, and incorporates many pre-existing classifications, it is recommended for application by the Ramsar Convention (at its ecoregional scale) with respect to coastal and near-shore marine areas within the scope of the Convention.

5.3.2 Terrestrial bioregionalization schemes

48. Three principle biogeographic regionalization schemes have been developed for use in conservation planning and assessment in terrestrial environments (Udvardy 1975; Bailey 1998; Olson *et al.* 2001). None of these schemes addresses inland wetland ecosystems, as they are largely derived from the distributions and similarities of other terrestrial ecosystems (forests, grasslands, etc.). They have differing spatial resolutions and have been developed for different purposes based on different types of data.

Udvardy's Biogeographical Provinces (Udvardy 1975)

49. Intended to provide a satisfactory classification of the world's biotic areas and to provide a framework for conserving species as well as ecological areas, the classification is a hierarchical system of geographical areas (Realms, Biomes and Provinces) based on the distribution of species and the distribution of ecosystem units. Realms are based on phylogenetic subdivisions, Biomes on both vegetation and climatic features, and Provinces on fauna, flora and ecology.

Bailey's Ecoregions (Bailey 1998)

50. Originally intended to illustrate how the national forests of the U.S. fit within the global ecoregional scheme, an ecoregion is defined here as any large portion of the Earth's surface over which the ecosystems have characteristics in common. There are three levels within the classification system: Domains, Divisions and Provinces. Ecoregions are based on macroclimate following the theory that macroclimates are among the most significant factors affecting the distribution of life on Earth. Temperature and rainfall along with climatic zones were used to identify the Domains and Divisions. Provinces were based on the physiognomy of the vegetation, modified by climate.

WWF Terrestrial Ecoregions (Olson *et al.* 2001)

51. Derived primarily as a tool for prioritizing areas for conservation, the WWF Terrestrial Ecoregions comprise relatively large units of land or water containing a geographically distinct assemblage of natural communities. These communities share a majority of their species, ecological dynamics and environmental conditions, and they interact in ways that are critical for their long-term persistence. The hierarchical classification system consists of Realms, Biomes, and Ecoregions, which reflect the distribution of distinct biotas.
52. In addition, WWF-US has recently been leading the development of a scheme for Freshwater Ecoregions of the World (FEOW) (Abell *et al.* 2008), which are being derived

by aggregating and subdividing watersheds based on the distribution patterns of aquatic species, notably fish.

53. In Europe, a biogeographic regionalization scheme (<http://dataservice.eea.europa.eu/atlas/viewdata/viewpub.asp?id=3641>) contains 11 biogeographic regions and forms the basis for establishing the Natura 2000 network of the Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora and the Emerald Network of the Convention on European Wildlife and Natural Habitats (Bern Convention) (www.dataservice.eea.europa.eu/dataservice).
54. As these schemes have been or are being developed for different purposes and using different criteria, and have not been assessed or their common features and differences articulated, it is not proposed at this stage that any single inland/terrestrial classification should be adopted for use by the Convention. Contracting Parties are encouraged to make use of these schemes as they consider appropriate or to draw to the attention of the STRP other schemes that better represent the biogeographical distribution of inland wetlands, keeping in mind the differences in scale necessary to present wetland distribution nationally and internationally.
55. Recording precise locational information on the Ramsar Information Sheet will allow Ramsar Sites to be placed within the context of each or any of these schemes, depending on which is most appropriate for any particular international analytical purpose. It would also allow analyses to be undertaken with respect to international regionalization schemes that do not have global coverage, for example, biogeographic regionalizations used within Europe (above).
56. Additional information and advice relating to the use of biogeographic regionalization schemes in the context of the Ramsar Convention is provided by Rebelo, Finlayson & Stroud (2009). This publication includes examples of the use of MEOW in analytical contexts to assess the coverage in the Ramsar List, and gaps in coverage, of specific coastal and near-shore marine wetland types, including mangroves, coral reefs, and saltmarshes.

5.4 Representation

57. The reasons for which such wetland types are as yet under-represented in the Ramsar List are various. They may include:
 - lack of recognition of the existence of particular wetland types within a particular territory;
 - lack of recognition that coastal and marine wetland types such as mangroves and coral reefs fall within the Ramsar definition of wetlands and so are eligible for designation as Ramsar Sites;
 - difficulty in applying the guidance in completing the Information Sheet on Ramsar Wetlands (RIS) for Ramsar Site designation, particularly in relation to the delimitation of appropriate boundaries,
 - uncertainty, especially for coral reefs, as to which particular features of these habitat types indicate the best representative examples of such wetlands under Ramsar Criterion 1;

- uncertainty, in the case of peatlands and wet grasslands, as to which wetland types in the Ramsar Classification System for Wetland Type (section 5.2) apply, since these habitat types can occur in a number of different categories; and
- for peatlands, a lack of recognition that a wetland is a peat-based system if wetlands are assessed only for their vegetational characteristics.

58. All Ramsar Criteria (section 6.1) for the designation of Wetlands of International Importance can be applied to the identification and designation of peatland, wet grassland, mangrove, coral reef and temporary pond wetland types.

5.5 *Legal status and complementary conservation frameworks*

☞ RIS field 34

♦ See also: Section 7.4.6, Conservation measures taken

59. **Legal protected area status.** Contracting Parties should be aware that Ramsar Site designation does not require that the wetland in question must enjoy any type of previously conferred protected areas status or must necessarily acquire this after designation. Likewise, wetlands being considered for designation need not be pristine areas which have not been subjected to impacts from human activities. In fact, Ramsar designation can be used to confer a special type of recognition on these areas by virtue of elevating them to the status of sites recognized as internationally important. In this way, Ramsar designation could represent the starting point for a process of recovery and rehabilitation of a particular site, provided the site meets the Criteria for listing under the Convention when nominated.
60. While the existing protected area status of a site should not be a factor in determining priorities for listing, Contracting Parties are urged to be mindful of the need for consistency in approach when officially designating wetland sites under international conventions and treaties as well as national policy or legal instruments. If a wetland site gains national protected area status because it provides critical habitat for an endemic wetland-dependent species, the Criterion indicates that it will qualify as a Ramsar Site. Contracting Parties are therefore urged to review all of their current, proposed and future protected areas to ensure that consistency is applied.
61. **Complementary international frameworks.** When considering Ramsar Site designations Contracting Parties are urged, as specified in Objective 4.2 (see paragraph 20), to consider the opportunities this may also provide for contributing to other established and developing initiatives under related international and regional environment conventions and programmes. This applies in particular to the Convention on Biological Diversity and the Convention on Migratory Species and its Agreements, such as the African-Eurasian Waterbirds Agreement. Regionally, this may apply to cooperative initiatives such as the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, the Asia-Pacific Migratory Waterbird Conservation Strategy 2001-2005, the Mediterranean Wetlands Initiative (MedWet), the South Pacific Regional Environment Programme (SPREP), the Southern Africa Development Community (SADC), the Association of the South East Asian Nations (ASEAN), the European Union's Natura 2000 network, the Emerald Network of the Bern Convention on the Conservation of European Wildlife and Natural Habitats, the Pan-European Biological and Landscape

Diversity Strategy, the Wetlands Programme for the High Andes, the Treaty on Amazon Cooperation, the Central American Commission on Environment and Development (CCAD), etc.

5.6 *Site delineation and boundary definition*

● See also: Appendix C: Additional guidelines for the provision of maps and other spatial data for Ramsar Sites

62. **Smaller sites should not be overlooked.** In developing a systematic approach to Ramsar Site designation, Contracting Parties are encouraged to recognize that potential Ramsar Sites are not necessarily the largest wetlands within the territory. Some wetland types either never were or are no longer found as large wetland systems, and these should not be overlooked. They may be especially important in maintaining habitat or ecological community-level biological diversity.
63. **Boundary definition of sites.** When designating sites, Contracting Parties are encouraged to take a management-oriented approach to determining boundaries, recognizing that these should allow management of the site to be undertaken at the appropriate scale for maintaining the ecological character of the wetland. Article 2.1 of the Convention indicates that Ramsar Sites “may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands”. For very small and therefore potentially vulnerable sites, Contracting Parties are encouraged to include buffer zones around the wetland but within the designated Ramsar Site boundary. These may also be a useful management tool for subterranean system wetlands as well as for larger sites.
64. In determining the boundaries of sites identified as habitat for animal species, these should be established so as to provide adequately for all the ecological and conservation requirements of those populations. In particular, large animals, species at the top of food chains, those with large home-ranges, or with feeding and resting areas that are widely separated, will generally require substantial areas to support viable populations. If it is not possible to designate a site extending to the entire range used or accommodating viable (self-sustaining) populations, then additional measures relating to both the species and its habitat should be adopted in the surrounding areas (or the buffer zone). These measures will complement the protection of the core habitat within the Ramsar Site.
65. While some sites considered for designation will be identified at landscape scale, containing substantial elements of whole wetland ecosystems, others may be smaller. In selecting and delimiting such more restricted wetlands the following guidance may assist in determining their extent:
 - i) As far as possible, sites should include complexes or mosaics of vegetation communities, not just single communities of importance. Note that wetlands with naturally nutrient poor (oligotrophic) conditions generally exhibit low diversity of species and habitats. In these wetlands, high diversity may be associated with low conservation quality (indicated by markedly altered conditions). Thus, diversity must always be considered within the context of the norms of the wetland type.

- ii) Zonations of communities should be included as completely as possible in the site. Important are communities showing natural gradients (transitions), for instance from wet to dry, from salt to brackish, from brackish to fresh, from oligotrophic to eutrophic, from rivers to their associated banks, shingle bars and sediment systems, etc.
 - iii) Natural succession of vegetation communities often proceeds rapidly in wetlands. To the greatest extent possible and where these exist, all phases of succession (for example, from open shallow water, to communities of emergent vegetation, to reedswamp, to marshland or peatland, to wet forest) should be included in designated sites. Where dynamic changes are occurring, it is important that the site is large enough so that pioneer stages can continue to develop within the Ramsar Site.
 - iv) Continuity of a wetland with a terrestrial habitat of high conservation value will enhance its own conservation value.
66. The smaller the site, the more vulnerable it is likely to be to outside influences. In determining boundaries of Ramsar Sites, particular attention should be given to ensuring that wherever possible the limits of the sites serve to protect them from potentially damaging activities, especially those likely to cause hydrological disturbance. Ideally, boundaries should include those areas of land necessary to provide and maintain the hydrological functions needed to conserve the international importance and integrity of the site. Alternatively, it is important that planning processes are operating to ensure that potential negative impacts arising from land-use practices on adjoining land or within the drainage basin are suitably regulated and monitored to provide confidence that the ecological character of the Ramsar Site will not be compromised.

5.7 *Species*

What does this section do? Emphasises general considerations about species (including alien invasive species)

5.7.1 **Flagship and keystone species**

67. The concepts of indicator, flagship and keystone species are important for Contracting Parties to consider as well. The presence of “indicator” species can be a useful measure of good wetland quality. Well-known “flagship” species can also have great symbolic and awareness-raising value for wetland conservation and wise use, whereas “keystone” species play vital ecological roles. Wetlands with significant populations of indicator, flagship and/or keystone species may merit special consideration as sites of international importance.

5.7.2 **Contexts for species**

68. **Species presence in perspective.** When applying population figures to establish the relative importance of sites for designation, Contracting Parties should take care to put these within an appropriate context. It may be that in terms of relative importance for biological diversity conservation, a site providing habitat for a rare species is a higher

priority for listing and subsequent management action than a site which has larger numbers of a more common species.

69. **Less visible interests should not be overlooked.** Fish are not only an integral part of aquatic ecosystems, but are a vital source of food and income for people throughout the world. However, the production of fisheries in many parts of the world is declining as a consequence of unsustainable harvest regimes and the loss and degradation of habitats including spawning and nursery areas. Underwater species such as fish and other aquatic fauna and flora can often be overlooked in the development of cases for Ramsar Site designation, unlike more visible animals and plants. Such aquatic interests should be carefully and systematically reviewed.

5.7.3 Non-native species

70. The introduction and spread of non-native species is of great concern due to the impact this can have on the biological diversity and natural functioning of wetland ecosystems (see Resolutions VII.14 and VIII.18 on invasive species and wetlands). It follows, therefore, that the presence of introduced or non-native species should not be used to support a case for designating a site as a Wetland of International Importance. In some circumstances native species can also be considered invasive to wetlands due to the disruption and imbalances they can introduce into the ecosystem. It is possible for introduced non-native species to be rare or endangered in their native habitats. Such situations need to be carefully assessed by the Contracting Party.

5.7.4 Species taxonomy

71. In describing Ramsar Sites in the context of the Ramsar Information Sheet (especially **fields 18** and **20**), please use the international taxonomic standards adopted by the Convention on International Trade in Endangered Species (CITES) for all species other than waterbirds. The most recent reference source is at CITES Resolution 12.11 (Rev. COP15) (www.cites.org/eng/res/12/12-11R15.shtml) and this is revised following each CITES COP.
72. For waterbirds, please use Wetland International's *Waterbird Population Estimates* as the definitive source of information on populations and species taxonomy (see also sections **6.1.5** and **6.1.6** below). (Note that there are only a few differences between the nomenclatures adopted by *Waterbird Population Estimates* and CITES). The most recent reference source is *Waterbird Population Estimates*, 4th edition (www.wetlands.org/WatchRead/tabid/56/mod/1570/articleType/ArticleView/articleId/2028/Waterbird-Population-Estimates-Fourth-edition.aspx).

5.8 *Wetlands in the landscape: connectivity and site clusters*

73. **Site clusters.** Clusters of small sites, or individual small “satellite” sites associated with larger areas, should be considered for listing where these are:
- i) component parts of a hydrologically linked system (e.g., a complex of valley mires, a system of groundwater-fed wetlands along a spring line, or karst and subterranean wetland systems); and/or

- ii) linked in their use by a common population of animal (e.g., a group of alternative roost or feeding areas used by one population of waterbirds); and/or
- iii) formerly geographically continuous areas before being separated by human activity; and/or
- iv) otherwise ecologically interdependent (e.g., sites forming part of a distinct wetland district/landscape with a common developmental history and/or supporting discrete species populations); and/or
- v) found in arid or semi-arid zones, where complexes of dispersed wetlands (sometimes of a non-permanent nature) can both individually and collectively be of very great importance for both biological diversity and human populations (e.g., essential links in incompletely known chains).

74. Where a cluster of sites is designated, the Ramsar Information Sheet should state clearly the rationale for treating the component parts collectively as one listed site.

5.9 Hydrology

75. **Hydrological values:** A description of the principal hydrological values of the wetland, for example the ecosystem services that they provide to people. This may include, but not necessarily be limited to, the site's role in flood control, groundwater replenishment, shoreline stabilization, sediment and nutrient retention and export, climate change modification, and water purification and maintenance of water quality. Hydrology of the site (as opposed to its hydrological values and functions) should be covered **under RIS field 23, Water regime**.

5.10 Social and cultural values

☞ **RIS field 30**
 🔹 **See also: Section 7.4.17, Social or cultural importance**
 Material from other parts of the Ramsar oeuvre?

5.11 Sites on borders

☞ **RIS field 4**
 Something about the need for shared/harmonised management?

5.11.1 Internationally shared sites

76. Increasingly, Ramsar Contracting Parties are designating their new and existing Ramsar Sites as Transboundary Ramsar Sites, meaning that an ecologically coherent wetland extends across national borders and the Ramsar Site authorities on both or all sides of the border have formally agreed to collaborate in its management, and have notified the Secretariat of this intent.
77. This is a cooperative management arrangement and not a distinct legal status for the Ramsar Sites involved.
78. A list of such examples is maintained on Ramsar's website (www.ramsar.org/trs).

5.11.2 Trans-provincial sites

79. In identifying potential sites for designation, Contracting Parties are urged not to neglect wetland sites that straddle internal boundaries between different subnational jurisdictions (for example, between provinces, states, or other forms of administrations). The case for ecologically coherent wetland designations extending across such internal boundaries between different administrations is the same as for internationally shared sites (above).

6. Why is the wetland internationally important?

What does this section do? Introduces the Criteria. What they are for and how to use them. How to document them in a Ramsar Information Sheet.

☞ RIS field **14**

6.1 Assessing the site against Ramsar's Criteria

80. In this Section of the Strategic Framework, the Criteria for designating sites are presented, with guidelines for their application, in order to assist Contracting Parties in taking a systematic approach to identifying their priority sites for designation. These guidelines should be considered in conjunction with the more general guidelines given in **section 5 above**. Guidance on the appropriate documentation of relevant Criteria is given in **section 6.2**.
81. Many sites qualify for designation under more than one Criterion: be thorough and precise in selecting all of the Criteria that apply. The specific reasons justifying the application of each Criterion selected should be provided in relevant fields of the RIS.

Criteria for the designation of Wetlands of International Importance

<p>Group A of the criteria</p> <p>Sites containing representative, rare or unique wetland types</p>		<p>Criterion 1:</p> <p>A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.</p>
<p>Group B of the criteria</p> <p>Sites of international importance for conserving biodiversity</p>	<p>Criteria based on species and ecological communities</p>	<p>Criterion 2:</p> <p>A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.</p> <p>Criterion 3:</p> <p>A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.</p>

		<p>Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.</p>
	Specific criteria based on waterbirds	<p>Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.</p>
		<p>Criterion 6: 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.</p>
	Specific criteria based on fish	<p>Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.</p>
		<p>Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.</p>
	Specific criteria based on other taxa	<p>Criterion 9: 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.</p>

Group A of the Criteria: Sites containing representative, rare or unique wetland types

6.1.1 Criterion 1:

A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

What this Criterion is seeking to achieve?

82. Criterion 1 identifies wetlands that are of international importance, within a biogeographical context, as examples of wetland types or habitats (rather than for the species contained within the wetland).
83. The Criterion relates to sites which contain one or more natural or near-natural wetland types which are – nationally - either:
- a) **representative** examples;
 - b) **rare** examples or
 - c) **unique**.

More detail

84. Objective 1, and in particular Objective 1.2 (section 3.2 above), indicates that another consideration under this Criterion is to give priority to those wetlands whose ecological character plays a substantial role in the natural functioning of a major river basin or coastal system. Contracting Parties should consider the hydrological functioning of wetlands in determining priority sites under this Criterion. For guidance relevant to biological and ecological roles refer to Criterion 2.

How to interpret this Criterion – what it means?

85. In applying this Criterion systematically, Contracting Parties are encouraged to:
- i) determine biogeographic regions within their territory or at the supranational/ regional level using the Convention’s recommended regionalization schemes (see Section 5.3);
 - ii) within each biogeographic region, determine the range of wetland types present (using the Ramsar Classification System for Wetland Type, Appendix B), noting in particular any rare or unique wetland types; and
 - iii) for each wetland type within each biogeographic region, identify for designation under the Convention those sites which provide the best examples.
86. The Criterion refers to the Ramsar Site “containing” the wetland type concerned. This is an important pointer to the fact that the boundary of the site should, where possible, be drawn widely so as to contain the whole hydrological units, rather than the Ramsar Site being a small element of a larger wetland. See also Section 5.6.

Guidelines on specific wetland types

87. Peatlands, mangroves, and coral reefs were recognized by the *Global Review of Wetland Resources and Priorities for Wetland Inventory* report to COP7 (1999) as being amongst the wetland ecosystems that are most vulnerable and threatened by habitat loss and degradation, and thus in need of urgent priority action to ensure their conservation and wise use.
88. Additional guidance has been developed (Appendix E) to provide clarification of aspects of the application of this Strategic Framework as they apply to peatlands, wet grasslands, mangroves, and coral reefs, karst and other subterranean wetland types, temporary pools,

and bivalve (shellfish) reefs, in particular on the identification and designation of representative wetlands of these habitat types in accordance with Ramsar Criterion 1.

What data and information are needed to apply this Criterion?

89. A national wetland inventory is the fundamental requirement for the application of this Criterion, since it is only with such information that it is possible to assess whether a wetland is representative, rare or unique. Guidance on wetland inventory processes is given in Ramsar Handbooks 11 and 12 (see also Appendix F).
90. Information on recommended biographical regionalizations is given in Section 5.3.

Potential ambiguities and pitfalls

91. Note that as this Criterion relates only to natural or near-natural wetlands, it cannot be applied to human-made wetlands.
92. When interpreting the phrase “within the biogeographic region”, this should be read as “within that part of the biogeographic region that is within the relevant Contracting Party”. In other words, the Criterion is seeking to identify ‘best’ national examples of particular wetland types.

Where to go for further help or information?

93. Although not restricted to wetland ecosystems, IUCN’s guidance related to proposed Red List criteria for threatened ecosystems (Rodríguez et al. 2010) may be useful in undertaking national assessments of wetland type rarity.

More detail

94. **Definition of ‘representative’:** A wetland that is a typical example of a particular wetland type found in a region. Wetland types are defined in Appendix B.
95. **Definition of ‘unique’:** The only one of its type within a specified biogeographic region. Wetland types are defined in Appendix B.
96. **Definition of ‘natural’:** When used in Criterion 1, natural (or unmodified) areas are those that still retain a complete or almost complete complement of species native to the area, within a more or less naturally functioning ecosystem.
97. **Definition of ‘near natural’:** When used in Criterion 1, this means those wetlands which continue to function in what is considered an almost natural way. This clarification is provided in the Criterion to allow for the listing of sites which are not pristine, yet retain ecological values that nonetheless make them internationally important.
98. **Definition of ‘wetland types’:** As defined by the Convention’s classification system, see Appendix B.

99. **Definition of ‘appropriate’:** When applied to the term “biogeographic region” as here, this means the regionalization which is determined by the Contracting Party to provide the most scientifically rigorous approach possible at the time.
100. **Definition of ‘biogeographic region’:** A scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc. Note that for non-island Contracting Parties, in many cases biogeographic regions will be transboundary in nature and will require collaboration between countries to establish representative, unique, etc., wetland types. In some cases, the term bioregion is used synonymously with biogeographic region. **See Section 5.3.**
101. **Hydrological importance.** As indicated by Article 2 of the Convention, wetlands can be selected for their hydrological importance which, *inter alia*, may include the following attributes. They may:
- i) play a major role in the natural control, amelioration or prevention of flooding;
 - ii) be important for seasonal water retention for wetlands or other areas of conservation importance downstream;
 - iii) be important for the recharge of aquifers;
 - iv) form part of karst or underground hydrological or spring systems that supply major surface wetlands;
 - v) be major natural floodplain systems;
 - vi) have a major hydrological influence in the context of at least regional climate regulation or stability (e.g., certain areas of cloudforest or rainforest, wetlands or wetland complexes in semi-arid, arid or desert areas, tundra or peatland systems acting as sinks for carbon, etc.);
 - vii) have a major role in maintaining high water quality standards.

Group B of the Criteria: Sites of international importance for conserving biological diversity

Criteria based on species and ecological communities

6.1.2 Criterion 2:

A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

What this Criterion is seeking to achieve?

102. Criterion 2 identifies wetlands that are important for the conservation of such species, either individually or as communities, and reflects the important role that Ramsar Sites have in the conservation of globally threatened species and ecological communities.
103. Objective 2.2 of this Strategic Framework urges Contracting Parties to seek to include in the Ramsar List wetlands that support threatened ecological communities or are critical to the survival of species identified as vulnerable, endangered or critically endangered under:

- a) national endangered species legislation/programmes; and/or
- b) within international frameworks such as the IUCN Red Lists; and/or
- c) Appendix I of CITES and the Appendix I of CMS.

How to interpret this Criterion – what it means?

- 104. The Criterion is non-quantitative and merely requires that the Ramsar Site support threatened species in the categories given. It provides no numerical threshold for the numbers supported in the site concerned, and thus the Criterion is particularly valuable in those cases where a site is known to be of importance for the species concerned but population assessments are not available.
- 105. Notwithstanding that small absolute numbers of individuals or sites may be involved, or that poor quality of quantitative data or information may sometimes be available, particular consideration should be given to listing wetlands that support globally threatened communities or species at any stage of their life cycle using this Criterion.
- 106. In accordance with the Convention on Biological Diversity's (CBD) definition of biological diversity as including "diversity within species, between species and of ecosystems" (CBD Article 2), and in line with guidance related to other Ramsar Criteria which apply to sub-species and populations, where appropriate Criterion 2 can be applied to sub-species and biogeographic populations of threatened species.
- 107. The Convention has emphasised peatlands, wet grasslands, mangroves, and coral reefs, karst and other subterranean wetland types, temporary pools, and bivalve (shellfish) reefs, as under-represented on the Ramsar List of sites. Since each of these wetland types has been identified as being particularly vulnerable and threatened by habitat loss and degradation, the identification and designation of threatened ecological communities, as well as threatened species, under Ramsar Criterion 2 will often be of particular importance.
- 108. When reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a network of sites providing habitat for rare, vulnerable, endangered, or critically endangered species. Ideally, the sites in the network will have the following characteristics. They:
 - i) support a mobile population of a species at different stages of its life cycle; and/or
 - ii) support a population of a species along a migratory pathway or flyway – noting that different species have different migratory strategies with different maximum distances needed between staging areas; and/or
 - iii) are ecologically linked in other ways, such as by providing refuge areas to populations during adverse conditions; and/or
 - iv) are adjacent to or in close proximity to other wetlands included in the Ramsar List, the conservation of which enhances the viability of threatened species' population by increasing the size of habitat that is protected; and/or
 - v) hold a high proportion of the population of a dispersed sedentary species that occupies a restricted habitat type.

109. Those sites which contribute most to the survival of species or ecological communities locally and as a whole are those which enable its geographic range to be maintained on a long-term basis. The long-term persistence of species is most likely to occur where:
- i) population dynamics data on the species concerned indicate that it is self-sustaining on a long-term basis as a viable component of its natural habitats, and
 - ii) the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
 - iii) there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.
110. For identifying sites with threatened ecological communities, greatest conservation value will be achieved through the selection of sites with ecological communities that have one or more of the following characteristics. They:
- i) are globally threatened communities or communities at risk from direct or indirect drivers of change, particularly where these are of high quality or particularly typical of the biogeographic region; and/or
 - ii) are rare communities within a biogeographic region; and/or
 - iii) include ecotones, seral stages, and communities which exemplify particular processes; and/or
 - iv) can no longer develop under contemporary conditions (because of climate change or anthropogenic interference, for example); and/or
 - v) are at the contemporary stage of a long developmental history and support a well-preserved paleoenvironmental archive; and/or
 - vi) are functionally critical to the survival of other (perhaps rarer) communities or particular species; and/or
 - vii) have been the subject of significant decline in extent or occurrence.

More detail

111. **Definition of ‘critically endangered’:** As used by the Species Survival Commission of IUCN. A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1* (IUCN 2001). See also ‘globally threatened species’ in Appendix **F**.
112. **Definition of ‘endangered’:** As used by the Species Survival Commission of IUCN. A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1* (IUCN 2001). See also ‘globally threatened species’ in Appendix **F**.
113. **Definition of ‘vulnerable’:** As used by the Species Survival Commission of IUCN. A taxon is Vulnerable when it is not either Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1* (IUCN 2001). See also ‘globally threatened species’ in Appendix **F**.

114. **Definition of ‘ecological communities’:** Any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationships and relatively independent of other groups. Ecological communities may be of varying sizes, and larger ones may contain smaller ones.
115. **Definition of ‘ecotone’:** A narrow and fairly sharply defined transition zone between two or more different communities. Such edge communities are typically rich in species.
116. **Definition of ‘seral stage’:** A phase in the sequential development of a climax community of plant succession.
117. **Definition of ‘flyway’** (Guideline for Criterion 2): The concept developed to describe areas of the world used by migratory waterbirds and defined as the migration routes(s) and areas used by waterbird populations in moving between their breeding and wintering grounds (Boere & Stroud 2006). Each individual species and population migrates in a different way and uses a different suite of breeding, migration staging and wintering sites. Hence a single flyway is composed of many overlapping migration systems of individual waterbird populations and species, each of which has different habitat preferences and migration strategies. From knowledge of these various migration systems it is possible to group the migration routes used by waterbirds into broad flyways, each of which is used by many species, often in a similar way, during their annual migrations. Recent research into the migrations of many wader or shorebird species, for example, indicates that the migrations of waders can broadly be grouped into eight flyways: the East Atlantic Flyway, the Mediterranean/Black Sea Flyway, the West Asia/Africa flyway, the Central Asia/Indian sub-continent Flyway, the East Asia/Australasia Flyway, and three flyways in the Americas and the Neotropics.
118. There are no clear separations between flyways, and their use is not intended to imply major biological significance; rather it is a valuable concept for permitting the biology and conservation of waterbirds, as with other migratory species, to be considered in broad geographical units into which the migrations of species and populations can be more or less readily grouped.
119. **Definition of ‘threatened ecological community’:** An ecological community which is likely to become extinct in nature if the circumstances and factors threatening its extent, survival or evolutionary development continue to operate.
120. Guidelines for a threatened ecological community are that the community is subject to current and continuing threats likely to lead to extinction as demonstrated by one or more of the following phenomena:
 - i) Marked decrease in geographic distribution. A marked decrease in distribution is considered to be a measurable change whereby the distribution of the ecological community has contracted to less than 10% of its former range, or the total area of the ecological community is less than 10% of its former area, or where less than 10% of the area of the ecological community is in patches of a size sufficiently large for them to be likely to persist for more than 25 years. (The figure of 10% is indicative and for some communities, especially those which originally covered a relatively large area, it may be appropriate to use a different figure).

- ii) Marked alteration of community structure. Community structure includes the identity and number of component species that make up an ecological community, the relative and absolute abundance of those species and the number, type and strength of biotic and abiotic processes that operate within the community. A marked alteration of community structure is a measurable change whereby component species abundance, abiotic interactions, or biotic interactions are altered to the extent that rehabilitation of the ecological community is unlikely to occur within 25 years.
- iii) Loss or decline of native species that are believed to play a major role in the community. This guideline refers to species that are important structural components of a community or are important in the processes that sustain or play a major role in the community, e.g., seagrass, termite nests, kelp, dominant tree species.
- iv) Restricted geographic distribution (determined at national level) such that the community could be lost rapidly by the action of a threatening process.
- v) Community processes being altered to the extent that a marked alteration of community structure will occur. Community processes can be abiotic (e.g., fire, flooding, altered hydrology, salinity, nutrient change) or biotic (e.g., pollinators, seed dispersers, soil disturbance by vertebrates which affect plant germination). This guideline recognizes that ecological processes are important to maintain an ecological community, e.g., fire regimes, flooding, cyclone damage, and that disruption to those processes can lead to the decline of the ecological community.

121. **Definitions of ‘globally threatened species’, ‘importance’, ‘species’, and ‘threatened ecological community’** are given in Appendix **F**.

What data and information are needed to apply this Criterion?

122. The biogeographical region context can also apply to certain reasons for the designation of threatened ecological communities under Criterion 2. The biogeographic region encompassing the Ramsar Site and the biogeographic regionalization scheme applied should be provided in **section 11**, Biogeography.

Potential ambiguities and pitfalls

123. Note also the issues concerning habitat diversity and succession in **paragraphs 56 to 59** above, “Boundary definition of sites”.

124. Be aware also of the biological importance of many karst and other subterranean hydrological systems (see specific guidance **below**).

125. See section **5.7.4** for guidance on species nomenclature.

Where to go for further help or information?

126. Information on species status is available from IUCN, CITES and CMS as follows:

	Web-link
IUCN Red List	www.iucnredlist.org
CMS Appendices	www.cms.int/documents/appendix/cms_app1_2.htm
CITES Appendices	www.cites.org/eng/resources/species.html

Information on waterbird flyways and their definition is given by Boere & Stroud (2006) and Hagemeyer (2006).

6.1.3 Criterion 3:

A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

What this Criterion is seeking to achieve?

127. Criterion 3 identifies wetlands that are important in maintaining the characteristic biological diversity of a particular biogeographic region through support of regionally typical species or habitats.

How to interpret this Criterion – what it means?

128. The interpretation of this Criterion must consider the significance of the wetland for biodiversity support within its wider regional context. It should particularly consider the role of the site as a ‘source’ of species dispersing to surrounding areas as well as its significance in the definition and maintenance of characteristic regional biodiversity.

129. Although not necessarily required, the Criterion can typically be used to recognize the importance of large-scale wetlands extending across landscapes (or of broad coastal/inshore waters). These large-scale sites define regional biodiversity. Examples include the blanket peatlands of Caithness and Sutherland (UK); the diverse tropical wetlands of the Okovango Delta (Botswana); the coral reefs of the [Great Barrier Reef (Australia)] **[Add more examples]**.

130. When Contracting Parties are reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a suite of sites that have the following characteristics. They:

- i) are “hotspots” of biological diversity and are evidently species-rich even though the number of species present may not be accurately known; and/or
- ii) are centres of endemism or otherwise contain significant numbers of endemic species; and/or
- iii) contain the range of biological diversity (including habitat types) occurring in a region; and/or

- iv) contain a significant proportion of species adapted to special environmental conditions (such as temporary wetlands in semi-arid or arid areas); and/or
- v) support particular elements of biological diversity that are rare or particularly characteristic of the biogeographic region.

131. Notwithstanding that small absolute numbers of individuals or sites may be involved, or that poor quality of quantitative data or information may sometimes be available, particular consideration should be given to using this Criterion for listing wetlands that support globally threatened communities or species at any stage of their life cycle.

What data and information are needed to apply this Criterion?

132. The following minimum information is needed to apply this Criterion:

- an inventory of plant and/or animal species present at the site;
- a broad understanding of the elements which define the characteristic plant and animal diversity of the biogeographic region in which the wetland occurs; and
- a broad understanding of the significance of the specific wetland in the context of the wider regional biodiversity assessment.

Potential ambiguities and pitfalls

132. See section 5.7.4 for guidance on species nomenclature.

133. See section 5.4 for guidance on biogeographic regionalizations.

134. Be aware also of the biological importance of many karst and other subterranean hydrological systems (see specific guidance in Appendix E1).

Where to go for further help or information?

135. Conserving hotspots of endemism is particularly important in the context of Criterion 3. Information on centres of endemism for a number of taxa is readily available. These include:

- *Centres of Plant Diversity: a guide and strategy for their conservation* (WWF & IUCN 1994-1997)
- BirdLife International's Endemic Bird Areas of the World (Stattersfield et al. 1998);
- Alliance for Zero Extinction (AZE) sites
- [Amphibia?;
- Fish atlases?;
- Mammals?
- Plants?]

More detail

136. **Definition of 'populations':** In the context of Criterion 3, meaning the population of a species within the specified biogeographical region.

137. **Definition of ‘biogeographic region’:** - See definition in [section 5.3](#).

6.1.4 Criterion 4:

A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

What this Criterion is seeking to achieve?

138. This Criterion identifies those wetlands that are of critical importance in enabling plant and/or animal species to fulfil life cycles by providing necessary ecological support (for example, essential food resources) on a basis that is either regular and annual or is more infrequent though nonetheless predictable.

How to interpret this Criterion – what it means?

139. All aspects of the environment provide support or refuge to those plants and animals that live within it. A test of ‘international importance’ needs to be applied in the application of this Criterion. Thus, its use typically (though not necessarily always) occurs in conjunction with one or more of Ramsar’s other Criteria.
140. The life-cycle support, or refuge, being acknowledged by the application of this Criterion should thus apply to internationally important (or near internationally important) numbers of a species (Criterion 5, 6, 7 or 9) and/or to species or communities that are important by virtue of their presence or rarity (Criteria 2, 3 or 8). Some examples of the possible application of the Criteria are given below (see *More detail*).
141. The Criterion can especially be used to identify sites, the loss of which would be critical in the context of the life-cycle of the species occurring there.

More detail

142. Critical sites for mobile or migratory species are those which contain particularly high proportions of populations gathered in relatively small areas at particular stages of life cycles. This may be at particular times of the year or, in semi-arid or arid areas, during years with a particular rainfall pattern. For example, many waterbirds use relatively small areas as key staging points (to eat and rest) on their long-distance migrations between breeding and non-breeding areas. For Anatidae species, moulting sites are also critical. Sites in semi-arid or arid areas may hold very important concentrations of waterbirds and other mobile wetland species and be crucial to the survival of populations, yet may vary greatly in apparent importance from year-to-year as a consequence of considerable variability in rainfall patterns.
143. Non-migratory wetland species are unable to move away when climatic or other conditions become unfavourable and only some sites may feature the special ecological characteristics to sustain species’ populations in the medium or long term. Thus in dry periods, some crocodile and fish species retreat to deeper areas or pools within wetland complexes, as the

extent of suitable aquatic habitat diminishes. These restricted areas are critical for the survival of animals at that site until rains come and increase the extent of wetland habitat once more. Sites (often with complex ecological, geomorphological and physical structures) which perform such functions for non-migratory species are especially important for the persistence of populations and should be considered as priority candidates for listing.

144. **Definition of ‘adverse conditions’:** Ecological conditions unusually hostile to the survival of plant or animal species, such as occur during severe weather like prolonged drought, flooding, cold, etc.
145. **Definition of ‘critical stage’:** Critical stages of the life cycle of wetland-dependent species are those in which occur those activities (breeding, migration stopovers, etc.) which, if interrupted or prevented from occurring, may threaten long-term conservation of the species. For some species (Anatidae – ducks, geese and swans – for example), areas where moulting occurs are vitally important.
146. **Definition of ‘provides refuge’:** Refer also to the definition for “critical stage”, which is related. Refuges should be interpreted to mean those locations where such critical stages gain some degree of protection during adverse condition such as drought.

What data and information are needed to apply this Criterion?

147. The following minimum information is needed to apply this Criterion:
- an inventory of plant and/or animal species present at the site;
 - knowledge of the ecological functions (either seasonally or periodically) provided by the site for the species present (e.g., food resources, physical shelter, etc.); and
 - a broad understanding of the significance of the ecological support functions of the site in the context of the overall life-cycle of the species concerned (for example, that the site is an important staging area for specified migratory species).

Potential ambiguities and pitfalls

148. The main pitfall of interpretation relates to ensuring that, in its application, sites selected are of international importance for either types of species (e.g., rarity) or numbers of species (e.g., population sizes). It is thus recommended that the Criterion be applied in association with one or more other Criteria (although this is not formally required).
149. See section 5.7.4 for guidance on species nomenclature.

Where to go for further help or information?

150. Ridgill & Fox (1990) reviewed the movements of waterbirds in periods of extreme cold weather and identified European wetlands that are periodically of critical importance as refuges. That work is a good example of a regional scale analysis valuable in informing understanding of site criticality to mobile species during periodic adverse conditions.

151. Information on life cycles and influencing factors for all bird species is available at: www.birdlife.org/datazone/home. For all IUCN Red-listed species, information is available at: www.iucnredlist.org/.
152. Information on the role of wetlands as refuges or otherwise in their support of species during climatically adverse conditions will become increasingly important.

Specific criteria based on waterbirds

6.1.5 Criterion 5:

A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

What this Criterion is seeking to achieve?

153. This Criterion identifies those wetlands which are of numerical importance for waterbirds through their support of internationally important numbers, either of one or of several species. In completing the RIS, indicate the actual total number of waterbirds present, and preferably, when available, the average total number from several recent years. It is not sufficient simply to restate the Criterion, i.e., that the site supports >20,000 waterbirds.

More detail

154. When Contracting Parties are reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a network of sites that provide habitat for waterbird assemblages containing globally threatened species or subspecies. These are currently poorly represented in the Ramsar List. (Refer also to paragraph 53 above, “Species presence in perspective”.)

How to interpret this Criterion – what it means?

[Add text]

More detail

155. **Definition of ‘waterfowl’:** The Convention functionally defines waterfowl (a term which, for the purposes of these Criteria and Guidelines, is considered to be synonymous with “waterbirds”) as “birds ecologically dependent on wetlands” (Article 1.2). This definition thus includes any wetland bird species. However, at the broad level of taxonomic order, it includes especially:

- penguins: *Sphenisciformes*.
- divers: *Gaviiformes*;
- grebes: *Podicipediformes*;
- wetland related pelicans, cormorants, darters and allies: *Pelecaniformes*;
- herons, bitterns, storks, ibises and spoonbills: *Ciconiiformes*;
- flamingos: *Phoenicopteriformes*.

- screamers, swans, geese and ducks (wildfowl): *Anseriformes*;
- wetland related raptors: *Accipitriiformes* and *Falconiformes*;
- wetland related cranes, rails and allies: *Gruiformes*;
- Hoatzin: *Opisthocomiformes*;
- wetland related jacanas, waders (or shorebirds), gulls, skimmers and terns: *Charadriiformes*;
- coucals: *Cuculiformes*; and
- wetland related owls: *Strigiformes*.

156. **Definition of ‘regularly’** (Criteria 5 & 6): As in supports regularly. A wetland regularly supports a population of a given size if:

- i) the requisite number of birds is known to have occurred in two thirds of the seasons for which adequate data are available, the total number of seasons being not less than three; or
- ii) the mean of the maxima of those seasons in which the site is internationally important, taken over at least five years, amounts to the required level (means based on three or four years may be quoted in provisional assessments only).

157. In establishing long-term ‘use’ of a site by birds, natural variability in population levels should be considered especially in relation to the ecological needs of the populations present. Thus in some situations (e.g., sites of importance as drought or cold weather refuges or temporary wetlands in semi-arid or arid areas – which may be quite variable in extent between years), the simple arithmetical average number of birds using a site over several years may not adequately reflect the true ecological importance of the site. In these instances, a site may be of crucial importance at certain times (‘ecological bottlenecks’), but hold lesser numbers at other times. In such situations, there is a need for interpretation of data from an appropriate time period in order to ensure that the importance of sites is accurately assessed.

158. In some instances, however, for species occurring in very remote areas or which are particularly rare, or where there are particular constraints on national capacity to undertake surveys, areas may be considered suitable on the basis of fewer counts. For some countries or sites where there is very little information, single counts can help establish the relative importance of the site for a species.

What data and information are needed to apply this Criterion?

159. This Criterion can be simply applied using data from regular counts of waterbirds at a site. Typically data from the International Waterbird Census collated by Wetlands International are the key reference source, although other site-specific survey data may also be used where this exists.

More detail

160. See **paragraph XX** for the definition of the term **turnover**. 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.

161. 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 sometimes been applied do not yield statistically reliable or accurate estimates.
162. The only currently available method that 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.
163. 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.
164. **Size of sites.** This Criterion will apply to wetlands of varying size in different Contracting Parties. While it is impossible to give precise guidance on the size of an area in which these numbers may occur, wetlands identified as being of international importance under Criterion 5 should form an ecological unit, and may thus be made up of one big area or a group of smaller wetlands. Refer also to paragraphs 60 and 61 above, "Site clusters". Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is reached, if such data are available.

Potential ambiguities and pitfalls

165. **Non-native waterbirds** should not be included within the totals for a particular site (refer also to paragraph 54 above, "Non-native species").
166. Criterion 5 should be applied not only to multi-species assemblages, but also to sites regularly holding more than 20,000 waterbirds of any one species. For populations of waterbirds of more than 2,000,000 individuals, a 1% threshold of 20,000 is adopted on the basis that sites holding this number are of importance under Criterion 5. To reflect the importance of the site for the species concerned, it is also appropriate to list such a site under Criterion 6.
167. See section 5.7.4 for guidance on species nomenclature.

Where to go for further help or information?

International Waterbird Census: [contact details](#).

6.1.6 Criterion 6:

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.

What this Criterion is seeking to achieve?

168. This Criterion identifies wetlands of numerical importance for waterbirds through their support of a significant proportion of specific biogeographic populations (more than 1%), and in most cases the biogeographic range of waterbird populations is larger than the territory of one Contracting Party.

More detail

169. When Contracting Parties are reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a suite of sites that hold populations of globally threatened species or subspecies. Refer also to section 5.8 above, “Species presence in perspective”, and section 5.6 above, “Legal status and complementary frameworks”. Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is reached, if such data are available.

How to interpret this Criterion – what it means?

170. The Criterion is unambiguous and has been widely applied throughout the world. The term ‘population’ in this Criterion refers to the relevant biogeographic population as defined below. For each population listed under Criterion 6 the name of the biogeographic population, as well as the number of birds of this population regularly occurring in the site, should be listed.

More detail

171. **Biogeographical population.** Several types of ‘populations’ are recognized:

- i) the entire population of a monotypic species;
- ii) the entire population of a recognized subspecies;
- iii) a discrete migratory population of a species or subspecies, i.e., a population which rarely if ever mixes with other populations of the same species or subspecies;
- iv) that ‘population’ of birds from one hemisphere which spends the non-breeding season in a relatively discrete portion of another hemisphere or region. In many cases, these ‘populations’ may mix extensively with other populations on the breeding grounds or mix with sedentary populations of the same species during the migration seasons and/or on the non-breeding grounds;
- v) a regional group of sedentary, nomadic or dispersive birds with an apparently rather continuous distribution and no major gaps between breeding units sufficient to prohibit interchange of individuals during their normal nomadic wanderings and/or post-breeding dispersal.

What data and information are needed to apply this Criterion?

172. This Criterion can be simply applied with just two elements of information:
- a count of the total number of the waterbirds of a particular population of species or sub-species using the wetland; and
 - 1% threshold from the current estimate of the size of the relevant biogeographic population of the waterbird concerned.
173. Site-related population data are available for many wetlands from the International Waterbird Census (IWC) of Wetlands International, from national waterbird monitoring schemes contributing to the IWC, or indeed from specific surveys undertaken at the site concerned.
174. Current estimates of the sizes of all waterbird species' populations are available in Wetland International's periodic publication *Waterbird Population Estimates*.

More detail

175. **Waterbird population size.** To ensure international comparability, Contracting Parties should use the international population estimates and 1% thresholds published and updated every three years by Wetlands International as the basis for evaluating sites for the List using this Criterion. Current [2012] 1% thresholds are given in *Waterbird Population Estimates* 4th Edition (2006) (available at www.wetlands.org), which also provides a description of the biogeographic range of each population. Earlier editions of *Waterbird Population Estimates* are now superseded and should not be used for Criterion 6 application. Note that this Criterion should be applied only to those waterbird populations for which a 1% threshold is available. However, for populations of waterbird species in taxa not presently covered by *Waterbird Population Estimates*, this Criterion may be applied if a reliable population estimate and 1% threshold is available from another source and if that information source is clearly specified. It is not sufficient simply to restate the Criterion, that the site supports >1% of a population, nor is it a correct justification to list populations with numbers in the site >1% of their *national* population, except when the population is endemic to that country.
176. [Add text on IWC count data]
177. As urged by Resolutions VI.4 (1996) and VIII.38 (2002) for the better application of this Criterion, Contracting Parties should not only supply data for the future update and revision of international waterbird population estimates, but should also support the national implementation and development of Wetlands International's International Waterbird Census, which is the source of many of these data.
178. **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. For further guidance on estimation of turnover, see the guidance under Criterion 5, paragraphs 90-93.

Potential ambiguities and pitfalls

179. **Mixed populations.** 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.
180. 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.
181. Note that this guidance applies just during the period of population mixing (which is often, but not exclusively, during periods of migration). At other times, it is generally possible to assign a 1% threshold accurately to the single population that is present.
182. See section 5.7.4 for guidance on species nomenclature.

Where to go for further help or information?

International Waterbird Census: [\[add contact details\]](#).

Waterbird Population Estimates – (www.wetlands.org/WatchRead/tabid/56/mod/1570/articleType/ArticleView/articleId/2028/Waterbird-Population-Estimates-Fourth-edition.aspx).

183. Further information on the distribution of biogeographical populations of some groups of waterbirds are available as follows:

Waterbird taxa	Geographical area	Source of information
Anatidae	Africa and western Eurasia	Scott & Rose (1996)
Anatidae	Eastern Eurasia	Miyabayashi & Mundkur (1999)
Waders	Africa and western Eurasia	Delany et al. (2009)

Specific criteria based on fish

6.1.7 Criterion 7:

A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

What this Criterion is seeking to achieve?

184. Fishes are the most abundant vertebrates associated with wetlands. Worldwide, over 18,000 species of fishes are resident for all or part of their life cycles in wetlands.
185. Criterion 7 identifies those wetlands important to the maintenance of biodiversity through their support of fish species (which includes shellfishes). It emphasises the different forms that diversity might take, including the number of taxa, different life-history stages, species interactions, and the complexity of interactions between the above taxa and the external environment. In addition, the different ecological roles that species may play at different stages in their life cycles needs to be considered.

How to interpret this Criterion – what it means?

186. Criterion 7 has a very complex formulation. It can best be interpreted thus:

A wetland should be considered internationally important if it supports a significant proportion of:
indigenous fish subspecies, species or families;
and/or life-history stages;
and/or species interactions;
characteristic of a biogeographical region.

187. The Criterion sets out a number of categories of assessment (indigenous species, life history strategies, etc.) and states that a ‘significant proportion’ of these should be present. Elaboration of what is a ‘significant proportion’ is given in the definitions below. Assessment of significant proportionality should ideally be undertaken on the scale of the appropriate biogeographic region.

More detail

188. The Criteria refers directly to the contribution of sites important to fish in terms of global biodiversity. Implicit in this understanding of biological diversity is the importance of high levels of endemism. Many wetlands are characterised by the highly endemic nature of their fish fauna.
189. Some measure of the level of endemism should be used to distinguish sites of international importance. If at least 10% of fish are endemic to a wetland or to wetlands in a natural grouping, that site should be recognized as internationally important, but the absence of endemic fishes from a site should not disqualify it if it has other qualifying characteristics. In some wetlands, such as the African Great Lakes, Lake Baikal in the Russian Federation, Lake Titicaca in Bolivia/Peru, sinkholes and cave lakes in arid regions, and lakes on islands, endemism levels as high as 90-100% may be reached, but 10% is a practical figure for worldwide application. In areas with no endemic fish species, the endemism of genetically-distinct infraspecific categories, such as geographical races, should be used.
190. According to the 2006 IUCN Red List, 1,173 species of fish are globally threatened, and 93 species are extinct or extinct in the wild. The occurrence of rare or threatened fish is also included within the scope of Criterion 2.

191. **Definition of ‘supports’:** Provides habitat for; areas which can be shown to be important to a species or an assemblage of species for any period of time are said to support that species. Occupation of an area need not be continuous, but may be dependent on natural phenomena such as flooding or (local) drought conditions.
192. **Definition of ‘significant proportion’** (Criteria 7 and 8): In polar biogeographical regions a “significant proportion” may be 3-8 subspecies, species, families, life-history stages or species interactions; in temperate zones 15-20 subspecies, species, families, etc.; and in tropical areas 40 or more subspecies, species, families, etc., but these figures will vary among regions.
- A “significant proportion” of species includes all species and is not limited to those of economic interest.
 - Some wetlands with a “significant proportion” of species may be marginal habitats for fish and may only contain a few fish species, even in tropical areas, e.g., the backwaters of mangrove swamps, cave lakes, the highly saline marginal pools of the Dead Sea.
 - The potential of a degraded wetland to support a “significant proportion” of species if it were to be restored also needs to be taken into account. In areas where fish diversity is naturally low, e.g., at high latitudes, in recently glaciated areas or in marginal fish habitats, genetically distinct infraspecific groups of fishes could also be counted.
193. **Definition of ‘species interaction’:** Exchanges of information or energy between species that are of particular interest or significance, e.g., symbiosis, commensalism, mutual resource defence, communal brooding, cuckoo behaviour, advanced parental care, social hunting, unusual predator-prey relationships, parasitism and hyperparasitism. Species interactions occur in all ecosystems but are particularly developed in species-rich climax communities, such as coral reefs and ancient lakes, where they are an important component of biological diversity.
194. **Definition of ‘biological diversity’:** The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species (genetic diversity), between species (species diversity), of ecosystems (ecosystem diversity), and of ecological processes. (This definition is largely based on the one contained in Article 2 of the Convention on Biological Diversity.)
195. **Definition of ‘endemic species’:** A species that is unique to one biogeographical region, i.e., it is found nowhere else in the world. A group of fishes may be indigenous to a subcontinent with some species endemic to a part of that subcontinent.
196. **Definition of ‘family’:** An assemblage of genera and species that have a common phylogenetic origin, e.g., pilchards, sardines and herrings in the family *Clupeidae*
197. **Definition of ‘fish’:** Any finfish, including jawless fishes (hagfishes and lampreys), cartilaginous fishes (sharks, rays, skates and their allies, *Chondrichthyes*) and bony fishes (*Osteichthyes*), as well as certain shellfish or other aquatic invertebrates (see below).

198. **Definition of ‘indigenous species’:** A species that originates and occurs naturally in a particular country.
199. **Definition of ‘life-history stage’:** A stage in the development of a finfish or shellfish, e.g., egg, embryo, larva, leptocephalus, zoea, zooplankton stage, juvenile, adult, or post-adult.
200. **Definition of ‘population’:** In this case, a group of fishes comprising members of the same species.
201. **Definition of ‘wetland benefits’:** The services that wetlands provide to people, e.g., flood control, surface water purification, supplies of potable water, fishes, plants, building materials and water for livestock, outdoor recreation and education. See also Resolution VI.1.
202. **Definition of ‘wetland values’:** The roles that wetlands play in natural ecosystem functioning, e.g, flood attenuation and control, maintenance of underground and surface water supplies, sediment trapping, erosion control, pollution abatement and provision of habitat.

What data and information are needed to apply this Criterion?

203. The following information is needed *ideally* to apply this Criterion. However, it may be applied even with partial information:
- an inventory of the species (and ideally subspecies) of fish present at the wetland (and from which can be derived a list of the fish families present);
 - knowledge of the extent to which fish subspecies, species or families are indigenous to the wetland concerned (within the context of a biogeographic region);
 - an understanding of the life history stages of fish present at the site;
 - an understanding of the interactions between fish present at the site; and
 - contextual information about fish to enable attributes of the site to be placed in a regional context.

Potential ambiguities and pitfalls

204. A species list alone is not sufficient justification for the use of this Criterion, and information on other measures of diversity, including life-history stages, species interactions, and level of endemism is required for the application of this Criterion.
205. See section 5.7.4 for guidance on species nomenclature.

Where to go for further help or information?

6.1.8 Criterion 8

A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or

migration path on which fish stocks, either within the wetland or elsewhere, depend.

What this Criterion is seeking to achieve?

206. Criterion 8 identifies those wetlands which support internationally important fish stocks (including bivalves/shellfish) through aspects of their ecological functioning. This includes via the role of the wetland in providing food and/or as a spawning ground, a nursery area, or a migration path.

More detail

207. Many fishes (including shellfishes) have complex life histories, with spawning, nursery and feeding grounds widely separated and long migrations necessary between them. It is important to conserve all those areas that are essential for the completion of a fish's life cycle if the fish species or stock is to be maintained. The productive, shallow habitats offered by coastal wetlands (including coastal lagoons, estuaries, saltmarshes, inshore rocky reefs, and sandy slopes) are extensively used as feeding and spawning grounds and nurseries by fishes with openwater adult stages. These wetlands therefore support essential ecological processes for fish stocks, even if they do not necessarily harbour large adult fish populations themselves.
208. Furthermore, many fishes in rivers, swamps or lakes spawn in one part of the ecosystem but spend their adult lives in other inland waters or in the sea. It is common for fishes in lakes to migrate up rivers to spawn, and for fishes in rivers to migrate downstream to a lake or estuary, or beyond the estuary to the sea, to spawn. Many swamp fishes migrate from deeper, more permanent waters to shallow, temporarily inundated areas for spawning. Wetlands, even apparently insignificant ones in one part of a river system, may therefore be vital for the proper functioning of extensive river reaches up- or downstream of the wetland.

How to interpret this Criterion – what it means?

209. The emphasis of this Criterion is not on the fish themselves (the object of Criterion 7) but rather on the ecological functions provided by the wetland, notably as a source of food, or as a spawning ground, or nursery or as a migration path. The Criterion notes that the importance of these functions need not just be for fish within the wetland itself but may also be for fish stocks further afield. For example, many coastal wetlands such as estuaries or mangrove swamps are crucial importance as nursery areas for fish stocks living in deeper waters offshore.
210. Many wetlands support functions for fish stocks. An assessment of overall significance is relevant in determining whether or not these functions are of *international* importance. The following attributes are likely to be associated with a wetland internationally important under Criterion 8. These include functions that support fish stocks:
- across extensive areas or multiple wetlands;
 - across national borders;

- of multiple species (including, but not restricted to those that are of high conservation status and/or are endemic within a biogeographic region); and/or
- which further support significant ecosystem services related to fish.

211. The guidance for Criterion 8 does not interfere with the rights of Contracting Parties to regulate fisheries within specific wetlands and/or elsewhere.

More detail

212. **Definition of ‘fishes’:** “Fishes” is used as the plural of “fish” when more than one species is involved. Fish orders that typically inhabit wetlands (as defined by the Ramsar Convention) and which are indicative of wetland benefits, values, productivity or biological diversity, include:

- i) **Jawless fishes - *Agnatha***
 - hagfishes (*Myxiniiformes*)
 - lampreys (*Petromyzontiformes*)
- ii) **Cartilaginous fishes - *Chondrichthyes***
 - dogfishes, sharks and allies (*Squaliformes*)
 - skates (*Rajiformes*)
 - stingrays and allies (*Myliobatiformes*)
- iii) **Bony fishes - *Osteichthyes***
 - Australian lungfish (*Ceratodontiformes*)
 - South American and African lungfishes (*Lepidosireniformes*)
 - bichirs (*Polypteriformes*)
 - sturgeons and allies (*Acipenseriformes*)
 - gars (*Lepisosteiformes*)
 - bowfins (*Amiiformes*)
 - bonytongues, elephant fishes and allies (*Osteoglossiformes*)
 - tarpons, bonefishes and allies (*Elopiformes*)
 - eels (*Anguilliformes*)
 - pilchards, sardines and herrings (*Clupeiformes*)
 - milkfishes (*Gonorhynchiformes*)
 - carps, minnows and allies (*Cypriniformes*)
 - characins and allies (*Characiformes*)
 - catfishes and knifefishes (*Siluriformes*)
 - pikes, smelts, salmons and allies (*Salmoniformes*)
 - mullets (*Mugiliformes*)
 - silversides (*Atheriniformes*)
 - halfbeaks (*Beloniformes*)
 - killifishes and allies (*Cyprinodontiformes*)
 - sticklebacks and allies (*Gasterosteiformes*)
 - pipefishes and allies (*Syngnathiformes*)
 - cichlids, perches and allies (*Perciformes*)

- flatfishes (*Pleuronectiformes*)
- iv) **Several groups of shellfishes:**
- shrimps, lobsters, freshwater crayfishes, prawns and crabs (*Crustacea*)
 - mussels, oysters, pencil baits, razor shells, limpets, winkles, whelks, scallops, cockles, clams,
 - abalone, octopus, squid and cuttlefish (*Mollusca*)
- v) **Certain other aquatic invertebrates:**
- sponges (*Porifera*)
 - hard corals (*Cnidaria*)
 - lugworms and ragworms (*Annelida*)
 - sea urchins and sea cucumbers (*Echinodermata*)
 - sea squirts (*Ascidacea*)
213. **Definition of ‘fish stock’:** The potentially exploitable component of a fish population.
214. **Definition of ‘spawning ground’:** That part of a wetland used by fishes for courting, mating, gamete release, gamete fertilization and/or the release of the fertilized eggs, e.g. herring, shad, flounder, cockles, and many fishes in freshwater wetlands. The spawning ground may be part of a river course, a stream bed, inshore or deep water zone of a lake, floodplain, mangrove, saltmarsh, reed bed, estuary or the shallow edge of the sea. The freshwater outflow from a river may provide suitable spawning conditions on the adjacent marine coast.
215. **Definition of ‘migration path’:** The route along which fishes, such as salmon and eels, swim when moving to or from a spawning or feeding ground or nursery. Migration paths often cross international boundaries or boundaries between management zones within a country.
216. **Definition of ‘nursery’:** That part of a wetland used by fishes for providing shelter, oxygen and food for the early developmental stages of their young. In some fishes, e.g., nest-guarding tilapias, the parent/s remain at the nursery to protect the young whereas in others the young are not protected by the parent/s except by virtue of the shelter provided by the habitat in which they are deposited, e.g., non-guarding catfishes. The ability of wetlands to act as nurseries depends on the extent to which their natural cycles of inundation, tidal exchange, water temperature fluctuation and/or nutrient pulses are retained. Welcomme (1979) showed that 92% of the variation in catch from a wetland-recruited fishery could be explained by the recent flood history of the wetland.

What data and information are needed to apply this Criterion?

217. The following *ideal* information is needed to apply this Criterion. However, it may be applied even with partial information:

[text needed];

Potential ambiguities and pitfalls

[text to be added]

Where to go for further help or information?

[text to be added]

Specific Criterion based on other taxa

6.1.9 Criterion 9

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.

What this Criterion is seeking to achieve?

[text to be added]

How to interpret this Criterion – what it means?

218. When Contracting Parties are reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a suite of sites that hold populations of globally threatened species or subspecies. Refer also to section 5.8 above, “Species presence in perspective”, and section 5.6 above, “Legal status and complementary frameworks”. Consideration may also be given to turnover of individuals of migratory animals at migration periods, so that a cumulative total is reached, if such data are available (guidance in paragraphs 90-93 related to waterbirds is also applicable in relation to non-avian animals).
219. To ensure international comparability, wherever possible Contracting Parties should use the most current international population estimates and 1% thresholds provided and regularly updated by IUCN’s Specialist Groups through the IUCN Species Information Service (SIS) and published in the Ramsar Technical Report series, as the basis for evaluating sites for the List using this Criterion. [Note: An initial listing is provided as an adjunct to the RIS Explanatory Note and Guidelines, www.ramsar.org/ris/key_ris_criterion9_2006.pdf.]
220. This Criterion can also be applied to nationally endemic species or populations, where reliable national population size estimates exist. When making such an application of the Criterion, information concerning the published source of the population size estimate should be included in the justification for the application of this Criterion. Such information can also contribute to expanding the taxonomic coverage of the information on population estimates and 1% thresholds published in the *Ramsar Technical Report* series.

What data and information are needed to apply this Criterion?

221. This Criterion is applicable to populations and species in a range of non-avian taxa including, *inter alia*, mammals, reptiles, amphibians, fish and aquatic macro-invertebrates.

However, only species or subspecies for which reliable population estimates have been provided and published (paragraphs 114-116) should be included in the justification for the application of this Criterion. Where no such information exists, Contracting Parties should give consideration to designation for important non-avian animal species under Criterion 4. For better application of this Criterion, Contracting Parties should assist, where possible, in the supply of such data to the IUCN-Species Survival Commission and its Specialist Groups in support of the future updating and revision of international population estimates.

Potential ambiguities and pitfalls

222. Note that this Criterion should be applied only to those animal populations for which a 1% threshold is available. However, for populations of species in taxa not presently covered by the paper “*Population estimates and 1% thresholds for wetland-dependent non-avian species, for the application of Criterion 9*”, the guidelines indicate that this Criterion may be applied if a reliable population estimate and 1% threshold is available from another source, and in such cases the information source should be clearly specified. In the application of this Criterion, it is not sufficient simply to restate the Criterion, that the site supports >1% of a population, nor is it a correct justification to list populations with numbers in the site >1% of their *national* population, except when the population is endemic to that country.
223. See section 5.7.4 for guidance on species nomenclature.
224. The guidance for the application of **Criterion 9** for non-avian animal species is similar to that in sub-paragraph iii) above for Criterion 6 for waterbirds. In particular, this Criterion must be applied to the regular occurrence of >1% of a biogeographic population of a species or subspecies of wetland-dependent animal, and it should be recognized that in many cases the biogeographic range of the population is larger than the territory of one Contracting Party. For each population listed under Criterion 9 the name of the biogeographic population, as well as the number of individuals of this population regularly occurring in the site, should be listed. An initial list of recommended 1% thresholds for the application of Criterion 9 are provided in the paper “*Population estimates and 1% thresholds for wetland-dependent non-avian species, for the application of Criterion 9*” (www.ramsar.org/ris/key_ris_criterion9_2006.pdf), which also provides a description of the biogeographic range of each population.

Where to go for further help or information?

[text to be added]

6.2 Documenting selected Criteria in the Ramsar Information

225. Each Criterion for which the site qualifies should be indicated in the RIS, with accompanying information as to how that Criterion applies to the site. Part 2 of the RIS (Criteria for designation) is central to the concept of “international importance”. It is essential to provide sufficient precise descriptions to explain and support each of the Ramsar Criteria selected. This should provide the necessary details to describe the way in which a particular Criterion applies specifically at the site being designated.

7. Ramsar Site description: Guidance on describing the site at designation

7.1 *The Ramsar Site Information Sheet*

7.1.1. The history of the Ramsar Site Information Sheet

226. Recommendation 4.7 (1990) of the Conference of Contracting Parties established that the “data sheet developed for the description of Ramsar Sites be used by Contracting Parties and the Secretariat in presenting information for the Ramsar database, and as appropriate in other contexts”. The Recommendation listed the information categories covered by the “data sheet”, including the “reasons for inclusion” (the Ramsar Criteria) and the Ramsar “Classification system for wetland type”.
227. Resolution 5.3 (1993) reaffirmed that a completed “Ramsar datasheet” and site map should be provided upon designation of a Ramsar Site for the List of Wetlands of International Importance (the Ramsar List). This was subsequently reiterated in Resolutions VI.13, VI.16, and VII.12. This datasheet, formally entitled the Information Sheet on Ramsar Wetlands and abbreviated “RIS”, provides a standardized format for recording information and data about the Ramsar Site.
228. Resolution 5.3 also stressed that information concerning criteria for inclusion on the Ramsar List, the functions and values (hydrological, biophysical, floral, faunal, social and cultural) of the site, and conservation measures taken or planned were particularly important categories of information, and it emphasized the importance of applying the Ramsar Classification System for Wetland Type when describing the wetland in the RIS.
229. Criteria for Identifying Wetlands of International Importance were first adopted by the Heiligenhafen Conference in 1974 and refined by subsequent meetings of the Conference of the Parties. The form of the present Criteria was established by Recommendation 4.2 (1990), with additional criteria based upon fish adopted by Resolution VI.2 (1996). The Criteria were again substantively revised and, together with detailed guidance for their application, adopted by Resolution VII.11 (2002) as part of the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance*. An additional Criterion (Criterion 9) and amendments to the guidance for the application of other Criteria were adopted by COP9 (2005) in Resolution IX.1 Annex B.

7.1.2 General guidance about Ramsar Information Sheets

230. The Information Sheet on Ramsar Wetlands (RIS) is completed and supplied to the Ramsar Secretariat when a Ramsar Site is designated by a Contracting Party. In recognition that the status of designated Ramsar Sites can and does change, both in terms of their ecological character, the threats to this character, and the conservation management process and actions underway, Resolution VI.13 (1996) urged Parties to revise the data provided in the RIS at least every six years.
231. The RISs and their accompanying maps are held by the Ramsar Secretariat. The information provided by Contracting Parties in the RIS is used as the basis for entering data and information into the Ramsar Sites Database, managed on behalf of the

Convention by Wetlands International under contract from the Ramsar Secretariat. The Database and its associated information on Ramsar Sites is managed so as to provide an information service on Ramsar Sites, including undertaking analysis and reporting to meetings of the Conference of the Parties on progress in implementing the *Strategic Framework and Vision for the List of Wetlands of International Importance* (Resolution VII.11) and other Resolutions of the Conferences of the Parties.

232. The information provided by Contracting Parties in the RIS, including any supplementary information provided, and held in the Ramsar Sites Database is also made publicly available through the Ramsar Site Information Service Website (<http://ramsar.wetlands.org>).
233. The RIS must be completed in one of the Convention's three working languages, namely English, French, or Spanish. The RIS is available in each of those languages.
234. The information provided in the RIS should be clear and succinct.
235. In the case of a wetland that has been well-studied and well-documented, or which is the subject of special field investigations, far more information may be available than can be accommodated in the RIS. Additional information, such as taxonomic lists of species' status, management plans, copies of published papers or photocopied reports on the site, should be appended to the RIS and are treated as part of the official record of the site. Photographs of the wetland, with permission to make public use of them, are also especially welcome. It is essential that the source providing any such additional information be noted.
236. Where the Ramsar Site being designated is a very large and complex wetland system, or consists of a suite of separate sub-sites, two levels of approach may be advisable: a broad approach for the system as a whole and a more detailed approach for each key locality or sub-site within the system. Thus for a particularly large wetland complex it may be appropriate to complete an overall RIS for the whole site and a series of separate RIS datasheets for each key area or sub-site within the complex.
237. Resolution VI.1 highlights the importance of clearly defining the ecological character of Ramsar Sites as the basis for monitoring these wetlands in order to maintain their ecological character. Key features of the ecological character of the site which should be maintained should include those identified as the justification for designation under each Ramsar Criterion applied to the designation. Further guidance on defining and describing ecological character features is provided in the *New Guidelines for management planning for Ramsar Sites and other wetlands* (Resolution VIII.14).
238. The annex to Resolution VI.1 notes that there is a need to increase the value of the information collected for describing and assessing the ecological character of listed sites, and that emphasis should be given to:
 - establishing a baseline by describing the functions, products and attributes of the site that give it benefits and values of international importance (necessary because the existing Ramsar Criteria do not cover the full range of wetland benefits and values

that should be considered when assessing the possible impact of changes at a site) – fields 14, 16, 18, 19, 20, 21, 22 and 23 of the RIS apply;

- providing information on human-induced factors that have affected or could significantly affect the benefits and values of international importance – section 26 of the RIS applies; and
 - providing information on the natural variability and amplitude of seasonal and/or long-term “natural” changes (e.g., vegetation succession, episodic/catastrophic ecological events such as hurricanes) that have affected or could affect the ecological character of the site – fields 18 and 26 of the RIS apply.
239. The following sections give guidance on completing sections of the RIS. Each is cross-referenced accordingly.

7.2 *Recording administrative and locational details*

7.2.1 Name and address of the RIS compiler

☞ RIS field 1

The full name, institution/agency, postal address, telephone and fax numbers, and e-mail address of

- a) the person(s) who compiled the RIS; and
- b) the Contracting Party’s national administrative authority for the Convention in the Contracting Party.

7.2.2 Key dates

☞ RIS field 2

Please record the period over which the data and information used in RIS was collected, either a) at designation or b) for RIS update. Note that this is not the date of compilation of the form, but rather the period from which research has been undertaken to inform the completion of the RIS.

Additional dates associated with the RIS will be recorded directly in the Ramsar database by the Secretariat.

7.2.3 Country

☞ RIS field 3

The official (short) version of the Contracting Party/country name.

7.2.4 Name of the Ramsar Site

☞ RIS field 4

◆ See also: Appendix C Additional guidelines for the provision of maps

The official name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Ensure that the site name used is the same in this section and on the maps provided (see also Appendix C). **This official name will be used precisely as given**

when the site is added to the Ramsar List. Alternative names, including in local language(s), can be given following the precise name.

Please also note in this field whether:

- a) the wetland system extends into one or more other countries;
- b) whether the site is adjacent to a designated Ramsar Sites in the territory of another Contracting Party;
- c) whether the site is part of a formal transboundary designation with another Contracting Party; and
- d) in the case of formally designated Transboundary Ramsar Sites, whether the official name given differs from the Transboundary Ramsar Site name? In which case the different name should be given.

7.2.5 Designation of new Ramsar Site or update of existing site

 RIS field 5

Indicate here if the RIS is being provided for the designation of a new Ramsar Site or if it is provided as an update for an already designated Ramsar Site. If the RIS is an update for an existing site, please also complete **field 6** of the RIS (see below).

7.2.6 Updating the RIS: recording changes to the site since its designation or earlier update

 RIS field 6

RIS **field 6** relates just to updated RIS. Part a) seeks information on whether there have been any changes to the boundaries of the site since the previous RIS or other site information was supplied. If there are any changes to the designated site boundary and/or site area, please tick the appropriate box or boxes to indicate the type of change being made.

The Convention text makes provision for the designation of new sites and the extension of existing sites, but for the reduction in area (through a boundary restriction) or deletion from the List of sites already designated only under the terms of Article 2.5 concerning “urgent national interest”. The Annex to COP9 Resolution IX.6, *Guidance for addressing Ramsar Sites or parts of sites which no longer meet the Criteria for designation*, established procedures to follow should the deletion or reduction of a site be contemplated under circumstances which are not in the “urgent national interest”. If the boundary and/or the area of the designated site is being contemplated for restriction/reduction, the Contracting Party should follow the procedures established in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, in addition to the provision of an updated RIS. [Text to be added concerning agreed process if Ramsar Site boundaries to be reduced].

Field 6b seeks information as to whether the ecological character of the wetland has changed since the previously submitted RIS. There may be several reasons why the ecological character may have changed including influences within the site, the influence of factors beyond the site’s boundaries (e.g. upstream water abstraction) or changes to the site’s boundaries that lead to redefinition of its character. The options in the RIS allow the recording of these different scenarios as appropriate.

Field 6c asks for a description of any changes in the ecological character of the Ramsar Site, including in the application of the criteria (additions or deletions) since the previous RIS for the site was submitted. If change of ecological character is negative and human-induced, please indicate whether an Article 3.2 report has been submitted to the Secretariat.

7.2.7 Map of the Ramsar Site

 **RIS field 7**

 See also: **Appendix C Additional guidelines for the provision of maps**

At designation, the most up-to-date map of the wetland should be submitted to the Secretariat with the RIS. This is required for the inclusion of the site in the List of Wetlands of International Importance. The map must clearly show the boundary of the designated Ramsar Site.

The map should be provided in digital format using one of the common image formats (TIFF, BMP, JPG, GIF, etc.). Exceptionally a hardcopy map will be accepted if it is not possible to submit a map in electronic format.

For any GIS-derived digital map, the corresponding GIS files should also be provided to the Ramsar Secretariat. GIS files should include the boundaries of the site as geo-referenced polygons, specifying clearly the geographical coordinate system used. **Appendix C** below provides more detailed guidance on the provision of suitable Ramsar Site maps, GIS files and other spatial data.

A list of the maps supplied and any other relevant maps of the Ramsar Site that are available should be included in a note annexed to the RIS.

7.2.8 Geographical co-ordinates

 **RIS field 8**

 See also: **Section 7.2.7 Map of the Ramsar Site**
Section 7.2.10 Area

The geographical coordinates of the *approximate* centre of the site should be given expressed in *degrees and minutes of latitude and longitude* (e.g. in the format: 01°24'S 104°16'E or 010°30'N 084°51'W). If relevant, specify the number of discrete units forming the site. If any disjunct units are situated at least 1.6 km apart (approximately equivalent to one minute of latitude or longitude, at the equator in the case of longitude), the coordinates of the approximate centres of each of these units should be given separately (along with individual names or differentiating labels, e.g. "A, B, C" ..., etc.). Any discrete units so identified in an RIS should also be clearly labelled on the site map(s). A single site occupying less than 1,000 hectares needs only one central set of coordinates. Locational information on larger areas should be supplemented by providing the coordinates of the southwest and northeast corners of the Ramsar Site.

If the site is shaped in such a way that the approximate centre point cannot be easily specified, or if such a point falls outside the site or within a very narrow portion of the site, please explain this with a note, and provide the coordinates for the approximate centre point of the largest part of the site.

7.2.9 General location

 **RIS field 9**

Information about the general location of the wetland should include:

- a) the name of the large administrative region(s) (i.e., state, province, territory, canton, etc.) within which the site lies (e.g., Alberta, Canada; Punjab, Pakistan; Andalucía, Spain); and
- b) the nearest “provincial”, “district” or other significant administrative centre, town, or city.

7.2.10 Area

☞ RIS field 10

💧 See also: Section 7.2.7 Map of the Ramsar Site

The total area of the designated Ramsar Site should be given in hectares. If the areas of discrete site units are known, please also list each of these together with the names (or labels) used to identify and differentiate these units.

7.2.11 Biogeography

☞ RIS field 11

💧 See also: Section 5.3 Biogeographic regionalizations

The *biogeographic region* encompassing the Ramsar Site and the *biogeographic regionalization scheme* applied (with full reference citation) should be provided. Biogeographical specification is essential for the correct application of Criteria 1 and 3 and certain applications of Criterion 2 (see also section 14 - Ramsar Criteria and their justification of Criteria). In this context the guidelines for the application of the Ramsar Criteria (see Appendix E) define “bio(geographic) region” as “a scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc.” Note that for non-island Contracting Parties, in many cases biogeographic regions will be transboundary in nature and will require collaboration between countries to establish the locations of representative, rare or unique examples of different wetland types.

Section 5.3 explains the Convention’s approach to regionalization in more detail. For coastal and near-shore marine areas, the Marine Ecoregions of the World (MEOW) regionalization should be used as agreed by Resolution X.19 recording the relevant Eco-region Province and Realm. See www.nature.org/tncscience/news/meow.html for details and on-line map of MEOW ecoregions.

For terrestrial Ramsar Sites, one or more of the four given alternatives should be used (again recording the smallest scale region as appropriate).

Please give citation of other biogeographical regionalization scheme and other details if none of these four global schemes is appropriate.

7.3 Ecological Character Description

☞ RIS Part 3

Start with available data and information. In developing a description of the ecological character of a wetland, it is important to start with whatever data and information are currently

available, even if information is not comprehensively available for all fields in the description sheet. Starting with compiling what is currently available also helps to identify gaps and priorities for further data and information collection to enhance the description.

Start with qualitative description if quantitative data are not available. Even if detailed quantitative data are not available, begin by compiling qualitative data and information and do not underestimate the value of expert and local knowledge as a source of such information. Often, bringing together those who know the wetland best to share their knowledge can be an important and effective start to compiling the ecological character description.

Simple ‘conceptual models’ can be a powerful tool. Developing simple two- or three-dimensional ‘conceptual models’ accompanied by summary descriptions of key features, processes and functioning can be a powerful tool supporting the ecological character description. Further guidance on approaches to developing such conceptual models will be developed by the Scientific and Technical Review Panel. See Davis & Brock (2008) for one example of this approach for a Ramsar Site.

7.3.1 The key ecological components that determine the ecological character of the site

☞ RIS field 13

💧 See also: worked examples of completed RIS at www.ramsar.org/xxxxxxxxxx

Field 13 provides a central evaluation in the process of ecological character description. This field should record which of the ecological components described in Part 3.1, together with ecological processes (Part 3.2) and ecological services in Part 3.3, are central to determining the ecological character of the Ramsar Site. The ecological character may be determined, for example, by aspects of climate, geology, anthropogenic management, or other features described in the ecological character description.

It will be easier to complete this field *after* Parts 3.1 and 3.3 have been completed. Please see also the worked examples published at www.ramsar.org/xxxxxxxxxx, which give examples of the type and level of information requested.

This section should aim to encapsulate all the information in Part 3 so as to provide a simple description of what features are critical in determining the ecological character of the wetland. For further guidance see Ramsar Handbook 19 *Addressing change in wetland ecological character* (4th ed., 2010).

7.3.2 Climate

☞ RIS field 14

If changing climatic conditions are affecting the site, please indicate the nature of these changes, as they are influencing the wetland, in a short descriptive paragraph.

7.3.3 Geomorphic setting

☞ RIS field 15

In part a), please record the minimum and maximum elevation of the wetland in metres above mean sea level. Elevations can be obtained via the Google Earth mapping programme for those without access to Geographical Information Systems.

In part b), please indicate the location of the Ramsar Site in relation to wider catchments by ticking all of the various options which apply. If none of these categories apply, please describe the situation in the text box.

It is helpful to give the name of the catchment or basin if known – or in the case of coastal or near-coastal sites, the name of the sea or ocean within which the site is placed.

7.3.4 Plant communities

RIS field 17

This field relates to plant communities and their attributes, especially (but not exclusively) in the context of the application of Criterion 2 for which the wetland is particularly important or significant. In the description box, please briefly specify *why* each community listed is considered noteworthy (e.g., if it has particular rarity or is of economic importance). Note specifically whether the community is of significance in the context of Criterion 2.

7.3.5 Plant species

RIS field 18

 See also: Section 6.1 Assessing the site against Ramsar's criteria

RIS field 18 records individual plant species. Field 18a documents those species that support the qualification of the site through either Criteria 2, 3 or 4, whilst field 18b documents other plants that are 'noteworthy' but do not directly support the qualification of the site as of international importance.

For individual plant species, indicate their IUCN Red list status as follows:

Critically Endangered	CR
Endangered	EN
Vulnerable	VU

Please also indicate if the species is listed as either on:

- a) Appendix I of CITES; and/or
- b) considered as vulnerable, endangered or critically endangered under national endangered species legislation, programmes or Red Lists. In this case, please add the relevant citation details of such national legislation, programmes or Red Lists to field 37.

Endemic plant species, if they have not been considered towards the application of Criterion 3 at the site (e.g., if the *number* of endemic species was not considered "significant", following the guidance for that Criterion), can be listed here.

General species (occurrence) lists should not be included here or under other RIS fields, but such lists (properly labeled with site details) should be appended to the RIS when they are available.

Field 18c should be completed to record the presence of any invasive alien plant species as requested by Resolution VII.18. Please indicate whether the impacts of the invasive alien species are such as to actually or potentially threaten the ecological of the Ramsar Site. If this is the case,

please also record this in field 32 (Factors adversely affecting the ecological character of the site) and for an updated RIS, also in field 6c.

See section 5.7.4 for guidance on species nomenclature. The scientific name and vernacular name (if one exists) in English, French or Spanish should be given for all species listed.

7.3.6 Animal communities

☞ RIS field 19

💧 See also: Section 6.1 Assessing the site against Ramsar's Criteria

This field relates to animal communities and their attributes, especially (but not exclusively) in the context of the application of Criteria 2 and/or 5 for which the wetland is particularly important or significant. In the description box, please briefly specify why each community listed is considered noteworthy (e.g., if it has particular rarity or is of economical importance). Note specifically whether the community is of significance in the context of Criteria 2 and/or 5.

7.3.7 Animal species

☞ RIS field 20

RIS field 20 records individual animal species. Field 20a documents those species that support the qualification of the site through either Criteria 2, 3, 4, 6, 7 or 9 whilst field 20b documents other animal species that are 'noteworthy' but do not directly support the qualification of the site as of international importance.

If data are available please give the most recent assessment of the population size of the species within the site, also providing units of assessment (e.g., pairs, individuals, etc.), the date of the assessment, and (for the application of Criteria 6 and 9) the proportion of the relevant biogeographical population.

For individual animal species, indicate their IUCN Red list status as follows:

Critically Endangered	CR
Endangered	EN
Vulnerable	VU

Please also indicate if the species is listed as either on:

- Appendix I of CMS; and/or
- Appendix I of CITES; and/or
- considered as vulnerable, endangered or critically endangered under national endangered species legislation, programmes or Red Lists. In this case, please add the relevant citation details of such national legislation, programmes or Red Lists to field 37.

In fields 20a and 20b, if possible, specify why each species listed is considered noteworthy (e.g., if it is an economically important species, or a "keystone" species, or a species associated with high wetland biodiversity values, e.g., turtles, crocodiles, otters, dolphins) or is zoogeographically significant (e.g. relict populations, unusual range extensions, etc.).

Endemic animal species that have not been considered towards the application of relevant Criteria at the site (e.g., because either the number of endemic species was not considered

“significant” (Criterion 3) or the percentage of endemic fish did not reach the threshold percentage for the application of Criterion 7) should be listed in field 20b.

General species (occurrence) lists should not be included here or under other RIS fields, but such lists (properly labeled with site details) should be appended to the RIS when they are available.

Field 20c should be completed to record the presence of any invasive alien plant species as requested by Resolution VII.18. Please indicate whether the impacts of the invasive alien species are such as to actually or potentially threaten the ecological of the Ramsar Site. If this is the case, please also record this in field 32 (Factors adversely affecting the ecological character of the site), and for an updated RIS, also in field 6c.

See section 5.7.4 for guidance on species nomenclature. The scientific name and vernacular name (if one exists) in English, French or Spanish should be given for all species listed.

7.3.8 Soil

☞ RIS field 21

Please indicate the predominant soil types across the site as *a whole*. Also indicate whether soil types are subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification).

7.3.9 Water regime

☞ RIS field 22

Field 22 is intended to record information about the hydrology of the site, specifically the permanence of water at the site, its source and destination, and the stability of the water regime. Please tick all options that apply under each heading.

Information about other key hydrological features such as evaporation, flooding frequency, seasonality and duration of water flows; magnitude of flow and/or tidal regimes, and links with groundwater can be added in the text box if appropriate.

For RIS updates, please note significant change in any of these hydrological elements.

7.3.10 Sediment regime

☞ RIS field 23

If known, please indicate whether significant erosion, accretion, deposition or transportation of sediments occurs on or through the site.

7.3.11 Water pH

☞ RIS field 24

If known, please note the approximate pH regime averaged across the site as a whole.

7.3.12 Water salinity

☞ RIS field 25

If known, please note the water salinity averaged across the site as a whole.

7.3.13 Dissolved or suspended nutrients in water

☞ RIS field 26

If known, please note the relevant categories of dissolved or suspended nutrients in water, averaged across the site as a whole.

7.3.14 Physical features of the catchment area

☞ RIS field 27

Please describe whether, and if so how, the landscape and ecological characteristics in the wider catchment or area surrounding the Ramsar Site differ from the site itself. Indicate all the categories which apply.

7.3.15 Ecological processes

☞ RIS Part 3.2

Ecological processes are an important component of the definition of ecological character. The main ecological processes – as included in the Convention’s format for describing ecological character (Resolution X.15) – are listed here for the sake of completeness. However, it is **not** envisaged that information on ecological processes would be reported as part of a normal RIS submission.

7.3.16 Ecosystem services

☞ RIS field 28

Wetlands exist within landscapes in which people’s activities are influenced by the wetlands and their delivery of ecosystem services, and in which the wetlands themselves are influenced by the use of such services by dependent local communities (e.g., by forms of traditional management). There are many examples where the ecosystem structure and functioning of the wetland has developed as a result of cultural features or legacies. There are also many examples where the maintenance of the ecosystem structure and functioning of wetlands depends upon the interaction between human activities and the wetland’s biological, chemical, and physical components.

Field 31 of the RIS enables a summary of the main ecosystem services currently provided by the site. These are organized against the Millennium Ecosystem Assessment’s classification (**reference**) of Provisioning, Regulating, Cultural and Supporting Services. If other ecosystem services occur on the site that do not fit against this classification or the examples given, then please describe them.

If possible, indicate the relative importance of services provided by site as follows:

- 0 = not relevant for site
- 1 = present but low importance/extent or significance
- 2 = present, medium importance/extent or significance
- 3 = present, high importance/extent or significance

It would be helpful to record whether or not there have been studies or assessments of the economic valuation of ecosystem provided by the Ramsar Site, whether published or unpublished. [Example to be added]

7.3.17 Social or cultural values

☞ RIS field 29

💧 See also: Section 7.4.5, Factors adversely affecting the site's ecological character

Indicate here whether the site is considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning. If so, provide information about this importance according to the categories adopted by Resolution IX.21. Details about values derived from non-sustainable exploitation or which result in detrimental ecological changes should be described in field 32 (Factors adversely affecting the site's ecological character).

7.4 Conservation and management

7.4.1 Land tenure/ownership

☞ RIS field 30

Field 30 summarizes details of ownership/tenure both of the Ramsar Site and in surrounding areas. Please indicate all the categories which apply at the site or in the surrounding areas.

7.4.2 Management authority

☞ RIS field 31

Provide the name and address of the local office(s) of the agency(ies) or organization(s) directly responsible for managing the wetland. Wherever possible, provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

7.4.3 Factors adversely affecting the site's ecological character

☞ RIS field 32

Field 32 aims to summarize the human and natural factors affecting the ecological character of the site, from both within and around the site (including the greater catchment, if relevant). These may include new or changing activities/uses, major development projects, etc., which have had, are having, or may have a detrimental effect on the natural ecological character of the wetland.

It is important to specify both the agent for the change (e.g., diversion of water, drainage, reclamation, pollution, over-grazing, excessive human disturbance, or excessive hunting and fishing, etc.) and the resulting change and its impact (e.g., siltation, erosion, fish mortality, change in vegetation structure, habitat fragmentation, disturbed reproduction of species, physical or ecological change due to climate change, etc.). It is also important to differentiate between factors coming from within the site itself and those factors emanating from outside the site, but which are having or may have an impact on the site. Please distinguish between potential and existing adverse factors.

When reporting on pollution, special notice should be taken of toxic chemical pollutants and their sources. These should include industrial and agricultural-based chemical effluents and other emissions.

Natural events, including episodic catastrophes (e.g., an earthquake or volcanic eruption) or natural vegetative succession which have had, are having, or are likely to have an impact on the ecological character of the site should be detailed, in order to facilitate monitoring.

The table in the RIS contains some of the most frequently reported threats to Ramsar Sites, but if these are not relevant, then they should be replaced with other factors as appropriate. The categorisation of factors listed on the Convention's website at www.ramsar.org/xxxxxxx should be used if possible.

7.4.4 Conservation measures taken

RIS field 33

In field 33a, please provide details of any other relevant conservation status which either wholly or partly overlaps with the Ramsar Site as follows:

- Global international legal and other formal designations;
- Regional international legal and other formal designations;
- National legal and other formal designations; and
- Non-statutory designations.

If a reserve has been established, give the date of establishment and size of the protected area. In field 33a, list the IUCN (2008) protected areas management category/ies which apply to the site. These are as follows:

Category	Definition
Ia Strict Nature Reserve: protected area managed mainly for science	Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.
Ib Wilderness Area: protected area managed mainly for wilderness protection	Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.
II National Park: protected area managed mainly for ecosystem protection and recreation	Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.
III Natural Monument: protected area managed mainly for conservation of specific natural features	Area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.
IV Habitat/Species Management Area: protected	Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of

area managed mainly for conservation through management intervention	habitats and/or to meet the requirements of specific species.
V Protected Landscape/ Seascape: protected area managed mainly for landscape/seascape conservation and recreation	Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.
VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems	Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

IUCN defines a “protected area” as “A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (Dudley 2008).

7.4.5 Management planning

☞ RIS field 34

- See also: Ramsar Handbook 16, *Managing wetlands: Frameworks for managing Wetlands of International Importance and other wetland sites* (4th ed., 2010)

Where a management plan has been prepared for the site being designated, the information provided in the RIS should be consistent with the plan’s description of ecological character features, the values and functions of the wetland, the factors affecting or likely to affect its character, values and functions, and the management planning process, including monitoring.

Describe the management planning process for the site in field 34 of the RIS, including any plan developed and being implemented, including whether it has been officially approved. Cite the management plan document(s) in field 37, (Bibliographic references), and whenever possible provide a copy of the management plan as supplementary information to the RIS.

When a management plan is prepared as part of the management planning process for the site after it has been designated as a Ramsar Site, the information in the RIS should be checked and, if necessary, a revised RIS should be completed and sent to the Ramsar Secretariat.

7.4.6 Restoration planning

☞ RIS field 34

Field 34 summarizes any activities, if relevant, related to restoration. Where such activity is being undertaken or planned, please indicate whether this affects the whole Ramsar Site or just part of it.

7.4.7 Conservation measures proposed but not yet implemented

☞ RIS field 36

Provide details of any conservation measures that have been proposed, or are in preparation, for the site, including any proposals for legislation, protection and management. Summarize the history of any long-standing proposals which have not yet been implemented, and differentiate between those proposals which have already been officially submitted to the appropriate government authorities and those which have not as yet received formal endorsement, e.g., recommendations in published reports and resolutions from specialist meetings.

7.4.8 Bibliographic references

RIS field 37

A list of key technical references relevant to the wetland, including management plans, major scientific reports, and bibliographies, if such exist. Please list any functional/active website addresses dedicated to the Ramsar Site or which prominently feature the site (e.g., a website detailing all of a country's Ramsar Sites), and include the date that the website was most recently updated. When a large body of published material is available about the site, only the most important references need be cited, with priority being given to recent literature containing extensive bibliographies.

Reprints or copies of the most important literature, including a copy of any management plan, should be appended whenever possible.

8. Site description: updating the Ramsar Site Information Sheet

What does this section do? Gives specific guidance on updating Information Sheets about already designated Ramsar Sites

240. Through Resolution VI.13 (1996), Contracting Parties have undertaken to provide updated Information Sheets for designated Ramsar Sites at least every six years (calculated from the date of designation).
241. In the event of actual or potential change in the ecological character of a Ramsar Site, Article 3.2 of the Convention requires Contracting Parties to inform the Secretariat “without delay”. Such notifications are typically accompanied with an updated RIS, but for other sites, the RIS should be updated at least every six years.
242. The process of RIS update should involve the systematic review of all fields. Whilst there may be few or no changes to many of the descriptive fields, typically new data and information will be available through site monitoring programmes. There may also be improved understanding of ecological processes at the site, possibly through research programmes. Such new information should be used to update the RIS.
243. Some of the RIS fields specifically relate to updated sheets (5b, 6, 22 and 32). These are specifically designed to track changes in ecological character, and factors influencing it, through time.
244. The central element of a RIS update is a re-assessment of the ecological character of the site (field 13). It is recommended that other fields in Parts 3 and 4 of the form be completed before revising field 13. The ecological character of the site may have changed because of:

- improved understanding of ecological processes as a result of new data and information from monitoring or research programmes; and/or
 - changes that are the result of factors external to the site (e.g., climate changes influencing the hydrological regime); and/or
 - changes that are the result of factors operating within the site (e.g., anthropogenic impacts).
245. Further information about addressing change in ecological character is given in Ramsar Handbook 19 (4th ed., 2010).
246. Should current data and information indicate the need to alter the ecological character description, then field 13 should be revised accordingly. Field 6b should also be completed to indicate the location of factors responsible for the changed ecological character. Finally, field 6c should be completed to *describe* the changes.
247. Updating field 2 – on the date of the data and information used – is an important part of the RIS update process. This field records the period over which the data and information used in the RIS was collected. For a new RIS, this date would typically relate to ‘contemporary’ data – usually for a period of five years or so prior to the designation. For an updated RIS, field 2 should record the period during which the new data and information summarized was collected. Thus for example, for a Ramsar Site designated for its international importance for waterbirds, and where there is an active monitoring programme, this would be the most recent five year period of assessment (which would also be the period given in field 20a alongside the assessments of each waterbird species).

9. Understanding Ramsar Site designation processes

[Text to be added outlining Contracting Parties’ roles and responsibilities, assignment of the date of designation, and Secretariat checking and processing responsibilities]

10. References and further sources of information

- Abell, R., Thieme, M.L., Revenga, C., Bryer, M., Kottelat, M., Bogutskaya, N., Coad, B., Mandrak, N., Contreras Balderas, S., Bussing, W., Stiassny, M.L.J., Skelton, P., Allen, G.R., Unmack, P., Naseka, A., Ng, R., Sindorf, N., Robertson, J., Armjio, E., Higgins, J.V., Heibel, T.J., Wikramanayake, E., Olson, D., López, H.L., Reis, R.E., Lundberg, J.G., Sabaj Pérez, M.H. & Petry, P. 2008. Freshwater ecoregions of the world: a new map of biogeographic units for freshwater biodiversity conservation. *Bioscience* 5: 403-414. doi:10.1641/B580507
- Bailey, R.G. 1998. *Ecoregions: the ecosystem geography of the oceans and continents*. Springer-Verlag. New York. 176 pp. (Available at: www.fao.org/geonetwork/srv/en/metadata.show?currTab=simple&id=1038).
- Beck, M.W., Brumbaugh, R.D., Airoidi, L., Carranza, A., Coen, L.D., Crawford, C., Defeo, O., Edgar, G.J., Hancock, B., Kay, M.C., Lenihan, H.S., Luckenbach, M.W., Toropova, C.L. & Zhang, G. & Guo, X. 2011. Oyster reefs at risk and

- recommendations for conservation, restoration, and management. *Bioscience* 61(2):107-116.
- Boere, G.C. & Stroud, D.A. (2006). The flyway concept: what it is and what it isn't. *Waterbirds around the world*. Eds. G.C. Boere, C.A. Galbraith & D.A. Stroud. The Stationery Office, Edinburgh, UK. Pp. 40-49. (Available at: www.jncc.gov.uk/PDF/pub07_waterbirds_part1_flywayconcept.pdf).
- Cerco, C.F. & Noel, M.R. 2007. Can oyster restoration reverse cultural eutrophication in Chesapeake Bay? *Estuaries and Coasts* 30: 331-343.
- Coen, L.D., Brumbaugh, R.D., Bushek, D., Grizzle, R., Luckenbach, M.W., Posey, M.H., Powers, S.P. & Tolley, S.G. 2007. Ecosystem services related to oyster restoration. *Marine Ecology Progress Series* 341: 303-307.
- Dame, R.F. 1996. *Ecology of Marine Bivalves: An Ecosystem Approach*. CRC Press. New York, NY.
- Davis, J. & Brock, M. 2008. Detecting unacceptable change in the ecological character of Ramsar Wetlands. *Ecological Management & Restoration* 9(1): 26-32.
- Delany, S., Scott, D.A., Dodman, T., & Stroud, D.A. (eds.) (2009). *An atlas of wader populations in Africa and western Eurasia*. Wetlands International, Wageningen, The Netherlands. 524 pp.
- Dudley, N. (ed.) 2008. *Guidelines for Applying Protected Area Management Categories*. Gland, Switzerland: IUCN. 86 pp. (Available at: <http://data.iucn.org/dbtw-wpd/edocs/PAPS-016.pdf>)
- Fulford, R.S., Breitburg, D.L., Newell, R.I.E., Kemp, W.M. & M. Luchenbach, M. 2007. Effects of oyster population restoration strategies on phytoplankton biomass in Chesapeake Bay: a flexible modeling approach. *Marine Ecology Progress Series* 336: 43-61.
- Grizzle, R.E., Greene, J.K., Luckenbach, M.W. & Coen, L.D. 2006. A new in situ method for measuring seston uptake by suspension-feeding bivalve molluscs. *Journal of Shellfish Research* 25(2): 643-649.
- Hagemeyer, W. 2006. Site networks for the conservation of waterbirds. *Waterbirds around the world*. Eds. G.C. Boere, C.A. Galbraith & D.A. Stroud. The Stationery Office, Edinburgh, UK. pp. 697-699. (Available at: www.jncc.gov.uk/PDF/pub07_waterbirds_part5.3.9.pdf).
- Jackson, J.B.C. 2008. Ecological extinction and evolution in the brave new ocean. *Proceedings of the National Academy of Sciences* 105: 11458-11465.
- Jones, C.G., Lawton, J.H. & Shachak, M. 1994. Organisms as ecosystem engineers. *Oikos* 69(3): 373-386.

- Kirby, M.X. 2004. Fishing down the coast: historical expansion and collapse of oyster fisheries along continental margins. *Proceedings of the National Academy of Sciences* 101(35):13096-13099.
- Lenihan, H.S. & Peterson, C.H. 1998. How habitat degradation through fishery disturbance enhances impacts of hypoxia on oyster reefs. *Ecological Applications* 8:128-140.
- Lotze, H.K., Lenihan, H.S., Bourque, B.J., Bradbury, R.H., Cooke, R.G., Kay, M.C., Kidwell, S.M., Kirby, M.X., Peterson, C.H. & Jackson, J.B.C. 2006. Depletion, degradation, and recovery potential of estuaries and coastal seas. *Science* 312:1806-1809.
- Mann, R., Harding, J.M. & Southworth, M.J. 2009. Reconstructing pre-colonial oyster demographics in the Chesapeake Bay, USA. *Estuarine Coastal and Shelf Science* 85: 217-222.
- McCormick-Ray, M.G. 1998. Oyster reefs in 1878 seascape pattern – Winslow revisited. *Estuaries* 21: 784-800.
- McCormick-Ray, J. 2005. Historical oyster reef connections to Chesapeake Bay – a framework for consideration. *Estuarine Coastal and Shelf Science* 64: 119-134.
- Meyer, D.L., Townsend, E.C. & Thayer, G.W. 1997. Stabilization and erosion control value of Oyster cultch for intertidal marsh. *Restoration Ecology* 5:93-99.
- Miyabayashi, Y. & Mundkur, T. 1999. *Atlas of Key Sites for Anatidae in the East Asian Flyway*. Wetlands International - Japan, Tokyo, and Wetlands International - Asia Pacific, Kuala Lumpur. 148 pp. (Available at: www.jawgp.org/anet/aaa1999/aaaendx.htm).
- Millennium Ecosystem Assessment (MEA). 2005. *Ecosystems and Human Well-Being: Wetlands and Water Synthesis*. World Resources Institute, Washington, DC.
- Newell, R.I.E. 1988. Ecological changes in Chesapeake Bay: Are they the result of overharvesting the American oyster, *Crassostrea virginica*? In: *Understanding the Estuary: Proceedings of a Conference, 29-31 March 1988*. Chesapeake Research Consortium Publication 129, CBP/TRS 24/88. Baltimore, Maryland.
- Newell, R.I.E. 2004. Ecosystem influences of natural and cultivated populations of suspension-feeding bivalve mollusks: A Review. *Journal of Shellfish Research* 23(1): 51-61.
- Newell, R.I.E., Fisher, T.R., Holyoke, R.R. & Cornwell, J.C. 2005. Influence of eastern oysters on nitrogen and phosphorus regeneration in Chesapeake Bay, USA. Pp. 93-120. In: *The Comparative Roles of Suspension Feeders in Ecosystems*. Dame, R. & Olenin, S. eds. Vol. 47, NATO Science Series IV: Earth and Environmental Sciences. Springer, Netherlands.

- Nixon, S.W. 1995. Coastal marine eutrophication: A definition, social causes and future concerns. *Ophelia* 41: 199-219.
- Olson, D.M, Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V.N., Underwood, E.C., D'Amico, J.A., Itoua, I., Strand, H.E., Morrison, J.C., Loucks, C.J., Allnutt, T.F., Ricketts, T.H., Kura, Y., Lamoreux, J.F., Wettengel, W.W., Hedao, P. & Kassem, K.R. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. *BioScience* 51:933-938. (Available at: www.worldwildlife.org/science/data/terreco.cfm).
- Piazza, B.P., Banks, P.D. & La Peyre, M.K. 2005. The potential for created oyster shell reefs as a sustainable shoreline protection strategy in Louisiana. *Restoration Ecology* 13:499-506.
- Rebelo, L-M., Finlayson, M. & Stroud, D.A. 2009. *Ramsar Site under-representation and the use of biogeographical regionalization schemes to guide the further development of the Ramsar List*. Ramsar Technical Report No. [X]. Ramsar Convention Secretariat, Gland, Switzerland. [in preparation]
- Ramsar Convention Secretariat. 2010. *Strategic Framework and guidelines for the future development of the List of wetlands of International Importance*. Ramsar Handbooks for the Wise Use of Wetlands, 4th ed., vol. 17 (www.ramsar.org/pdf/lib/hbk4-17.pdf).
- Ramsar Convention Secretariat. 2010. *Addressing change in ecological character: Addressing change in the ecological character of Ramsar Sites and other wetlands*. Ramsar Handbooks for the Wise Use of Wetlands, 4th ed., v. 19 (www.ramsar.org/pdf/lib/hbk4-19.pdf).
- Ridgill, S.C. & Fox, A.D. 1990. *Cold weather movements of waterfowl in Western Europe*. Slimbridge, IWRB. (IWRB Special Publication No. 13)
- Rodríguez, J.P., Rodríguez-Clark, K.M., Baillie, J.E.M., Ash, N., Benson, J., Boucher, T., Brown, C., Burgess, N.D., Collen, B., Jennings, M., Keith, D.A., Nicholson, E., Revenga, C., Reyers, B., Rouget, M., Smith, T., Spalding, M., Taber, A., Walpole, M., Zager, I. & Zamin, T. 2010. Establishing IUCN Red List criteria for threatened ecosystems. *Conservation Biology* 25(1): 21-29. DOI: 10.1111/j.1523-1739.2010.01598.x
- Spalding, M.D., Ravilious, C. & Green, E.P. 2001. *World Atlas of Coral Reefs*. UNEP World Conservation Monitoring Centre. University of California Press, Berkeley, USA. (Available at: www.unep-wcmc.org/marine/seagrassatlas/index.htm)
- Spalding, M.D., Fox, H.E., Allen, G.R., Davidson, N., Ferdaña, Z.A., Finlayson, M., Halpern, B.S., Jorge, M.A., Lombana, A., Lourie, S.A., Martin, K.D., McManus, E., Molnar, J., Recchia, C.A., & Roberston, J. 2007. Marine Ecoregions of the World: a bioregionalization of coastal and shelf areas. *BioScience* 57(7): 573-583.
- Stattersfield, A.J., Crosby, M.J., Long, A.J. & Wege, D.C. 1998. *Endemic bird areas of the world. Priorities for biodiversity conservation*. BirdLife Conservation Series No. 7. 846 pp. Cambridge, UK.

Udvardy, M.D.F. 1975. *A classification of the biogeographical provinces of the world*. Occasional Paper no. 18. World Conservation Union, Gland, Switzerland. (Available at: www.fao.org/geonetwork/srv/en/metadata.show?id=1008&currTab=simple).

WWF & IUCN. 1994-1997. *Centres of Plant Diversity. A guide and a strategy for their conservation*. 3 volumes. IUCN Publications Unit, Cambridge, UK.
Volume 1. *Europe, Africa, South-west Asia and the Middle East*. 354 pp. (1994)
Volume 2. *Asia, Australasia and the Pacific*.
Volume 3. *The Americas*. 562 pp. (1997)

Appendix A: Ramsar Information Sheet

[RIS - 2012 revision to be included here. For handling purposes at COP11, it is proposed that the proposed 2012 version of the RIS will be circulated as a separate document]

Appendix B: Ramsar Classification System for Wetland Type

The codes are based upon the Ramsar Classification System for Wetland Type as approved by Recommendation 4.7 and amended by Resolutions VI.5 and VII.11 of the Conference of the Contracting Parties. The categories listed here are intended to provide only a very broad framework to aid rapid identification of the main wetland habitats represented at each site.

To assist in identification of the correct Wetland Types to list in field 16 of the RIS, the table below outlines some of the characteristics of each Wetland Type.

Marine/Coastal Wetlands

- A -- **Permanent shallow marine waters** in most cases less than six metres deep at low tide; includes sea bays and straits.
- B -- **Marine subtidal aquatic beds**; includes kelp beds, sea-grass beds, tropical marine meadows.
- C -- **Coral reefs**.
- D -- **Rocky marine shores**; includes rocky offshore islands, sea cliffs.
- E -- **Sand, shingle or pebble shores**; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.
- F -- **Estuarine waters**; permanent water of estuaries and estuarine systems of deltas.
- G -- **Intertidal mud, sand or salt flats**.
- Ga -- **Bivalve (shell-fish) reefs**.
- H -- **Intertidal marshes**; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.
- I -- **Intertidal forested wetlands**; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.
- J -- **Coastal brackish/saline lagoons**; brackish to saline lagoons with at least one relatively narrow connection to the sea.
- K -- **Coastal freshwater lagoons**; includes freshwater delta lagoons.
- Zk(a) – **Karst and other subterranean hydrological systems**, marine/coastal

Inland Wetlands

- L -- **Permanent inland deltas**.
- M -- **Permanent rivers/streams/creeks**; includes waterfalls.
- N -- **Seasonal/intermittent/irregular rivers/streams/creeks**.
- O -- **Permanent freshwater lakes (over 8 ha)**; includes large oxbow lakes.
- P -- **Seasonal/intermittent freshwater lakes (over 8 ha)**; includes floodplain lakes.
- Q -- **Permanent saline/brackish/alkaline lakes**.
- R -- **Seasonal/intermittent saline/brackish/alkaline lakes and flats**.
- Sp -- **Permanent saline/brackish/alkaline marshes/pools**.
- Ss -- **Seasonal/intermittent saline/brackish/alkaline marshes/pools**.

- Tp -- **Permanent freshwater marshes/pools**; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.
- Ts -- **Seasonal/intermittent freshwater marshes/pools on inorganic soils**; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.
- U -- **Non-forested peatlands**; includes shrub or open bogs, swamps, fens.
- Va -- **Alpine wetlands**; includes alpine meadows, temporary waters from snowmelt.
- Vt -- **Tundra wetlands**; includes tundra pools, temporary waters from snowmelt.
- W -- **Shrub-dominated wetlands**; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.
- Xf -- **Freshwater, tree-dominated wetlands**; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.
- Xp -- **Forested peatlands**; peat swamp forests.
- Y -- **Freshwater springs; oases.**
- Zg -- **Geothermal wetlands**
- Zk(b) – **Karst and other subterranean hydrological systems, inland**

Note: “**floodplain**” is a broad term used to refer to one or more wetland types, which may include examples from the R, Ss, Ts, W, Xf, Xp, or other wetland types. Some examples of floodplain wetlands are seasonally inundated grassland (including natural wet meadows), shrublands, woodlands and forests. Floodplain wetlands are not listed as a specific wetland type herein.

Human-made wetlands

- 1 -- **Aquaculture** (e.g., fish/shrimp) **ponds**
- 2 -- **Ponds**; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).
- 3 -- **Irrigated land**; includes irrigation channels and rice fields.
- 4 -- **Seasonally flooded agricultural land** (including intensively managed or grazed wet meadow or pasture).
- 5 -- **Salt exploitation sites**; salt pans, salines, etc.
- 6 -- **Water storage areas**; reservoirs/barrages/dams/impoundments (generally over 8 ha).
- 7 -- **Excavations**; gravel/brick/clay pits; borrow pits, mining pools.
- 8 -- **Wastewater treatment areas**; sewage farms, settling ponds, oxidation basins, etc.
- 9 -- **Canals and drainage channels, ditches.**
- Zk(c) – **Karst and other subterranean hydrological systems, human-made**

Tabulations of Wetland Type characteristics

Marine / Coastal Wetlands:

Saline water	Permanent	< 6 m deep	A
		Underwater vegetation	B
		Coral reefs	C
	Shores	Rocky	D
		Sand, shingle or pebble	E
Saline or brackish water	Intertidal	Flats (mud, sand or salt)	G
		Bivalve (shell-fish) reefs	Ga
		Marshes	H
		Forested	I
	Lagoons	J	
	Estuarine waters	F	
Saline, brackish or fresh water	Subterranean	Zk(a)	
Fresh water	Lagoons	K	

Inland Wetlands:

Fresh water	Flowing water	Permanent	Rivers, streams, creeks	M
			Deltas	L
			Springs, oases	Y
		Seasonal/intermittent	Rivers, streams, creeks	N
	Lakes and pools		Permanent	> 8 ha
		< 8 ha		Tp
		Seasonal/intermittent	> 8 ha	P
			< 8 ha	Ts
	Marshes on inorganic soils	Permanent/Seasonal/intermittent	Herb-dominated	Tp
			Shrub-dominated	W
			Tree-dominated	Xf
	Marshes on peat soils	Permanent	Herb-dominated	Ts
			Non-forested	U
	Marshes on inorganic or peat soils	Permanent	Forested	Xp
			High altitude (montane)	Va
	Tundra	Vt		
Saline, brackish or alkaline water	Lakes	Permanent	Q	
		Seasonal/intermittent	R	
	Marshes & pools	Permanent	Sp	
		Seasonal/intermittent	Ss	
Fresh, saline, brackish or alkaline water	Geothermal		Zg	
	Subterranean		Zk(b)	

Appendix C: Additional guidelines for the provision of maps and other spatial data for Ramsar Sites

The following guidance has drawn from the experience of Wetlands International and the Ramsar Secretariat, the World Heritage Convention, and the UNEP-World Conservation Monitoring Centre, as well as from the guidance provided in: World Heritage Convention 1999. *Meeting to recommend digital and cartographic guidelines for World Heritage site nominations and state of conservation reports*. In: WHC-99/CONF.209/INF.19. Paris, 15 November 1999. WWW document: www.unesco.org/whc/archive/99-209-inf19.pdf

1. The provision of a suitable map or maps is a requirement under Article 2.1 of the Convention – it is fundamental to the process of designating a Wetland of International Importance (Ramsar Site), and is an essential part of the information supplied in the *Information Sheet on Ramsar Wetlands (RIS)*. Clear mapped information about the site is also vital for its management.
2. This additional guidance recognizes that Contracting Parties have increasing capacity to prepare and supply Ramsar Site maps in digital formats (for example, through the use of electronic Geographical Information System (GIS) software) and to delineate site boundaries through the establishment of precise Global Positioning System (GPS) way-points.
3. Maps provided by a Contracting Party on designation of a Ramsar Site should as high priority attributes:
 - i) clearly show the precise boundary of the Ramsar Site;
 - ii) be prepared to professional cartographic standards: maps not prepared to professional cartographic standards are problematic, since even moderately-opaque hand-drawn site boundaries or cross-hatching (e.g., to indicate zonation) often obscure other important map features. Although coloured annotations may appear distinguishable from the underlying map features on the map original, it is important to remember that most colours cannot be differentiated in any black and white photocopies. Such additional information should be provided on additional outline maps;
 - iii) show the Ramsar Site in its natural or modified environment and should be within the scale ranges specified below, depending upon the size of the site;
 - iv) if the site is adjacent to, or now includes, a previously designated Ramsar Site, the (former or active) boundaries of all of such sites should be shown, making clear the current status of all such previously designated areas;
 - v) include a key or legend that clearly identifies the boundary and each other category of feature shown on the map and relevant to the designation of the site;
 - vi) show the map's scale, an indication of geographical coordinates (latitude and longitude), an indication of compass bearing (north arrow) and, if possible,

information on the map's projection. The map (or a companion map) should also show the position of several other features if feasible; and

- vii) include a title that explicitly cite the official name for the Ramsar Site (as given in RIS field 4).
4. The most suitable map or set of maps for the designation of a Ramsar Site will also clearly show the following, although provision of such information is of lower priority than the attributes listed in paragraph 3 above:
- i) basic topographical information;
 - ii) the boundaries of relevant protected area designations (e.g. National Park, nature reserve, etc.) and administrative boundaries (e.g., province, district, etc.);
 - iii) clearly delineated wetland and non-wetland parts of the site, and depiction of the wetland boundary with respect to the site's boundary, especially where the wetland extends beyond the site being designated. Where available, information on the distribution of the main wetland habitat types and key hydrological features is also useful. Where there is substantial seasonal variation in the extent of the wetland, separate maps showing the wetland extent in the wet and in the dry seasons are helpful;
 - iv) major landmarks (towns, roads, etc.); and
 - v) distribution of land uses in the same catchment.
5. A general location map, showing the location of the Ramsar Site within the territory of the Contracting Party, is also extremely useful.
6. Maps should not be trimmed, so that data managers and Ramsar Secretariat staff can consult any printed marginal notes or coordinate tick marks.
7. Maps should be provided in digital format using one of the common image format (TIFF, BMP, JPG, GIF, etc.). Exceptionally, hardcopy maps can be accepted, if it is not possible to submit an electronic or digital map.

Guidelines for the provision GIS Ramsar Site boundaries

8. In light of the increasing importance of GIS technologies in decision-making processes (e.g., for land use management, development projects, etc), it is essential for the Ramsar Convention to be able to display publicly Ramsar Sites GIS boundaries in addition to the digital map. Hence, for any GIS-derived digital map provided, the corresponding GIS files including at least the GIS boundaries should also be sent to the Ramsar Secretariat.
9. Other information, for example on wetland types and land uses, whether vector- or raster-based, should be submitted on one or more separate layers at the highest resolution possible.

10. GIS boundaries are geo-referenced polygons of the Ramsar Site boundaries. For Ramsar Sites made of several units, the boundaries of each unit should be stored as different records in the same GIS file.
11. The format should be ideally a shapefile (ESRI Corporation) but other formats, if easily convertible to shapefiles, are also acceptable. The formal name of the Ramsar Site (as given in RIS field 4) should be clearly given as an attribute in the attribute table and in the file name. The geographical coordinate system (projection system) is a mandatory part of the file metadata: the GIS file is useless without such information. The source of the GIS data, the resolution, the lineage process (whether from GPS, a digitized hardcopy map, from field surveys, etc.), i.e., the process that has been used to create the data, are other useful metadata to be provided, but not mandatory.

Scale of maps

12. The optimum scale for a map depends on the size of the site depicted. The optimal scales of maps for different sizes of Ramsar Sites are:

Size of site (ha)	Preferred (minimum) scale of map
>1,000,000	1:1,000,000
100,000 to 1,000,000	1:500,000
50,000 to 100,000	1:250,000
25,000 to 50,000	1:100,000
10,000 to 25,000	1:50,000
1,000 to 10,000	1:25,000
< 1,000	1:5,000

13. In summary, the map should be of suitable scale to depict the detail necessary to clearly indicate the features of the site described in the RIS and, particularly, to show a precise boundary.
14. For moderate to large sites, it is often difficult to show sufficient detail on standard A4 (210mm x 297mm) or Letter-format (8.5" x 11") sheets at the desired scale, so generally a sheet larger than this format is more appropriate. However, whenever possible, each map should be no larger than A3 (420mm x 297 mm) as larger formats present difficulties for subsequent copying.
15. When the site is large or complex and/or when it is composed of several sub-sites with discrete boundaries, a finer-scale map of each section or sub-site should be provided, accompanied by a broader scale location map of the whole site which indicates the location of each sector or sub-site relative to the others. All such maps should follow the scale guidance above.

Boundary description (text)

16. When detailed topographical maps are not available, a description of the boundaries of the site should be separately provided to accompany the map(s), indicating topographic and other legally defined national, regional, or international boundaries followed by the site

boundaries, together with the relationship of the Ramsar Site boundary with the boundaries of any other existing protected area designations which cover part or all of the Ramsar Site.

17. If the precise position of the site boundary has been determined using a Global Positioning System (GPS), Contracting Parties are encouraged to include an electronic file listing each GPS latitude/longitude way-point determined and identifying these the site map.
28. Where a revision to the boundary of a designated Ramsar Site is being made in accordance with Resolution VIII.21, *Defining Ramsar Site boundaries more accurately in Ramsar Information Sheets*, under the following circumstances:
 - a) the site boundary has been drawn incorrectly and there has been a genuine error; and/or
 - b) the site boundary does not accurately match the description of the boundary as defined in the RIS; and/or
 - c) technology allows for a higher resolution and more accurate definition of the site boundary than was available at the time of Listing;

any change should be made clear in the revised RIS and/or on the site map, and the reasons for such refinement should be documented in the RIS.

Good examples of maps

21. Examples of good quality maps demonstrating desirable features noted above are available at www.ramsar.org/xxxxxxxxxxxxxx.

Appendix D: Criteria for Identifying Wetlands of International Importance

Adopted by the 7th (1999) and 9th (2005) Meetings of the Conference of the Contracting Parties, superseding earlier Criteria adopted by the 4th and 6th Meetings of the COP (1990 and 1996), to guide implementation of Article 2.1 on designation of Ramsar Sites.

Group A of the Criteria. Sites containing representative, rare or unique wetland types

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Group B of the Criteria. Sites of international importance for conserving biological diversity

Criteria based on species and ecological communities

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Specific criteria based on waterbirds

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

Criterion 6: 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.

Specific criteria based on fish

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

Specific criteria based on other taxa

Criterion 9: 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.

Appendix E: Supplementary guidelines for identifying and designating particular wetland types

[Text to be added on the purpose of this section]

E1. Karst and other subterranean hydrological systems

Geographic distribution and extent

1. The **Values** of karst wetlands are numerous. In accordance with Article 2.2 of the Ramsar Convention, “wetlands should be selected for the List on account of their international significance in terms of biology, botany, zoology, limnology or hydrology”. From this perspective the principal wetland conservation values of karst and other subterranean hydrological systems include:
 - a) uniqueness of karst phenomena/functions and functioning;
 - b) inter-dependency and fragility of karst systems and their hydrological and hydrogeological characteristics;
 - c) uniqueness of these ecosystems and endemism of their species;
 - d) importance for conserving particular taxa of fauna and flora.
2. **Threats** can be generated within or outside of the karst area. In general terms, many “living” karst areas are wetlands, whether surface or subterranean. The subterranean systems are, in many cases, still well-preserved, but due to increasing development pressures they are becoming endangered. The pressures are both direct (visitors to caves, researchers) and indirect, including pollution of all kinds (particularly water pollution; dumping of solid waste, sewage; development of infrastructure, etc.), water abstraction, retention in reservoirs and other uses.

Ecological role and functions

[Text to be added]

Values, importance and provision of ecosystem services

3. In addition to their many natural values, karst systems also have important socio-economic values, which include (but are not limited to) the supply of drinking water, water for grazing animals or agriculture, tourism and recreation. Karst wetland systems may play an especially vital role in ensuring adequate water supplies for human communities in generally dry surface landscapes.
4. Special consideration should be given to the cultural and socio-economic values of karst and other subterranean hydrological systems and to the fact that their “wise use” must be implemented at both national and local levels. A clear distinction is required between designation, management and monitoring of these wetlands.

Position within Ramsar’s classification system

5. The Ramsar definition of wetlands (Article 1.1) should be read/understood to include surface and subterranean wetlands, although the Convention text does not explicitly refer to these systems.

Applying the Ramsar Criteria

6. Information provided for the purposes of Ramsar Site designation and management of subterranean wetlands should be according to:
 - a) what is available (in many cases this may be limited, and subject to future research efforts); and
 - b) what is appropriate for the scale being considered. For example, local and national management authorities should have access to the full range and detail of information available, whilst a summary will normally suffice for international purposes, notably completion of the Information Sheet on Ramsar Wetlands (RIS).
7. Ramsar designation should be considered as part of a mosaic of national and international instruments. In this way, the most representative part(s) of larger karst/subterranean systems might be designated under the Ramsar Convention, with land-use planning controls, etc., applied to achieve “wise use” of the whole system and its catchment area.
8. In applying the Ramsar Criteria for Identifying Wetlands of International Importance, special attention should be given to unique and representative hydrological, hydrogeological, biological and landscape values. In this regard, intermittent karst and thermal springs can be of special interest.

Boundaries and size

9. Site survey and mapping may present special problems and should be done according to practical possibilities. For example, a two-dimensional ground plan of subterranean features, projected against surface features, would suffice as a Ramsar Site map. It is recognized that many Contracting Parties will not have the resources to generate three-dimensional representations of subterranean sites, and the lack of such resources should not be a barrier to designation.
10. Optimal boundaries for karst/subterranean Ramsar Sites would cover whole catchments, but this is unlikely to be realistic in most cases. Site boundaries should, however, cover the areas which have the most significant direct or indirect impacts on the features of interest.
11. The flexible approach of the Convention allows countries to choose the most appropriate boundaries for national or site-specific situations. In particular, designation of either or both single cave and complex systems (for example, with surface and subterranean wetlands) can be envisaged.

Other considerations

12. To avoid confusion in **terminology**, the formulations “karst and other subterranean hydrological systems” and “subterranean wetlands” should be used throughout. Regardless

of genesis, these terms should be used to include all subterranean cavities and voids with water (including ice caves). Such sites would be eligible for inclusion in the Ramsar List whenever the site selection Criteria are fulfilled. These terms should also clearly cover coastal, inland and human-made subterranean sites, following the broad approach of the Ramsar definition of “wetland” and thereby offering a high degree of flexibility for each Contracting Party.

13. The specialised technical terminology used to describe karst and other subterranean phenomena makes a glossary indispensable for non-experts. UNESCO’s *Glossary and Multilingual Equivalents of Karst Terms* (UNESCO, 1972) can be used as a detailed source of reference, but a simplified glossary is proposed for Ramsar purposes and is provided in the Glossary (see Appendix E) under “Karst”.

E2. Peatlands

Geographic distribution and extent

[Text to be added]

Ecological role and functions

14. Peatlands are ecosystems with a peat deposit that may currently support a vegetation that is peat-forming, may not, or may lack vegetation entirely. Peat is dead and partially decomposed plant remains that have accumulated *in situ* under waterlogged conditions. It is understood in this guidance that the term “peatland” is inclusive of active peatland (“mire”). An active peatland (“mire”) is a peatland on which peat is currently forming and accumulating. All active peatlands (“mires”) are peatlands, but peatlands that are no longer accumulating peat would not be considered as active peatlands (“mires”). The presence of peat or vegetation capable of forming peat is the key characteristic of peatlands.

Values, importance and provision of ecosystem services

15. Peatlands contribute to biological diversity, global water issues, global carbon retention relevant to climate change, and wetland functions valuable to human communities.
16. Significant features of peatlands include:
 - a) uniqueness of the peat-forming phenomenon and its ecological and natural resource functions;
 - b) dependence of peatlands on their hydrology and hydrochemistry;
 - c) interdependence between peatlands and their catchments and adjacent watersheds;
 - d) uniqueness of their vegetation;
 - e) provision of habitat for particular taxa of fauna and flora;
 - f) water regulation and buffering functions;
 - g) capacity to regulate local and regional climates;
 - h) capacity to sequester carbon from the atmosphere and store it for long periods of time; and
 - i) ability to serve as geochemical and palaeo archives.

17. In addition to their many natural values, peatlands have important socio-economic values which include, but are not limited to, the absorption and release of drinking water, natural resource provision to local communities and indigenous people, landscape stabilization, flood mitigation, removal of pollutants, tourism, and recreation.
18. Threats to peatlands can arise from both within and outside their area and include:
 - a) direct threats, including drainage and land conversion, excavation, burning, over-grazing, agricultural abandonment, visitor pressure, non-sustainable commercial exploitation; and
 - b) indirect threats, including pollution, excessive water abstraction, reduction in extent and quality of buffer zones, and climate change.
19. Some peatlands that have been modified but remain ecologically valuable are subject to similar threats. Opportunities exist for the restoration of such areas.

Position within Ramsar's classification system

20. Since peatlands are defined by the presence of a peat substrate, whilst the Ramsar Classification System is based on vegetation, peatlands occur in a number of categories in the Ramsar Classification System for Wetland Type:
 - a) They may occur as a *Marine/coastal* wetland under categories I (intertidal forested wetlands) and E (sand, shingle or pebble shores, including dune systems), and perhaps marginal areas of K (coastal freshwater lagoons).
 - b) They may occur as an *Inland wetland*, primarily under U (Non-forested peatlands) and Xp (Forested peatlands).
 - c) Peat soils also may be present in all other *Inland wetland* categories except: M (Permanent rivers/streams/creeks), Tp (Permanent freshwater marshes/pools – inorganic soils), Ts (Seasonal/intermittent freshwater marshes/pools – inorganic soils), W (Shrub-dominated wetlands – inorganic soils), Zg (Geothermal wetlands), and Zk(b) (subterranean karst systems).

Applying the Ramsar Criteria

21. Peatlands considered for designation under Criterion 1 should include pristine active peatlands, mature peatlands and peatlands that may be no longer forming peat, naturally degrading peatlands, human-modified and impacted peatlands, and restored or rehabilitated peatlands.
22. Special attention should be given to the designation of peatlands which have at least some of the following attributes:
 - a) an intact hydrology;
 - b) the presence of a peat-forming vegetation;
 - c) the capacity to act as a reservoir of regional/global biodiversity;

- d) the capacity to act as a carbon store;
 - e) the presence of a carbon sequestration function;
 - f) the ability to maintain a geochemical and/or palaeo archive;
 - g) hydrochemical diversity; and
 - h) macro- and/or micro-morphological features.
23. Special attention should also be given to the designation of peatlands that have high vulnerability, such that minor impacts can lead to major degradation, and to those with potential for restoration after degradation.

Boundaries and size

24. Large areas of peatland are normally of higher importance than small areas for their hydrological, carbon storage and palaeoarchive values and because they incorporate macro-landscapes: these should be afforded high priority for designation. Consideration should also be given to the capacity of the peatland system to influence regional climate.
25. Where appropriate and desirable, peatlands designated as Ramsar Sites should include entire catchments, so as to maintain the hydrological integrity of the peatland system.
26. Designation of both single peatlands and complex systems that incorporate more than one type of peatland system is appropriate.

Further sources of information on peatlands

[Text to be added]

E3. Wet grasslands

Geographic distribution and extent

[Text to be added]

27. Wet grasslands are natural and near-natural ecosystems with a vegetation characterized and dominated by lower growing perennial grasses, sedges, reeds, rushes and/or herbs. They appear under periodically flooded or waterlogged conditions and are maintained through mowing, burning, natural or human-induced grazing, or a combination of these.
28. Wet grasslands include: floodplain grasslands, washlands, polders, water meadows, wet grasslands with (intensive) water level management, lakeside grasslands, vegetation dominated by relatively large, perennial, competitive herbs, and groundwater dependent dune slacks. These grasslands occur on different soils: heavy clay, loam, sand, gravel, peat, etc., and occur in freshwater, brackish and saline water systems.
29. Vegetation types that fall under this definition can appear in mosaic with one another or with other wetland types, such as peatlands, reedbeds, water-dependent shrubs, forests and others.

Ecological role and functions

30. Wet grasslands support specific biodiversity, comprising rare and threatened plant and animal species and communities, including internationally important bird populations, a range of mammals, invertebrates, reptiles and amphibians.

Values, importance and ecosystem services

31. In recent years there has been increasing awareness of the value of wet grasslands in performing hydrological and chemical functions, notably:
- a) flood alleviation - since wet grasslands can retain floodwater;
 - b) groundwater recharge - wet grasslands retain water within a watershed enabling groundwater to be replenished; and
 - c) water quality improvement - riparian wet grasslands retain nutrients, toxic substances and sediment, preventing them from entering watercourses.
32. Economic benefits accrue from these functions. When wet grasslands are destroyed, these functions are lost and have to be replaced at often enormous financial cost. These benefits include:
- a) water supply – wet grasslands can influence both water quantity and quality;
 - b) health of freshwater fisheries – backwaters, ditches and other open water habitats within wet grassland areas are important for river fisheries;
 - c) agriculture – floodplains provide some of the most fertile agricultural land; and
 - d) recreation and sustainable tourism opportunities.
33. From an early stage in human history, floodplains have been subject to modifications. Since the industrial revolution, pressures on rivers and floodplains have increased significantly in many areas. As part of this process, wet grasslands have declined significantly in industrialized areas, but are also exposed to specific threats in other regions. This is being brought about by:
- a) changes in agricultural practices – increased drainage and use of fertilizer, change from hay-making to silage, re-seeding, herbicide use, conversion to arable land, higher stocking densities, neglect or abandonment, use of aquatic herbicides;
 - b) land drainage – modification of natural hydrological regimes, isolation of floodplains from river flows, rapid evacuation of winter floods and early fall of spring water tables, maintenance of low water levels in drainage channels;
 - c) abstraction for drinking water and crop irrigation – leading to lowered river flows and in-channel water levels, lowered water tables, exacerbation of drought-related problems;
 - d) eutrophication – leading to changes in grassland plant communities and increased sward vigour;

- e) threats to coastal wet grasslands from sea-level rise and construction of flood defences;
- f) development and mineral extraction – leading to a decline of routinely flooded area and increased frequency of flooding of the remaining washland; and
- g) site fragmentation – leading to isolation of sites, threatening species restricted to wet grassland and vulnerable to extinction, and to problems with water level control and agricultural management.

Position within Ramsar’s classification system

34. Wet grasslands are covered by the following wetland types of the Ramsar Classification System:
- a) They can occur as a *floodplain component*, under T’s (seasonal/intermittent freshwater marshes on inorganic soils, including seasonally flooded meadows and sedge marshes), and U (non-forested peatlands, including swamps and fens).
 - b) They can occur as a *human-made* wetland type, under 3 (irrigated land, including irrigation channels and rice fields), and 4 (seasonally flooded agricultural land, including intensively managed or grazed wet meadow or pasture). Irrigation channels with natural vegetation cutting through wet meadows fulfil substantial ecological functions; they are therefore considered part of wet grasslands.
 - c) *Wet grassland habitats* can also occur in other wetland types: E (sand, shingle or pebble shores including dune systems and humid dune slacks) and H (intertidal marshes, including salt meadows, raised salt marshes, tidal brackish and freshwater marshes). They can also occur on the edges of other wetland types, such as J (coastal brackish/saline lagoons), N (seasonal/intermittent/irregular rivers/streams/creeks), P (seasonal/intermittent floodplain lakes), R (seasonal/intermittent saline/brackish/alkaline lakes and flats), and Ss (seasonal/intermittent saline/brackish/alkaline marshes).

Applying the Ramsar Criteria

35. A wet grassland should be considered for designation under Criterion 1 particularly if it performs specific hydrological functions.
36. Since wet grasslands are particularly dynamic ecosystems, special attention should be paid to the designation of those systems that, as part of river or coastal floodplains, are maintained by periodic floods or waterlogged conditions, either natural or human-induced, and demonstrate hydrological integrity.
37. Where wet grasslands are associated with agricultural or other management practices, special attention should be paid to the designation of systems whose ecological character is maintained through specific management measures or traditional forms of land and wetland resource uses (typically including induced grazing, mowing, or burning, or a combination of these), and whose continuation is critical to preventing gradual vegetation

succession that may transform wet grasslands to tall reedbeds, peat bogs, or forested wetlands.

38. Many managed wet grasslands support important assemblages of breeding waterbirds and provide habitat for large populations of non-breeding waterbirds, and attention should be given to the designation under Criteria 4, 5 and 6 for these features.

Boundaries and size

[Text to be added]

Further sources of information on wet grasslands

[Text to be added]

E4. Mangroves

Geographic distribution and extent

39. Mangroves swamps are forested intertidal ecosystems that occupy sediment-rich sheltered tropical coastal environments, occurring from about 32° N (Bermuda, UK) to almost 39° S (Victoria, Australia). Around two-thirds to three-quarters of tropical coastlines are mangrove-lined.

Ecological role and functions

40. Mangrove swamps can form extensive and highly productive systems where there is adequate low-gradient topography, shelter, muddy substrates, and saline water with a large tidal amplitude.
41. Mangrove swamps are characterized by salt-tolerant woody plants with morphological, physiological, and reproductive adaptations that enable them to colonize littoral habitats. The term mangrove is used in at least two different ways:
 - a) to refer to the ecosystem composed of these plants, associated flora, fauna and their physico-chemical environment; and
 - b) to describe those plant species (of different families and genera) that have common adaptations which allow them to cope with salty and oxygen-depleted (anaerobic) substrates.
42. Mangroves carry out critical landscape-level functions related to the regulation of fresh water, nutrients, and sediment inputs into marine areas. By trapping and stabilizing fine sediments they control the quality of marine coastal waters. They are also exceptionally important in maintaining coastal food webs and populations of animals that live as adults elsewhere and live within the mangrove at different stages of their life cycle, such as birds, fish, and crustaceans. Mangroves have an important role in pollution control through their absorptive capacity for organic pollutants and nutrients.

43. Mangroves are key ecosystems whose persistence is critical for the maintenance of landscape and seascape functions well beyond the boundaries of individual forests. Mangroves, coral reefs, and seagrass beds are among the best examples of integrated landscape-level ecosystems. When they occur together, they act as a unit, forming a complex mosaic of interrelated and integrated subsystems linked by physical and biological interactions. They play an important role in storm protection and coastal stabilization.
44. Worldwide, mangrove ecosystems support at least 50 species of mammals, over 600 species of birds, and close to 2,000 species of fish and shellfish, which include shrimps, crabs and oysters. Mangroves are also important for migratory birds and endangered species. A wide variety of species from other taxa make this a highly diverse community with a complex food web that is closely interlinked with adjacent ecosystems.
45. Mangroves are indispensable to the vitality and productivity of marine and estuarine finfish as well as shellfish fisheries. Globally, nearly two thirds of all fish harvested in the marine environment ultimately depend on the health of tropical coastal ecosystems, such as mangroves, seagrass beds, salt marshes and coral reefs, for maintenance of their stocks. The health and integrity of mangroves are critical to maintaining coastal zones and their cultural and heritage assets, and in buffering impacts due to climate change effects, including sea-level rise.
46. Mangroves differ from other forested systems in that they receive large inputs of matter and energy from both land and sea, and more organic carbon is produced than is stored and degraded. They display a high degree of structural and functional diversity, placing mangroves among the most complex ecosystems. Because of the diversity of goods and services provided by mangroves, they should not be managed as a simple forest resource.
47. A large proportion of the world's mangrove resource has been degraded by:
 - a) unsustainable exploitation practices, such as over-fishing, bark (tannin) extraction, charcoal and fuel wood production, and exploitation for timber and other products;
 - b) habitat destruction: worldwide, mangroves are threatened by clearing for agriculture, urban, tourism, and industrial development, and particularly to make aquaculture ponds;
 - c) changes in hydrology due to stream diversions for irrigation and dam construction, causing nutrient deprivation and hypersalinization; and
 - d) pollution, including industrial and sewage effluents and chronic or catastrophic oil spills.
48. Mangroves are particularly vulnerable to oil pollution and increased coastal erosion, sea-level rise, and natural events such as hurricanes, frosts, tsunamis, and human-induced climate change.

Values, importance and ecosystem services

48. Mangroves have played an important role in the economies of tropical countries for thousands of years, and constitute an important reservoir and refuge for many plants and animals. In tropical countries, mangrove ecosystems support extremely valuable

subsistence, commercial and recreational fisheries, while also providing numerous other direct and indirect goods and services to society.

Position within Ramsar's classification system

49. Mangroves occur under *Marine/Coastal Wetlands*: I (Intertidal forested wetlands) in the Ramsar Classification System for Wetland Type.

Applying the Ramsar Criteria

50. In applying Ramsar Criterion 1 it should be recognized that mangroves occur in two broad biogeographic groups: an Indo-Pacific (Old World) group and a western African and American (New World) group, each with a characteristic but different species diversity.
51. Particular priority should be given to the designation of mangroves that form part of an intact and naturally functioning ecosystem which includes other wetland types, such as coral reefs, seagrass beds, tidal flats, coastal lagoons, salt flats, and/or estuarine complexes, since these are essential for maintaining the mangrove parts of the ecosystem. Under most circumstances, the mangrove, i.e., forested part of the site, should not be designated without inclusion of the other linked parts of the coastal ecosystem.
52. In determining the appropriate boundaries for site designation, consideration should be given to the following aspects:
 - a) inclusion of critical habitat patches, particular communities, or landforms to focus conservation and management actions;
 - b) provision for conservation actions within the human-dominated portion of the landscape, since a more benign human-dominated landscape can help alleviate negative edge effects;
 - c) provision for the conservation and wise use of large areas with relatively limited human access;
 - d) inclusion of whole landscape units (lagoon-estuarine complexes, salt flats, delta or mudflat/tidal flat systems);
 - e) the maintenance of hydrographical integrity and water quality, including in the context of catchment (river basin) management;
 - f) provision for the effects of sea-level rise and human-induced climate changes that may otherwise lead to loss of habitat and genetic processes; and
 - g) consideration of the possible landward migration of mangroves in response to sea-level rise.
53. In applying Criterion 1 to mangrove swamps, special attention should be given to the listing of areas which are in pristine condition or have biogeographic or scientific importance and protection needs.
54. Mangrove conservation should categorize units on the basis of the most appropriate use such as for protection; restoration; understanding and enjoyment of natural heritage, and conservation with emphasis on sustainable use. The minimum size of a site is that which contains the greatest diversity of habitat types, including habitats for endangered, threatened, rare, or sensitive species or biological assemblages. The "naturalness" should

be considered when selecting candidate sites, i.e., the extent to which an area has been protected from or has not been subjected to human-induced change. The ecological, demographic and genetic processes should also be considered because these maintain the structural and functional integrity and self-sustaining capacity of the designated site.

55. For mangroves, particular attention should be paid to the application of Criteria 7 and 8 since mangrove systems are of critical importance as breeding and nursery areas for fish and shellfish, and Criterion 4 in recognition of the fact that because of their complex ecological, geomorphological and physical structure they can act as refuges, and are important for the persistence of populations of many migratory and non-migratory species. Designation of such areas should take into account that different habitats of coastal complexes of mangroves, seagrass beds, and coral reefs may be essential for different stages of a species' life-cycle.

Boundaries and size

56. Networks of sites have more value than individual small areas of mangroves, since they contribute to the integrity of whole landscapes and seascapes. Designations that encompass whole landscapes and seascapes are valuable tools to safeguard critical coastal processes, and consideration should be given, where possible, to Ramsar Site designations as part of a nested management framework for the coastal zone.
57. When defining the site boundaries, it must be considered that the more complex a system, the larger the site must be in order to be effective for conservation purposes. However, boundary definition becomes more critical the smaller the unit. If in doubt, the site should be made larger rather than smaller.

Further sources of information on mangroves

[Text to be added]

Mangroves: Spalding (WCMC) new (2010) *World Atlas of Mangroves*

E5. Coral reefs

Geographic distribution and extent

58. Coral reefs are massive carbonate structures built by the biological activity of the stony corals (true corals) and the associated complex assemblage of marine organisms that make up the coral reef ecosystem. They are found throughout the world's oceans on mud-free coastlines between latitudes 30°N and 30°S. Their estimated total area is 617,000 km², forming about 15% of the marine shallow shelves.
59. There are three general types of coral reefs: fringing reefs, barrier reefs, and atolls. Fringing reefs are found close against the coast; barrier reefs are separated from land by a lagoon; and atolls are ring-shaped coral reefs that enclose a lagoon and have been formed where an island (often volcanic in origin) has progressively sunk below the sea surface. However, coral reefs that develop on continental coastlines are often complex and contain features that are difficult to categorize.

60. Coral reef ecosystems may also occur as a veneer over non-reef substrata. Although geologically these are not “true” coral reefs, they have the same ecological attributes as other coral reefs, and are used by people in the same ways.

Ecological role and functions

61. In terms of sheer beauty of form, colours, and diversity of life, perhaps no other natural area of the world can compare with coral reefs. Coral reefs have the highest species diversity of all marine ecosystems and represent a significant contribution to global biodiversity. There are 4,000 known species of reef fish, and about 10% of these are restricted to island groups or a few hundred kilometres of shoreline. Despite forming a small fraction of marine systems of the world, nearly two thirds of all fish species harvested in the marine environment depend upon coral reefs and associated ecosystems, such as mangroves and seagrass beds.

Values, importance and provision of ecosystem services

62. Corals also provide a vital source of life-saving medicines, including anticoagulants and anticancer agents such as prostaglandins.
63. Coral reefs have been valuable to people for as long as communities have lived in coastal areas adjacent to warm seas. They have been exploited for food, building materials, medicines, and decorative objects, and continue to provide many of the basic needs of millions of people living in tropical coastal regions.
64. In tropical regions, coastal ecosystems and marine biodiversity contribute significantly to the economies of many countries. Coral reefs support tourism and recreation and subsistence, commercial and recreational fisheries. Some countries, including Barbados, the Maldives, and the Seychelles, rely on reef tourism for much of their foreign income. The Caribbean region alone receives over 100 million visitors per year, most of whom are destined for the beaches and reefs.
65. Coral reefs function as natural, self-repairing, and self-sustaining breakwaters, protecting the often low-lying land behind them from the effects of storms and rising sea levels. The health and integrity of coral reefs are critical to maintaining tropical coastal zones and their cultural and heritage assets.
66. Despite their ecological and economic importance, coral reefs are in serious decline worldwide. They are threatened by numerous human actions that contribute to coral reef degradation, such as sediment, sewage, agriculture run-off and other pollution sources, mining, dredging of coastal areas, and coastal development. A strong correlation has been found between risk of degradation and coastal population density. The severe anthropogenic stresses from growing populations and their activities on the coastal zone are now coupled with die-offs due to coral diseases and epidemics affecting reef species. Over-fishing, blast fishing, fishing with poisons, and souvenir collecting for national and international trade are major agents of reef destruction. Rising carbon dioxide may reduce the rate of calcification and reef formation.

67. A further and increasing impact on coral reefs is the effect of rising sea surface temperatures linked to global climate change. This causes the phenomenon of coral bleaching – expulsion of symbiotic algae, leading often to the death of the corals themselves with consequent loss of the diverse communities dependent upon them. Coral reefs that are already under stress from other human-induced pressures such as pollution and sediment deposition appear to be most vulnerable to bleaching. Predictions of future sea surface temperatures indicate that bleaching will become increasingly widespread and frequent. Recent results suggest that bleaching of corals by increased UV-B radiation may be adding to the effects of temperature.
68. Once corals have died, reefs are more vulnerable to physical break-up during storms, thus threatening their function in protecting coastal lands and their people from impacts of rising sea levels and storms. The massive worldwide coral bleaching in 1997-98 suggests that coral reefs maybe signaling the first ecosystem-scale damage from human-induced global change. Recovery will depend upon reducing human pressures through sound management and upon whether bleaching events will recur with increased severity and frequency, reversing any coral reef regeneration.
69. As a result of these interacting problems, coral reefs have suffered a dramatic decline in recent years. About 11% of the world's reefs sites have been lost, 27% are under immediate threat, and another 31% are likely to decline in the next 10 - 30 years. At greatest risk are the reefs in the wider Indian Ocean; Southeast and East Asia; the Middle East, mainly in the Arabian-Persian Gulf; and the Caribbean-Atlantic region.
70. Coral reefs support multi-species fisheries. Protected areas are now often used as a tool in fisheries management. Some economically important species may spend part of their life cycle outside the boundaries of the designated area, which should be taken into account in management. On the other hand, fisheries management measures support not only sustainable fisheries but also biodiversity and other valuable characteristics of the site. Many reef fish species need regulatory frameworks beyond the Ramsar Convention to complement Ramsar Site designation. These species need protection under complementary conservation frameworks and authorities.
71. In managing coral reefs, conservation needs must be considered along with the needs of local people who may depend on certain reefs for their livelihoods. Some areas are best managed using multiple-use and zoning approaches that can accommodate the needs of different stakeholders. Nested protection frameworks at coastal zone level are required, as opposed to using schemes based on the strict protection of just a few areas. Coastal coral reef areas are best managed within the context of Integrated Coastal Zone Management (ICZM) programmes.

Position within Ramsar's classification system

72. Coral reefs falls under *Marine/ Coastal Wetlands: C* (Coral reefs) in the Ramsar Classification System for Wetland Type.
73. In many places coral reefs form part of an ecosystem that is functionally and intricately linked to other adjacent marine habitats in the Ramsar Classification System, notably A (Permanent shallow marine waters), B (Marine subtidal aquatic beds – especially seagrass

beds), E (Sand, shingle and pebble shores), H (Intertidal marshes), and J (Coastal brackish/saline lagoons).

Applying the Ramsar Criteria

74. Contracting Parties should pay special attention to the listing of coral reef areas that, because of their geographic location (“upstream-reefs”), are sources of pelagic larvae and ensure the seeding of large areas of reefs “downstream”.
75. Reefs that buffer coastlines against storm damage, and so protect coastal populations and infrastructure, should also be considered for designation.
76. Consideration should be given to the listing of sites where there is a threat of degradation, and where listing can lead to comprehensive management actions that enhance maintenance of the ecological character of the coral reef.
77. An important consideration in the identification of coral reef sites for designation is the extent to which an area is unaffected by, and can be protected from, human-induced change that alters the quality of coastal waters, since the ecological character of the reefs will be maintained only if the water quality is preserved and coastal zones are appropriately managed.
78. In addition, consideration should be given also to the listing of sites that:
 - a) support unusual geologic/biologic formations and/or species of fauna and flora of particular aesthetic, historic or scientific interest;
 - b) have a history of documented long-term research and management by local and international institutions; and
 - c) can be used for the establishment of long-term monitoring programmes for the assessment of environmental change.
79. Contracting Parties should pay special attention to the listing of coral reef areas that, because of their geographical location, are sources of larvae for other ‘downstream’ reefs, helping to maintain stable metapopulations of reef organisms over time.
80. The importance of coral reefs for fish species should be recognized through the application of Criteria 7 and 8. In applying Criterion 7 it should be noted that the fish species richness of reefs varies regionally, for example from more than 2,000 species in the Philippines to about 200 - 300 species in the Caribbean. Simple species counts (species inventories) are not sufficient to assess the importance of a particular area, and assessments must take into account the characteristics of the fish fauna in each region. Although endemism in coral reef fish is not common, some islands and shoals may be effectively isolated, with fish populations becoming genetically distinct. Such reef systems should be afforded a priority for listing.

81. Sites that support species of special conservation concern, unique biological assemblages, and flagship or keystone species (such as elkhorn coral forests, sponge and sea fan assemblages), and which are in pristine condition, should be a high priority for designation.

Boundaries and size

82. In determining the boundaries of a coral reef site to be designated, Contracting Parties should take into account Article 2.1 of the Convention. Since the outer parts of many coral reef systems as defined in paragraph 59 and the middle of some lagoon systems extend to below six metres water depth, boundaries of coral reefs sites should include all such parts of the reef. Moreover, since coral reef ecosystems as defined in paragraph 59 extend beyond the boundaries of the reef structure, and activities in adjacent areas can harm them, adjacent waters should, as appropriate, be included in the site designation.
83. The size of a designated coral reef site should be appropriate to the geographic scale of the reef and the management approaches necessary to maintain its ecological character. Wherever possible, the area should be large enough to protect an integral, self-sustaining ecological entity. In the sea, habitats are rarely precisely restricted, and it should be noted that many marine species have large ranges and that ocean currents can carry genetic materials of sedentary species over great distances.
84. Contracting Parties should consider, where appropriate, the listing of composite sites under Criterion 1 that include coral reefs and associated systems, in particular adjacent shallow reef flats, seagrass beds, and mangroves, which normally function as intricately linked ecosystems. The designated coral reef area should contain the greatest diversity of habitat types and successional stages possible, and also include the habitat types and successional stages of the associated systems.
85. Special attention should also be given to the listing of networks of sites rather than to individual reefs. Networks have more value than individual sites, contributing to the preservation of the integrity of whole seascapes.
86. Contracting Parties should consider, where appropriate, the listing of composite sites under Criterion 1 that include coral reefs and associated systems, in particular adjacent shallow reef flats, seagrass beds, and mangroves, which normally function as intricately linked ecosystems. The designated coral reef area should contain the greatest diversity of habitat types and successional stages possible, and also include the habitat types and successional stages of the associated systems.
87. Special attention should also be given to the listing of networks of sites rather than to individual reefs. Networks have more value than individual sites, contributing to the preservation of the integrity of whole seascapes.

Further sources of information on coral reefs

88. WCMC's *World Atlas of Coral Reefs* (Spalding et al. 2001) contains much relevant information.

E5. Temporary pools

Geographic distribution and extent

89. Temporary pools can occur in many different parts of the world, but are particularly well represented in karstic, arid, semi-arid, and mediterranean-type regions.

Ecological role and functions

90. Temporary pools are usually small (< 10 ha in area) and shallow wetlands which are characterized by an alternation of flooded and dry phases, and whose hydrology is largely autonomous. They occupy depressions, often endorheic, which are flooded for a sufficiently long period to allow the development of hydromorphic soils and wetland-dependent aquatic or amphibious vegetation and fauna communities. However, equally importantly, temporary pools dry out for long enough periods to prevent the development of the more widespread plant and animal communities characteristic of more permanent wetlands.
91. The water supply for temporary ponds usually comes from precipitation, from run-off from their often small and discrete catchment, and/or from the groundwater table. Temporary pools can also be important for groundwater recharge in karstic, arid and semi-arid areas.
92. Pools which are in direct physical contact with permanent, surface wetlands such as lake edges, permanent marshes or large rivers are excluded from this definition.
93. Significant and characteristic features of temporary pools include:
- a) the ephemeral nature of their wet phase, normally with shallow waters, which means that they may not appear as obvious wetlands for most of the time;
 - b) their total dependence upon local hydrology, especially with the absence of any link to permanent aquatic habitats;
 - c) the uniqueness of their vegetation with, for example, typical communities of aquatic ferns (*Isoetes* species, *Marsilea* species, *Pilularia* species), normally endangered, and other amphibious plants such as *Ranunculus* species and *Calitriche* species;
 - d) the uniqueness of their invertebrate communities and a particular abundance of endangered faunal groups such as amphibians and branchiopod crustaceans, often due to the absence of fish as predators;
 - e) their particularly good representation in arid, semi-arid and mediterranean-type zones (including occurring as surface features in karst landscapes);
 - f) the human-made nature of many temporary pools in different parts of the world, created either as a result of extractive activities or for water retention and storage for use by local communities; and
 - g) their provision of nesting places for waterbirds.

94. Information on the sustainable management of temporary pools has been adopted by the Convention in Resolution VIII.33 (*Guidance for identifying, sustainably managing, and designating temporary pools as Wetlands of International Importance*).

Values, importance and provision of ecosystem services

95. Temporary ponds are often undervalued as wetlands because of their generally small size and seasonal or ephemeral nature, yet such wetlands can be of critical importance for the maintenance of biodiversity and as sources of water, food and other wetland products for local communities and indigenous peoples and their ways of life, particularly in arid and semi-arid areas and those which are vulnerable to persistent drought.

Position within Ramsar's classification system

96. Since temporary pools are defined by their size and their hydrological functioning, whilst the Ramsar Classification System for Wetland Type is based chiefly on vegetation, temporary pools are covered by a number of categories of wetland types in the Classification System:
- a) they can occur as a *Marine/coastal wetland* under category E (Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks);
 - b) they can occur as an *Inland wetland*, under categories N (Seasonal/ intermittent/ irregular rivers/streams/creeks), P (Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes), Ss (Seasonal/intermittent saline/ brackish/alkaline marshes/pools), Ts (Seasonal/ intermittent freshwater marshes /pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes), W (Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils), and Xf (Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils); and
 - c) they can occur as a *Human-made wetland*, in category 2 (Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha)).

Applying the Ramsar Criteria

97. Ramsar Criteria 1 to 4 of the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* are particularly relevant to the designation of temporary pools as Ramsar Sites. Because of their generally small size, temporary pools seldom regularly support sufficiently large numbers of waterbirds for Criteria 5 and 6 to apply, although their importance for waterbirds in maintaining the biological diversity of the area can be recognized using Criterion 3, and as critical sites for waterbirds during their life cycle, particularly in arid and semi-arid regions, using Criterion 4. Most fish species do not occur in temporary ponds as they cannot generally survive their dry phases, but Criteria 7 and 8 may apply to temporary pools where they support fish species that are capable of survival in mud or in cysts during dry periods.

98. In applying Criterion 1, Contracting Parties should take into account the particular representation of temporary pools in karstic, arid or sub-arid (including Mediterranean-type) zones: this wetland type is particularly representative of these biogeographic regions.
99. In applying Criteria 2 and 4, it should be recognized that the characteristic plant and animal communities of temporary pools are:
 - a) virtually dependent on this wetland type during at least part of, and often for all of, their life cycle; and
 - b) very vulnerable by nature, being totally dependent on the very specific hydrological conditions of the pool: by altering the hydrology to drier or wetter conditions, whole plant and animal communities characteristic of temporary pools can be rapidly lost.
100. A number of species typical of temporary pools, for example aquatic ferns (*Isoetes* spp., *Marsilea* spp., *Pilularia* spp.), are globally or nationally threatened and listed in Protected Species Lists or Red Data Books. National key sites for such species are appropriate for consideration for designation under Criterion 2.

Boundaries and size

101. Contracting Parties should be aware that the importance of temporary pools is not linked to their size, and that important sites in terms of their contribution to global biodiversity can be only a few hectares, or even square meters, in size. See also guidance in paragraph **XX** above.
101. Where possible, temporary pools designated as Ramsar Sites should include their entire (usually small) catchments, so as to maintain their hydrological integrity.
102. Concerning the application of Criterion 4, it should be noted that temporary pools often occur as clusters or complexes of pools, sometimes involving hundreds of pools. In areas where rainfall is very localized, at any one time different pools may be dry or filled. When filled they may provide habitats for waterbird populations which move around the entire area. Such waterbird populations are thus dependent upon the whole cluster of pools rather than individual pools. Therefore, wherever possible, designation of a Ramsar Site should include the whole cluster of temporary pools, noting especially the guidance provided in the Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance concerning designating clusters of small sites and especially those in arid or semi-arid zones and of a non-permanent nature.

E6. Shell-fish reefs

Geographic distribution and extent

103. Oyster reefs and mussel beds (i.e., bivalve reefs) have historically been a dominant ecological feature within estuaries, lagoons, sounds and other coastal embayments throughout the world's subtropical to temperate zones.

Ecological role and functions

104. Bivalve reefs – and oyster reefs in particular – provide many if not all of the ecological services that are commonly associated with other wetland types, and these services are increasingly being invoked as a basis for their restoration and protection (Coen et al. 2007; Beck et al. *in press*). They contribute to nutrient cycling; provide structure that serves as foraging and nursery habitat for other species, including many commercial fisheries; stabilize subtidal and intertidal sediments; and in some instances, provide a structural defence against shoreline erosion. This latter function is of particular value in an era of accelerating sea-level rise. Because of the strong influence they can exert at scales ranging from meters to entire estuarine ecosystems, bivalve aggregations are often referred to as ‘ecosystems engineers’, modifying local environmental conditions in ways that influence their own growth and survival, as well as a myriad other species (Jones et al. 1994).

Values, importance and provision of ecosystem services

105. Using the Millennium Ecosystem Assessment’s classification scheme for ecosystem services (MEA 2005), the most obvious ecosystem services provided by bivalve reefs are the *Provisioning* services. Bivalve reefs have long been harvested for food and mined as a mineral resource (e.g., combustion of shell for lime, as well as processing into fertilizer and feed additive). Globally, these extractive services have been almost the singular management focus for centuries, if not millennia. Unfortunately, there are few if any examples of sustainable management for these provisioning services, resulting in global declines of not only the bivalves but, perhaps more importantly, their broader ecological role as functional habitats (Kirby 2004; Lotze et al. 2006; Grabowski & Peterson 2007; Jackson 2008; Beck et al. *in press*).
106. Bivalve reefs and beds provide a much broader array of ecosystem services that, until very recently, have not been particularly well recognized or – importantly – a management objective or conservation priority. Bivalves remove significant fractions of the suspended material (‘seston’) from waters flowing past their reefs (Grizzle et al. 2006) and in doing so can contribute significantly to sustaining good water quality (Cerrato et al. 1994). The organic material deposited into surrounding sediments as feces or pseudofeces is processed by bacteria, ultimately increasing rates of denitrification (Newell 2004).
107. Denitrification is a critically important *Regulating* ecosystem service in many estuaries where cultural eutrophication (Nixon 1995) has occurred. Nutrient management and, often, nutrient reduction strategies are increasingly common management objectives within estuarine watersheds and restoration, and conservation of oyster reefs has been invoked as a potentially valuable part of overall management strategy of these wetlands (Newell et al. 2005; Fulford et al. 2007; Cerco & Noel 2007).
108. A *Supporting* service is the provision of structured habitat for other organisms such as fish, crabs, sponges and other macroinvertebrates. As with coral reefs in tropical systems, and vegetated wetlands such as salt marshes, mangroves (Appendix E6), kelp forests and sea grasses, many species of fish and crustaceans use oyster reefs and mussel beds as a foraging ground or nursery habitat. Intact reefs can enhance the overall productivity of estuaries (Grabowski & Peterson 2007); conversely, the degradation of bivalve reef structure through destructive fishing practices, dredging or filling activities can cause

cascading ecological impacts and increase the overall impact of hypoxia and anoxia (Newell 1988; Lenihan & Peterson 1999).

109. Shoreline protection is a service that is receiving increasing attention in regions where sea level rise is a concern for both human and ecological communities. Several studies have shown that oyster reefs in the intertidal zone have the potential to help mitigate the impact of sea level rise by stabilizing shorelines and reducing erosion of adjacent salt marsh wetlands (Meyer et al. 1997; Piazza et al. 2007).

Position within Ramsar's classification system

110. At present, oyster reefs and mussel beds fall within the shallow marine and coastal wetlands down to 6 m (although, as with coral reefs, some oyster reefs and mussel beds may also occur at depths greater than 6 m).
111. Bivalve reefs fall under Marine/Coastal Wetlands: **Ga (Bivalve (shell-fish) reefs)** in the Ramsar Classification System for Wetland Type. Bivalve reefs are also functionally linked to adjacent marine habitats in the Ramsar Classification System, notably A (Permanent shallow marine waters), B (Marine subtidal aquatic beds), F (Estuarine waters), G (Intertidal mud, sand or salt flats), and J (Coastal brackish/saline lagoons).

Applying the Ramsar Criteria

112. Contracting Parties should consider, where appropriate, the listing of composite sites under Criterion 1 that include bivalve reefs and associated systems, in particular adjacent mangroves, seagrass beds, and salt marshes which normally function as intricately linked ecosystems. The designated bivalve reef area should contain sufficient reef area to sustain populations of reef-forming bivalves and provide a full array of ecosystem services.
113. Special attention should be given to the listing of networks of sites rather than to individual reefs. Networks have more value than individual sites, contributing to the preservation and integrity of bivalve metapopulations as well as whole estuarine and lagoon ecosystems.
114. Contracting Parties should pay special attention to the listing of bivalve reef areas that, because of their geographical location, are sources of larvae for other 'downstream' reefs, helping to maintain stable bivalve metapopulations over time.
115. Bivalve reefs that buffer coastlines and protect coastal infrastructure against storm damage and anthropogenic waves resulting from commercial and recreational vessels should also be considered for designation.
116. Consideration should be given to the listing of sites where there is a threat of degradation, and where listing can lead to comprehensive management actions that enhance protection of the ecological character and benefits of the bivalve reefs.

Boundaries and size

117. Optimal Ramsar Site boundaries for bivalve reefs would extend beyond the reef structures themselves and include the necessary surrounding areas to ensure ecosystem function and larval dispersion and recruitment. This would likely include reef complexes and identification of local circulation patterns, as well as the underlying geomorphology of the basin. Oyster reefs in some estuaries, for example, can be long sinuous structures many kilometres in length and extending meters off the surrounding substrate. In other estuaries they form extensive 'patch reef' structures in open water away from channels or other bathymetric features. They can also be strongly associated with shorelines, forming fringing reefs that occur from the shallow subtidal zone to the upper intertidal zone.
118. In many locations, their reef structures occur perpendicular to the predominant tidal flow, creating turbulent mixing that brings food and other suspended organic materials into contact with the bivalve reef and enhances their feeding efficiency (McCormick-Ray 1998, 2005). Ultimately, the overall biomass of bivalves in a coastal embayment and, hence, the physical extent of reefs is driven by primary productivity and availability of food resources to support the population in an ecosystem context (Dame 1996; Mann et al. 2009).

Further sources of information on shell-fish reefs

[Text to be added]

E7. Artificial wetlands

Position within Ramsar's classification system

[Text to be added]

Applying the Ramsar Criteria

119. Article 1.1 of the Convention states that "for the purpose of this Convention wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres."
120. Many existing Ramsar Sites are artificial (in whole or in part) inasmuch as they are human-made wetlands which have, in some parts of the world and especially in anthropogenic landscapes, developed international importance for biodiversity in the period following their creation.
121. However, within the legal context of the Convention, the fact that some artificial wetlands may eventually develop importance for biodiversity should never be used as justification for the destruction, substantial modification, or conversion of natural or near-natural wetlands at a location.

Appendix F. Glossary of terms used in the Strategic Framework

[Need to x-check and add the few new definitions from main text]

adverse conditions (Criterion 4) - ecological conditions unusually hostile to the survival of plant or animal species, such as occur during severe weather like prolonged drought, flooding, cold, etc.

appropriate (Criterion 1) - when applied to the term “biogeographic region” as here, this means the regionalization which is determined by the Contracting Party to provide the most scientifically rigorous approach possible at the time.

biogeographical population - several types of ‘populations’ are recognized:

- i) the entire population of a monotypic species;
- ii) the entire population of a recognized subspecies;
- iii) a discrete migratory population of a species or subspecies, i.e., a population which rarely if ever mixes with other populations of the same species or subspecies;
- iv) that ‘population’ of birds from one hemisphere which spend the non-breeding season in a relatively discrete portion of another hemisphere or region. In many cases, these ‘populations’ may mix extensively with other populations on the breeding grounds, or mix with sedentary populations of the same species during the migration seasons and/or on the non-breeding grounds;
- v) a regional group of sedentary, nomadic or dispersive birds with an apparently rather continuous distribution and no major gaps between breeding units sufficient to prohibit interchange of individuals during their normal nomadic wanderings and/or post-breeding dispersal.

Guidance on waterbird biogeographical populations (and, where data is available, suggested 1% thresholds for each population) is provided by Wetlands International, most recently in [Delany & Scott (2002)], with more detail for Anatidae populations in Africa and western Eurasia given in Scott & Rose (1996).

biogeographic region (Criteria 1 & 3) - a scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc. Note that for non-island Contracting Parties, in many cases biogeographic regions will be transboundary in nature and will require collaboration between countries to establish representative, unique, etc., wetland types. In some cases, the term bioregion is used synonymously with biogeographic region. In some circumstances, the nature of biogeographic regionalization may differ between wetland types according to the nature of the parameters determining natural variation.

biological diversity (Criteria 3 & 7) – the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species (genetic diversity), between species (species diversity), of ecosystems (ecosystem diversity), and of ecological processes. (This definition is largely based on the one contained in Article 2 of the Convention on Biological Diversity.)

change in ecological character - for the purposes of implementation of Article 3.2, the human-induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service. (Resolution IX.1 Annex A)

critically endangered (Criterion 2) - as used by the Species Survival Commission of IUCN. A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined [for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1.* (IUCN 2001)] See also 'globally threatened species' below.

critical stage (Criterion 4) - meaning stage of the life cycle of wetland-dependent species. Critical stages being those activities (breeding, migration stopovers etc.) which if interrupted or prevented from occurring may threaten long-term conservation of the species. For some species (Anatidae for example), areas where moulting occurs are vitally important.

ecological character - the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time. [Within this context, ecosystem benefits are defined in accordance with the MA definition of ecosystem services as "the benefits that people receive from ecosystems".] (Resolution IX.1 Annex A)

ecological communities (Criterion 2) - any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationships and relatively independent of other groups. Ecological communities may be of varying sizes, and larger ones may contain smaller ones.

ecotone (Criterion 2) – a narrow and fairly sharply defined transition zone between two or more different communities. Such edge communities are typically rich in species.

endangered (Criterion 2) - as used by the Species Survival Commission of IUCN. A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined [for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1.* (IUCN 2001)]. See also 'globally threatened species' below.

endemic species (Guidelines for Criterion 7) - a species that is unique to one biogeographical region, i.e., it is found nowhere else in the world. A group of fishes may be indigenous to a subcontinent with some species endemic to a part of that subcontinent.

endorheic - a water body which loses water only by evaporation, i.e. no stream or river flows from it.

family (Criterion 7) - an assemblage of genera and species that have a common phylogenetic origin, e.g., pilchards, sardines and herrings in the family *Clupeidae*

fish (Criterion 7) - any finfish, including jawless fishes (hagfishes and lampreys), cartilaginous fishes (sharks, rays, skates and their allies, *Chondrichthyes*) and bony fishes (*Osteichthyes*) as well as certain shellfish or other aquatic invertebrates (see below).

fishes (Criterion 8) - “fishes” is used as the plural of “fish” when more than one species is involved.

Fish orders that typically inhabit wetlands (as defined by the Ramsar Convention) and which are indicative of wetland benefits, values, productivity or biological diversity, include:

- i) **Jawless fishes - *Agnatha***
 - hagfishes (*Myxiniiformes*)
 - lampreys (*Petromyzontiformes*)
- ii) **Cartilaginous fishes - *Chondrichthyes***
 - dogfishes, sharks and allies (*Squaliformes*)
 - skates (*Rajiformes*)
 - stingrays and allies (*Myliobatiformes*)
- iii) **Bony fishes - *Osteichthyes***
 - Australian lungfish (*Ceratodontiformes*)
 - South American and African lungfishes (*Lepidosireniformes*)
 - bichirs (*Polypteriformes*)
 - sturgeons and allies (*Acipenseriformes*)
 - gars (*Lepisosteiformes*)
 - bowfins (*Amiiformes*)
 - bonytongues, elephant fishes and allies (*Osteoglossiformes*)
 - tarpons, bonefishes and allies (*Elopiformes*)
 - eels (*Anguilliformes*)
 - pilchards, sardines and herrings (*Clupeiformes*)
 - milkfishes (*Gonorhynchiformes*)
 - carps, minnows and allies (*Cypriniformes*)
 - characins and allies (*Characiformes*)
 - catfishes and knifefishes (*Siluriformes*)
 - pikes, smelts, salmon and allies (*Salmoniformes*)
 - mullets (*Mugiliformes*)
 - silversides (*Atheriniformes*)
 - halfbeaks (*Beloniformes*)
 - killifishes and allies (*Cyprinodontiformes*)
 - sticklebacks and allies (*Gasterosteiformes*)
 - pipefishes and allies (*Syngnathiformes*)
 - cichlids, perches and allies (*Perciformes*)
 - flatfishes (*Pleuronectiformes*)
- iv) **Several groups of shellfishes:**

- shrimps, lobsters, freshwater crayfishes, prawns and crabs (*Crustacea*)
 - mussels, oysters, pencil baits, razor shells, limpets, winkles, whelks, scallops, cockles, clams,
 - abalone, octopus, squid and cuttlefish (*Mollusca*)
- v) **Certain other aquatic invertebrates:**
- sponges (*Porifera*)
 - hard corals (*Cnidaria*)
 - lugworms and ragworms (*Annelida*)
 - sea urchins and sea cucumbers (*Echinodermata*)
 - sea squirts (*Ascidiacea*)

fish stock (Criterion 8) - the potentially exploitable component of a fish population.

flagship species - species that appeal to the public and have other features that make them suitable for communicating conservation concerns.

flyway (Guideline for Criterion 2) - the concept developed to describe areas of the world used by migratory waterbirds and defined as the migration routes(s) and areas used by waterbird populations in moving between their breeding and wintering grounds. Each individual species and population migrates in a different way and uses a different suite of breeding, migration staging and wintering sites. Hence a single flyway is composed of many overlapping migration systems of individual waterbird populations and species, each of which has different habitat preferences and migration strategies. From knowledge of these various migration systems it is possible to group the migration routes used by waterbirds into broad flyways, each of which is used by many species, often in a similar way, during their annual migrations. Recent research into the migrations of many wader or shorebird species, for example, indicates that the migrations of waders can broadly be grouped into eight flyways: the East Atlantic Flyway, the Mediterranean/Black Sea Flyway, the West Asia/Africa flyway, the Central Asia/Indian sub-continent Flyway, the East Asia/Australasia Flyway, and three flyways in the Americas and the Neotropics.

There are no clear separations between flyways, and their use is not intended to imply major biological significance; rather it is a valuable concept for permitting the biology and conservation of waterbirds, as with other migratory species, to be considered in broad geographical units into which the migrations of species and populations can be more or less readily grouped.

globally threatened species (Criteria 2, 5 & 6) - species or subspecies which are listed by IUCN Species Survival Commission's Specialist Groups or Red Data Books as either Critically Endangered, Endangered or Vulnerable. Note that, especially for invertebrate taxa, IUCN's Red Data listings may be both incomplete and dynamic, reflecting poor knowledge of the global status of many taxa. Interpretation of the terms 'vulnerable', 'endangered' or 'critically endangered' species should thus always be undertaken at a national level in the light of the best available scientific knowledge of the status of the relevant taxa.

hydromorphic soils - waterlogged soils which develop under conditions of poor drainage in marshes, swamps, seepage areas, or flats.

importance (long-term target for Criterion 2) - sites, the protection of which will enhance the local and thus global long-term viability of species or ecological communities.

indicator species - species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem; taxa that are sensitive to environmental conditions and which can therefore be used to assess environmental quality.

indigenous species (Criterion 7) - a species that originates and occurs naturally in a particular country.

introduced (non-native) species - a species that does not originate or occur naturally in a particular country.

karst (section IV.1) - a landscape created on soluble rock with efficient underground drainage. Karst is characterised by caves, dolines, a lack of surface drainage and is mainly, but not exclusively, formed on limestone. The name derives from Kras - the Classical Karst from Slovenia. In this original, temperate, karst the dominant landforms are dolines, but contrasting landscapes are the pinnacle, cone, and tower karsts of the tropics, and the fluviokarst and glaciokarst of colder climates. The term “kras” originally denoted bare, stony ground in the Slovene language.

The following subsection of the Glossary is related to Karst.

Allogenic drainage: karst drainage that is derived from surface run-off that originates on adjacent impermeable, rocks. Also known as allochthonous drainage.

Aquiclude: relatively impermeable rock acting as the boundary to an aquifer.

Aquifer: a water-bearing horizon, sufficiently permeable to transmit groundwater and yield such water to wells and springs.

Aquitard: a bed of rock that retards, but does not totally inhibit, the movement of water into or out of an aquifer.

Artesian flow: flow through a confined aquifer where the entire aquifer is saturated and the flow is under hydrostatic pressure.

Autogenic drainage: karst drainage that is derived entirely by absorption of meteoric water into the karst rock surface. Also known as autochthonous drainage.

Backflooding: flooding due to backup of excess flow behind a constriction in a major conduit.

Bedding plane: a depositional lamination in sedimentary rocks.

Bedding plane cave: cave passages guided by bedding.

Blind valley: a valley that terminates where its stream sinks, or once sank, underground.

Breakdown: Synonym for the collapse of caves, or, in American usage, for the debris produced by collapse.

Calcium carbonate: naturally occurring compound with the chemical formula CaCO_3 , the major component of carbonate rocks including limestone and marble.

Carbonate rock: a rock consisting of one or more carbonate minerals.

Cave: A natural hole in the ground, large enough for human entry. This does not include hydrologically very significant, conduits or fissures. A cave may be a single, short

length of accessible passage, or an extensive and complex network of tunnels as long as the hundreds of kilometers in the Flint Mammoth Cave System. Most caves are formed by dissolution in limestone but sandstone caves, lava caves, glacier caves and tectonic caves also occur. In some countries a cave is regarded as being a horizontal opening, as opposed to a pothole, or jama, which is a vertical opening, or natural vertical shaft.

Cave lake: any underground lake, it may be the entrance to a sump, in vadose caves formed by ponding behind banks of sediment or gour barriers.

Chamber: an enlargement in a cave passage or system. The largest chamber currently known, Sarawak Chamber in Sarawak, is over 700m long, up to 400m wide and 70m high.

Classical Karst: the region called Kras in Slovenia, which gave its name to the karst landscape.

Conduit: dissolutional voids, including enlarged fissures and tubular tunnels; in some usage the term is restricted to voids that are water-filled.

Conduit flow: underground water flow within conduits.

Corrosion: the erosion of rock by chemical activity that leads to dissolution.

Doline: a circular closed depression, saucershaped, conical or in some cases cylindrical. Dolines may form by dissolution, collapse, or a combination of these. They are ubiquitous features of limestone karst, but can form in or above any soluble rock; subsidence dolines are developed in insoluble sediment leached or collapsed into an underlying cavernous limestone. The largest dolines in Slovenia, Smrekova draga for instance, are more than 1 km long and over 100m deep.

Dry valley: valley without a permanent surface stream. It became dry when underground drains formed or were re-opened.

Entrenchment: erosion by a freely flowing stream to form a canyon.

Estavelle: opening that acts as either a sinkhole or a spring, depending upon groundwater level.

Floodwater zone: the zone through which the level of the water table fluctuates, also epiphreatic zone.

Freshwater lens: fresh groundwater found beneath permeable limestone islands or peninsular land masses. It is limited by a water table above and below by a mixing zone between fresh and saline groundwater along the halocline.

Gour: pool formed by calcite deposition. Gours can grow into large dams many metres high and wide. Travertine, gours form in the open air.

Groundwater: a subsurface water that lies below the water table in the saturated or phreatic zone.

Gypsum: mineral or rock composed of the hydrated calcium sulphate, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

Gypsum cave: gypsum is very soluble and vadose and phreatic caves can form in it. Largest caves are in the Podolie region of the Ukraine, where the Optimisticeskaja only has around 180km of passage.

Halocline: the interface between fresh groundwater and saline groundwater.

Hydraulic gradient: the slope of the water table in an aquifer.

Ice cave: a cave in rock filled with permanent ice.

Input point: the start of underground drainage route or aquifer.

Limestone: sedimentary rock containing at least 50% calcium carbonate by weight.

Meteoric water: water that originates from any form of atmospheric precipitation.

Moonmilk: fine-grained mineral deposit of calcite, aragonite, formed largely by bacterial deposition.

- Output point*: a point where water exits from an underground drainage route or aquifer.
- Passage*: any negotiable part of a cave system, horizontal rather than vertical or sub-vertical sections. Cave passages vary in size and shape, the largest known is Deer Cave, which is up to 170m wide and 120m high, in the Mulu karst of Sarawak.
- Percolation water*: water moving slowly through the fissure network of a limestone. Usually percolation water enters the limestone through a soil cover. Percolation water accounts for most of the storage in a limestone aquifer, responds slowly to flooding in comparison to sinkhole water.
- Permeability*: the ability of a rock to transmit water. Permeability may be primary, due to the effects of interlinked porosity or open tectonic fractures, or secondary, due to the dissolutional enlargement of fissures developing conduit permeability.
- Phreas*: the zone of saturated rock below the water table, within which all conduits are water filled.
- Phreatic cave*: cave developed below the water table, where all voids are water filled within the phreas. Phreatic caves may include loops deep below the water table, karstic maturity encourages shallow phreatic development just below the water table.
- Piezometric surface*: the level to which a column of water ascends in an observation well (piezometric tube).
- Pit*: shaft or pothole from the surface or inside a cave, vertical segment of a gallery.
- Pocket valley*: a valley that begins abruptly and has no headwaters, having formed from and below the site of a karst spring.
- Polje*: large flat-floored closed karst depression, with commonly alluviated floor. Streams or springs drain into poljes and outflow is underground through ponors. Commonly the ponors cannot transmit flood flows, so many poljes turn into wet-season lakes. The form of some poljes is related to the geological structure, but others are purely the products of lateral dissolution and planation.
- Ponor*: also a sinkhole or swallowhole.
- Pothole*: a single shaft, or an entire cave system that is dominantly vertical.
- Pseudokarst*: a landscape containing karst-like features but not formed by bedrock dissolution.
- Relict cave*: inactive cave segment, left when the water is diverted elsewhere.
- Salt karst*: karst landforms developed upon halite or halite-rich rock.
- Shaft*: natural vertical, or steeply inclined, section of a cave passage, deepest known shaft is the entrance shaft on the Kanin plateau, Slovenia; it is 643m deep, with no ledges.
- Sink*: a point where a stream or river disappears underground, through a choke, or may flow into an open horizontal cave or vertical shaft. The character of sink water, flowing directly and rapidly into an open cave, distinguishes it from percolation water. Sink water is also referred to as sub-surface runoff.
- Speleology*: Scientific study of caves, including aspects of sciences, such as geomorphology, geology, hydrology, chemistry and biology, and also the many techniques of cave exploration.
- Speleothem*: general term for all cave mineral deposits, embracing all stalactites, flowstone, flowers etc.
- Spring*: point where underground water emerges on to the surface, not exclusive to limestone, but generally larger in cavernous rocks. Among the world's largest is the Dumanli spring, Turkey, with a mean flow of over 50 cubic metres per second.
- Subcutaneous zone*: a zone of generally highly weathered rock that lies below the soil but above the main, relatively unweathered, rock mass of a karst aquifer.
- Sump*: a section of flooded passage, also siphon.

Travertine: calcareous mineral deposited by flowing water, where plants and algae cause the precipitation by extracting carbon dioxide from the water and give travertine its porous structure. Capillary forces, loss of head and aeration also influence travertine deposition.

Troglobite: a creature that lives permanently underground beyond the daylight zone of a cave. Many troglobitic species are adapted in some way to living in a totally dark environment.

Troglophile: an animal that enters beyond the daylight zone of a cave intentionally and habitually and generally spends part of its life in the underground environment.

Trogloxene: a creature that will enter a cave on occasions but does not use the cave either for temporary or permanent habitation.

Vadose cave: a cave that underwent most of its development above the water table within the vadose zone, where drainage is free-flowing under gravity. The gravitational control of vadose flow means that all vadose cave passages drain downslope, they exist in the upper part of a karst aquifer, and they ultimately drain into the phreatic zone or out to the surface.

Vadose zone: the zone of rock above the water table, with free downward drainage, only partially water-filled. Also known as unsaturated zone, and comprises the soil, a subcutaneous or epikarstic zone, and a free-draining percolation zone.

Vauclusian rising: a type of rising or spring where direct drainage from the phreatic flows up a flooded cave passage under pressure to emerge in daylight. Such risings are named after the Fontaine de Vaucluse in southern France with a mean flow of 26 cubic metres per second. It is vertical and 243m deep. Discharge fluctuates seasonally.

Water table: the top surface of a body of groundwater that fills the pore spaces within a rock mass. Above it lies the freely draining vadose zone, and below it lies the permanently saturated phreatic. Individual cave conduits may be above or below the water table, and therefore either vadose or phreatic, and the water table cannot normally be related to them. The water table slope (hydraulic gradient) is low in limestone due to the high permeability, and the level is controlled by outlet springs or local geological features. High flows create steeper hydraulic gradients and hence rises in the water level away from the spring. In France's Grotte de la Luire, the water level in the cave (and therefore the local water table) fluctuates by 450m.

Water tracing: underground drainage links through unexplored caves confirmed by labelling input water and identifying it at points downstream. The common labelling techniques involve the use of fluorescent dyes (uranine, fluorescein, rhodamine, leucophor, pyranine etc.), lycophodium spores, or chemicals such as common salt. The longest successful water trace was in Turkey over a distance of 130km.

keystone species - species whose loss from an ecosystem would cause a greater than average change in other species populations or ecosystem processes; whose continued well-being is vital for the functioning of a whole community, such as the herring in the North Atlantic or krill in Antarctica.

life-history stage (Criterion 7) - a stage in the development of a finfish or shellfish, e.g., egg, embryo, larva, leptocephalus, zoea, zooplankton stage, juvenile, adult, or post-adult.

migration path (Criterion 8) - the route along which fishes, such as salmon and eels, swim when moving to or from a spawning or feeding ground or nursery. Migration paths often cross international boundaries or boundaries between management zones within a country.

natural (Criterion 1) - when used in Criterion 1, natural (or unmodified) areas are those that still retain a complete or almost complete complement of species native to the area, within a more-or-less naturally functioning ecosystem.

near natural (Criterion 1) - when used in Criterion 1 this means those wetlands which continue to function in what is considered an almost natural way. This clarification is provided in the Criteria to allow for the listing of sites which are not pristine, yet retain values making them internationally important.

nursery (Criterion 8) - that part of a wetland used by fishes for providing shelter, oxygen and food for the early developmental stages of their young. In some fishes, e.g., nest-guarding tilapias, the parent/s remain at the nursery to protect the young whereas in others the young are not protected by the parent/s except by virtue of the shelter provided by the habitat in which they are deposited, e.g., non-guarding catfishes. The ability of wetlands to act as nurseries depends on the extent to which their natural cycles of inundation, tidal exchange, water temperature fluctuation and/or nutrient pulses are retained. Welcomme (1979) showed that 92% of the variation in catch from a wetland-recruited fishery could be explained by the recent flood history of the wetland.

plants (Criteria 3 & 4) – meaning vascular plants, bryophytes, algae and fungi (including lichens).

population (Criterion 6) – in this case meaning the relevant biogeographic population.

population (Criterion 7) - in this case meaning a group of fishes comprising members of the same species.

populations (Criterion 3) - in this case meaning the population of a species within the specified biogeographical region.

provides refuge (Criterion 4) - refer also to definition for “critical stage” which is related. Critical stages are defined as being those activities (breeding, non-breeding, migration stopovers, etc.) which if interrupted or prevented from occurring may threaten long-term conservation of the species. Refuges should be interpreted to mean those locations where such critical stages gain some degree of protection during adverse condition such as drought.

regularly (Criteria 5 & 6) - as in supports regularly - a wetland regularly supports a population of a given size if:

- i) the requisite number of birds is known to have occurred in two thirds of the seasons for which adequate data are available, the total number of seasons being not less than three; or
- ii) the mean of the maxima of those seasons in which the site is internationally important, taken over at least five years, amounts to the required level (means based on three or four years may be quoted in provisional assessments only).

In establishing long-term ‘use’ of a site by birds, natural variability in population levels should be considered especially in relation to the ecological needs of the populations present. Thus in some situations (e.g., sites of importance as drought or cold weather refuges or temporary wetlands in semi-arid or arid areas – which may be quite variable in extent between years), the simple arithmetical average number of birds using a site over several years may not adequately reflect the true ecological importance of the site. In these instances, a site may be of crucial importance at certain times (‘ecological bottlenecks’), but hold lesser numbers at other times. In such situations, there is a need for interpretation of data from an appropriate time period in order to ensure that the importance of sites is accurately assessed.

In some instances, however, for species occurring in very remote areas or which are particularly rare, or where there are particular constraints on national capacity to undertake surveys, areas may be considered suitable on the basis of fewer counts. For some countries or sites where there is very little information, single counts can help establish the relative importance of the site for a species.

The International Waterbird Census data collated by Wetlands International is the key reference source.

representative (Criterion 1) - a wetland that is a typical example of a particular wetland type found in a region. Wetland types are defined in Appendix B.

seral stage (Criterion 2) – a phase in the sequential development of a climax community of plant succession.

significant proportion (Criterion 7) - for the fish Criteria - in polar biogeographical regions a “significant proportion” may be 3-8 subspecies, species, families, life-history stages or species interactions; in temperate zones 15-20 subspecies, species, families, etc.; and in tropical areas 40 or more subspecies, species, families, etc., but these figures will vary among regions. A “significant proportion” of species includes all species and is not limited to those of economic interest. Some wetlands with a “significant proportion” of species may be marginal habitats for fish and may only contain a few fish species, even in tropical areas, e.g. the backwaters of mangrove swamps, cave lakes, the highly saline marginal pools of the Dead Sea. The potential of a degraded wetland to support a “significant proportion” of species if it were to be restored also needs to be taken into account. In areas where fish diversity is naturally low, e.g., at high latitudes, in recently glaciated areas or in marginal fish habitats, genetically distinct infraspecific groups of fishes could also be counted.

spawning ground (Criterion 8) - that part of a wetland used by fishes for courting, mating, gamete release, gamete fertilization and/or the release of the fertilized eggs, e.g. herring, shad, flounder, cockles, and many fishes in freshwater wetlands. The spawning ground may be part of a river course, a stream bed, inshore or deep water zone of a lake, floodplain, mangrove, saltmarsh, reed bed, estuary or the shallow edge of the sea. The freshwater outflow from a river may provide suitable spawning conditions on the adjacent marine coast.

species (Criteria 2 & 4) - naturally occurring populations that interbreed, or are capable of interbreeding, in the wild. Under these (and other) Criteria, subspecies are also included.

species interaction (Criterion 7) - exchanges of information or energy between species that are of particular interest or significance, e.g., symbiosis, commensalism, mutual resource defence, communal brooding, cuckoo behaviour, advanced parental care, social hunting, unusual predator-prey relationships, parasitism and hyperparasitism. Species interactions occur in all ecosystems but are particularly developed in species-rich climax communities, such as coral reefs and ancient lakes, where they are an important component of biological diversity.

supports (Criteria 4, 5, 6 & 7) - provides habitat for; areas which can be shown to be important to a species or an assemblage of species for any period of time are said to support that species. Occupation of an area need not be continuous, but may be dependent on natural phenomena such as flooding or (local) drought conditions.

threatened ecological community - an ecological community which is likely to become extinct in nature if the circumstances and factors threatening its extent, survival or evolutionary development continue to operate.

Guidelines for a threatened ecological community are that the community is subject to current and continuing threats likely to lead to extinction as demonstrated by one or more of the following phenomena:

- i) Marked decrease in geographic distribution. A marked decrease in distribution is considered to be a measurable change whereby the distribution of the ecological community has contracted to less than 10% of its former range, or the total area of the ecological community is less than 10% of its former area, or where less than 10% of the area of the ecological community is in patches of a size sufficiently large for them to be likely to persist for more than 25 years. (The figure of 10% is indicative and for some communities, especially those which originally covered a relatively large area, it may be appropriate to use a different figure).
- ii) Marked alteration of community structure. Community structure includes the identity and number of component species that make up an ecological community, the relative and absolute abundance of those species and the number, type and strength of biotic and abiotic processes that operate within the community. A marked alteration of community structure is a measurable change whereby component species abundance, abiotic interactions, or biotic interactions are altered to the extent that rehabilitation of the ecological community is unlikely to occur within 25 years.
- iii) Loss or decline of native species that are believed to play a major role in the community. This guideline refers to species that are important structural components of a community or that are important in the processes that sustain or play a major role in the community, e.g., seagrass, termite nests, kelp, dominant tree species.
- iv) Restricted geographic distribution (determined at national level) such that the community could be lost rapidly by the action of a threatening process.

- v) Community processes being altered to the extent that a marked alteration of community structure will occur. Community processes can be abiotic (e.g., fire, flooding, altered hydrology, salinity, nutrient change) or biotic (e.g., pollinators, seed dispersers, soil disturbance by vertebrates which affect plant germination). This guideline recognizes that ecological processes are important to maintain an ecological community, e.g., fire regimes, flooding, cyclone damage; and that disruption to those processes can lead to the decline of the ecological community.

turnover (Criteria 5 & 6) – the throughput of waterbirds using a wetland during migration periods such that the cumulative total number using the site is greater than the peak count at any one time.

unique (Criterion 1) - the only one of its type within a specified biogeographic region. Wetland types are defined in Appendix B.

vulnerable (Criterion 2) - as used by the Species Survival Commission of IUCN. A taxon is Vulnerable when it is not either Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1.* (IUCN 2001). See also ‘globally threatened species’ above.

waterbirds (Criteria 5 & 6) - The Convention functionally defines waterfowl (a term which, for the purposes of these Criteria and Guidelines, is considered to be synonymous with “waterbirds”) as “birds ecologically dependent on wetlands” (Article 1.2). This definition thus includes any wetland bird species. However, at the broad level of taxonomic order, it includes especially:

- penguins: *Sphenisciformes*.
- divers: *Gaviiformes*;
- grebes: *Podicipediformes*;
- wetland related pelicans, cormorants, darters and allies: *Pelecaniformes*;
- herons, bitterns, storks, ibises and spoonbills: *Ciconiiformes*;
- flamingos: *Phoenicopteriformes*;
- screamers, swans, geese and ducks (wildfowl): *Anseriformes*;
- wetland related raptors: *Accipitriiformes* and *Falconiformes*;
- wetland related cranes, rails and allies: *Gruiformes*;
- Hoatzin: *Opisthocomiformes*;
- wetland related jacanas, waders (or shorebirds), gulls, skimmers and terns: *Charadriiformes*;
- coucals: *Cuculiformes*; and
- wetland related owls: *Strigiformes*;

wetland benefits (Criterion 7) - the services that wetlands provide to people, e.g., flood control, surface water purification, supplies of potable water, fishes, plants, building materials and water for livestock, outdoor recreation and education. See also Resolution VI.1.

wetland types (Criterion 1) - as defined by the Ramsar Convention classification system, see Appendix B.

wetland values (Criterion 7) - the roles that wetlands play in natural ecosystem functioning, e.g. flood attenuation and control, maintenance of underground and surface water supplies, sediment trapping, erosion control, pollution abatement and provision of habitat.

Appendix G. Additional sources of useful Ramsar guidance

[Table to be completed]

Issue	Guidance	Web-link
Cultural values		
Hydrology and hydrological management		
International co-operation	Handbook	
Management planning	Handbook	
	Field guide	
Wetland inventory	<p>Handbook 11: Inventory, assessment, and monitoring. An Integrated Framework for wetland inventory, assessment, and monitoring</p> <p>Handbook 12: Wetland inventory. A Ramsar Framework for wetland inventory</p>	
Change of ecological character		