

Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX.22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

February 14, 2011

3. Country:

Unites States of America

4. Name of the Ramsar site:

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Congaree National Park

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only):

- a) Designation of a new Ramsar site ; or
b) Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

Not applicable.

a) Site boundary and area

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

- i) the boundary has been delineated more accurately ; or
ii) the boundary has been extended ; or
iii) the boundary has been restricted**

and/or

If the site area has changed:

- i) the area has been measured more accurately ; or
ii) the area has been extended ; or
iii) the area has been reduced**

** **Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) a hard copy (required for inclusion of site in the Ramsar List): ;
ii) an electronic format (e.g. a JPEG or ArcView image) ;
iii) a GIS file providing geo-referenced site boundary vectors and attribute tables .

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The boundary of the site corresponds to the legislated boundary of Congaree National Park (the “Park”), as established by Public Law 108-108 (2003), minus 164.43 ha (404.99 acres) of privately owned property located therein (see map).

8. Geographical coordinates (latitude/longitude, in degrees and minutes):

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

The site consists of a single unit on the north bank of the Congaree River in central South Carolina, USA.

- Midpoint coordinates: N 33° 47' 22"; W 80° 45' 34".
- Southwest coordinates: N 33° 48' 45"; W 80° 52' 3".
- Northeast coordinates: N 33° 46' 21"; W 80° 36' 21".

9. General location:

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

The site is located in the Southeastern United States, in Richland County, South Carolina (population: 340,078). Congaree National Park lies approximately 32 km southeast of the city of Columbia, the state capital (Columbia population: 122,819; metropolitan area population: 689,878).

10. Elevation: (in metres: average and/or maximum & minimum)

The wetland (floodplain) elevation of the site ranges from 30 m (100 feet) mean sea level on the western boundary (the maximum elevation) to approximately 24 m (80 feet) mean sea level on the eastern boundary (the minimum elevation).

11. Area: (in hectares)

Total area: 10,539.07 ha (26,020.31 acres). (Of this total, 10,359.01 ha are federally owned and 175.53 ha are owned by The Trust for Public Land (TPL), a non-profit conservation organization. The TPL lands are being held for transfer to the United States Department of the Interior, National Park Service, as funds are appropriated by the U.S. Congress. The TPL lands are included in this nomination with the express permission of TPL.)

The subject area includes wetlands with some adjoining upland.

Note: This Ramsar designation does not apply to 164.43 ha (404.99 acres) of privately owned land within the acquisition boundary of Congaree National Park (see map). Although the National Park Service is authorized to acquire these lands, none of these private lands are intended to be covered by this designation. Should any of these privately-owned lands be acquired in the future, they will be added to the Ramsar site boundary and site area in a subsequent update.

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

Congaree National Park protects a substantial portion of the floodplain of the Congaree River in central South Carolina, USA. The current total of federally owned land within the Park is 10,359.01 ha (25,586.76 acres). The floodplain portion of the Park is characterized by bottomland hardwood flats and ridges interspersed with bald cypress-tupelo swamps, sloughs, guts, oxbow lakes and blackwater tributary streams. Unique and subtle geomorphic features dramatically influence the hydrology and biological communities within the Park. Approximately 4,049 ha (10,000 acres) of the Park's floodplain contains

old-growth bottomland hardwood forest. The remainder of the Park consists of second-growth floodplain forest, low bluffs and adjoining uplands.

13. Ramsar Criteria:

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1 (Site is a representative, rare or unique example of natural wetland type): At one time, old-growth bottomland hardwood forest covered more than 21 million ha (52 million acres) in the Southeastern United States. Today, only a tiny fraction remains. Congaree National Park was established in 1976 to protect the largest remaining example of old-growth bottomland hardwood forest in North America. Studies suggest that a significant portion of the Park's approximately 4,453 ha of old-growth has never been logged or cleared. Moreover, the site's hydrology is relatively unaltered as compared to other floodplains in the South Atlantic Coastal Plain physiographic region due to the comparatively small number of dams located upstream from the Park. This wetland lies in the Middle Atlantic Coastal Forests biogeographic region, which ranks among the top ten biogeographic regions of the U.S. and Canada in diversity of reptiles, birds, and tree species. The Park itself provides optimal habitat for species preferring old-growth forest, especially forest-interior bird species and certain Neotropical migrants. The Park has been recognized as a Globally Important Bird Area by the American Bird Conservancy and has been designated a National Natural Landmark by the U.S. Department of the Interior.

Criterion 2 (Site supports vulnerable, endangered, or critically endangered species, or threatened ecological communities): Old-growth bottomland hardwood forest, the dominant seral stage of the Park's core area, is exceptionally rare in the Middle Atlantic Coastal Forests biogeographic region. Moreover, a tract this large exists nowhere else in North America. A number of species listed by the State of South Carolina as endangered, threatened, or very rare occupy or forage at the site, including the following: Rafinesque Big-eared Bat (*Corynorhinus rafinesquii*), Southeastern Myotis (*Myotis austroriparius*), Bald Eagle (*Haliaeetus leucocephalus*), Wood Stork (*Mycteria americana*), Swallow-tailed Kite (*Elanoides forficatus*), Red-headed Woodpecker (*Melanerpes erythrocephalus*) and Spotted Turtle (*Clemmys guttata*). (The Wood Stork (*Mycteria americana*) is also listed as endangered under the Federal Endangered Species Act.) Of particular note, the site protects what many consider the best potential habitat in North America for the critically endangered Ivory-billed Woodpecker (*Campephilus principalis*) as well as rare cane habitat for the Federally Endangered Bachman's Warbler (*Vermivora bachmani*). Historically, a small population of the Federally Endangered Red-cockaded Woodpeckers (*Picoides borealis*) occurred at the site, however this species' presence has not been confirmed in recent years.

Congaree National Park also supports the largest extant population of Carolina Bogmint (*Macbridea caroliniana*), which is a plant species of special concern in South Carolina, and listed as threatened in North Carolina. The upland bluffs at the site also support a small tract of the rare Longleaf Pine (*Pinus palustris*) forest, which was once ubiquitous across the Southeast. Other state listed plant species of concern that occur at the Park include Narrowleaf Sedge (*Carex amphibola*), Cherokee Sedge (*Carex cherokeensis*), Ravenfoot Sedge (*Carex crux-corvi*), Meadow Sedge (*Carex granularis*), Social Sedge (*Carex socialis*), Fivelobe Cucumber (*Cayaponia quinqueloba*), Wahoo (*Euonymus atropurpureus*), Sarvis Holly (*Ilex amelanchar*), Piedmont Pinweed (*Lechea torreyi*), Canada Moonseed (*Menispermum canadense*), Creel's Azalea (*Rhododendron eastmanii*), Globe Beaksedge (*Rhynchospora globularis*), Carolina wild petunia (*Ruellia caroliniensis*), Virginia Spiderwort (*Tradescantia virginiana*) and Heartleaf Nettle (*Urtica chamaedryoides*). The Federally Endangered Shortnose

Sturgeon (*Acipenser brevirostrum*) is also known to utilize the Congaree River, immediately adjacent to the Park.

Criterion 3 (Site supports populations of plant/animal species important for maintaining the biodiversity of a particular biogeographic region): The site provides essential habitat for a number of plant and animal species preferring scarce old-growth bottomland hardwood forest habitat. Among these are various Neotropical migratory birds, including some whose numbers have been declining in recent years, such as the Northern Parula (*Parula americana*), Swainson's Warbler (*Lymnolobus swainsonii*), Worm-eating Warbler (*Helmitheros vermivorus*), and Prothonotary Warbler (*Protonotaria citrea*). Unlike many second-growth forests, the site's old-growth forest has large amounts of dead, dying, and downed wood, allowing it to support all of the confirmed woodpecker species in the Middle Atlantic Coastal Forests biogeographic region. Cavities created by woodpeckers in turn provide habitat for numerous species of cavity-nesting birds and mammals.

Criterion 4 (Site supports plant/animal species at a critical stage in their life cycles): More than half the breeding species of birds at the site are Neotropical migrants. The site also provides important stop-over habitat for Neotropical migrants that breed farther north. During the winter months, the site is an important over-wintering area for large numbers of temperate migrants and year-round residents. One winter bird census documented over 2,000 birds per 101 ha (250 acres), one of the highest wintering bird densities reported in the United States. Because of the important role it plays in bird conservation, the site has been recognized as a Globally Important Bird Area by the American Bird Conservancy and an Important Bird Area by Birdlife International and the National Audubon Society. A total of 197 bird species have been observed at the site.

Criterion 8 (Site is an important source of food for fishes, or is a spawning ground, nursery and/or migration path on which fish stocks depend): The site supports 56 species of fish, or almost 40% of the freshwater fish species known to exist in South Carolina. These species spend much or all of their lives in the site's creeks, sloughs, and flooded flats where they find foraging, spawning, and nursery habitat. Floodplain processes play a major role in the life cycles of some of these species. For example, a recent study notes that redbfin pickerel increase dramatically after floods, suggesting that they are dependent on floodplain inundation (Rose and Bulak 2007). Other species not usually found in the Park likely move into the floodplain during floods to feed and spawn. Blue catfish (*Ictalurus furcatus*) have been observed opportunistically moving into the floodplain to feed during flood events, and it is possible that the migratory blueback herring (*Alosa aestivalis*) travels into the floodplain to locate spawning sites, but this has not been documented (pers. com. J. Bulak).

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Nearctic / Temperate Broadleaf and Mixed Forests / Middle Atlantic Coastal Forests (NA0517)

b) biogeographic regionalisation scheme (include reference citation):

World Wildlife Fund Scheme. See:

http://www.worldwildlife.org/wildworld/profiles/terrestrial/na/na0517_full.html

Originally published in:

Weakley, A., E. Dinerstein, R. Noss, B. Eichbaum, and K. Wolfe. 1999. Middle Atlantic Coastal Forests (NA0517). In Ricketts, T.H., E. Dinerstein, D.M. Olson, C.J. Loucks, et al. 1999. *Terrestrial Ecoregions of North America: A Conservation Assessment*. World Wildlife Fund – United States and Canada. Island Press, Washington, D.C. pp. 263-267.

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The site lies near the edge of the South Atlantic Coastal Plain, a large area consisting of unconsolidated sand and clay formations. During the geologic past, much of this area was affected by three separate invasions of the sea, resulting in three terraces and formations – the Brandywine, the Coharie, and the Sunderland. In the Congaree and Wateree river valleys, the marine sediments of these terraces and formations are covered by river alluvium (sediment) largely derived from soil materials washed from the higher Piedmont province. Floodplain soils at the site are predominantly in the Congaree, Tawcaw, Chastain, Chewacla, and Dorovan series. The Congaree, Tawcaw, Chastain, and Chewacla soils are acidic, with significant clay content. The Dorovan series is organic and strongly acidic.

The site protects a significant portion of the Congaree River floodplain, together with adjoining low bluffs and an upland buffer zone. The park also protects a small portion of the Wateree River floodplain. The floodplain in the Park extends approximately 24 km (15 miles) west to east and averages 5 km (3 miles) in width (north to south). The Park is bordered by the Congaree River on the south and the Wateree River on the east.

The Congaree River begins in Columbia, South Carolina near the “fall line”—an erosion front between the crystalline rocks of the piedmont and the softer sedimentary formations of the South Atlantic Coastal Plain. From its origin at the confluence of the Broad and Saluda Rivers, the Congaree meanders southeasterly for approximately 80 river km (50 river miles), where it converges with the Wateree River to form the Santee River. The Congaree River forms the southern boundary of the site for just over 45 river km (28 river miles).

The Congaree is a free-flowing river throughout its length with an average decrease in elevation of approximately 9 cm per km (6 inches per mile). During dry weather, upland streams fed by seepage from shallow and deep aquifers supply water to the floodplain, and the potentiometric gradient in the floodplain slopes toward the Congaree River. Cedar Creek and Toms Creek are the principal perennial streams in the Park. Each receives dry weather flows from the adjoining uplands as well as seepage from ground water. Cedar Creek enters the northwestern corner of the Park and meanders southeasterly through several channels before joining Toms Creek and discharging to the river. Flows from these perennial streams meet critical needs of biota by providing both surface water habitat and migration pathways for aquatic organisms.

The majority of the Park is inundated an average of ten times per year by overbank flooding. As the river rises, water flows backward through breaches in the natural levee and covers the floodplain via a complex network of interconnected waterways, creeks and guts. Under typical flood conditions, the natural levees and other elevated points in the floodplain escape inundation. However, about once per year, on average, 90% of the Park is inundated by a major flood. Floods are most common in late winter and early spring.

Typical volumetric measures of water storage (inflows, outflows, etc.) are of limited utility for understanding floodplain ecosystems. Instead, water depth and duration of flooding are the critical factors affecting ecosystem functioning. For the Congaree River at Columbia, South Carolina, mean annual discharge varies from about 6,000 cubic feet per second (cfs) to approximately 15,000 cfs. At 11,800 cfs, surface water begins to enter floodplain channels at the Park through ground water discharge. Breaks in the natural river levee allow river overflow into the lower elevations of the floodplain at 19,900 cfs. Most of the floodplain is underwater when flows reach 34,000 cfs. Inundation of the floodplain in the western part of the site rarely lasts more than a few days, but the central and eastern parts of the site can stay inundated much longer. It is during major floods that major geomorphic impacts are felt in the floodplain, such as sediment conveyance and deposition, and the erosion of cut banks.

The climate of Richland County is humid subtropical. The area experiences four distinct seasons, but has a long, 8-month growing season. Summers are long and very hot; winters are brief and mild. The average summer temperature is 27° C (80.5° F). Long-term average rainfall is 114.3 cm (45 inches) per year. Rainfall is well distributed, with July being the wettest month and November the driest. Despite generally abundant rainfall, the area does experience sustained droughts from time to time, the most recent lasting from 1998 to 2002. Between 1851 and 2001, Richland County experienced a total of 16 tropical storms and hurricanes. Wind disturbance plays an important role in the ecosystem processes of Congaree National Park.

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

The site is located on the Congaree and Wateree rivers, which together form the major part of the Santee River drainage basin. The watershed of the Congaree River extends into the North Carolina foothills and northwestern section of South Carolina, covering an area of 2,121,790 ha (5,238,988 acres). The site itself lies at the edge of the South Atlantic Coastal Plain. The local climate is humid subtropical.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The principal hydrological value of the site is for flood control, nutrient and sediment retention, and maintenance of water quality. During major floods, approximately 38% of the water flow occurs outside of the channel of the Congaree River and within the floodplain. The water quality in Cedar Creek, Toms Creek, and other waterways in the Park is of such high quality that the State of South Carolina has designated them Outstanding Resource Waters under the federal Clean Water Act. In addition, a substantial portion of Cedar Creek within the Park has been designated an Outstanding National Resource Water (ONRW), the only such designation in the state. These designations recognize the very high water quality of the site and commit the state to protecting that water quality from future degradation.

19. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar “Classification System for Wetland Type” present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • Q • P • Q • R • Sp • Ss • Tp Ts • U • Va • Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

The following percentages are rough approximations:

- Type Xf (freshwater swamp forest): 66%
- Ts (seasonal/intermittent sloughs): 25%
- Xp (forested peatlands): 5%
- M (permanent creeks): <1%
- N (seasonal/intermittent creeks): <1%
- O (permanent freshwater lakes): <1%

W (shrub-dominated wetlands): <1%

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

Wetlands at the site are predominantly classified as palustrine forested under the U.S. Fish and Wildlife Service's National Wetlands Inventory classification system. These forested wetlands are interspersed with a smaller amount of palustrine scrub/shrub, lacustrine and riverine wetland.

The location of the site's various wetland plant associations is dictated in large part by the topographic gradients of the floodplain, as well as elevation changes wrought by the gradual sedimentation of old river channels. Despite having an elevation change of only 6 m (20 feet) in almost 24 km (15 miles) from west to east, the floodplain at the site has a surprisingly varied and complex pattern of microsites, including flats, ridges, levees, deep-water sloughs, oxbow lakes, and intermittent and permanent streams. The characteristic vegetation of individual microsites is determined by the duration of saturated soil conditions in the growing season. Because of the minimal relief in the floodplain, even slight elevation changes affect the duration and frequency of flooding and therefore the variety of plant communities.

Twenty-two unique plant associations have been classified in the floodplain portion of the site, with an additional five associations located on the adjoining low bluffs and uplands (The Nature Conservancy 1998). The site's principal wetland vegetative communities are characteristic of floodplain communities throughout the South Atlantic Coastal Plain. Permanent water or saturated soils are dominated by the Bald-cypress (*Taxodium distichum*) - Water Tupelo (*Nyssa aquatica*) / Water Ash (*Fraxinus caroliniana*) Forest association, while the Overcup Oak (*Quercus lyrata*) - Diamondleaf Oak (*Quercus laurifolia*) / (Giant Cane (*Arundinaria gigantea*)) Forest association is a characteristic vegetation type of low lying poorly drained flats and shallow sloughs. The majority of the floodplain comprises flats and low ridges dominated by the Sugarberry (*Celtis laevigata*) - Sweetgum (*Liquidambar styraciflua*) - Diamondleaf Oak (*Quercus laurifolia*) / American Hornbeam (*Carpinus caroliniana*) / Giant Cane (*Arundinaria gigantea*) / Hop Sedge (*Carex lupulina*) Forest. The highest bottomland ridges contain the Sweetgum (*Liquidambar styraciflua*) - Water Oak (*Quercus nigra*) - Diamondleaf Oak (*Quercus laurifolia*) / Giant Cane (*Arundinaria gigantea*) / Concealed Sedge (*Carex abscondita*) Forest association.

Minerals and organic matter imported onto the floodplain during periodic high water give rise to a highly productive environment. Primary producers readily take up imported nutrients to manufacture biomass, which in turn serves as a source of food and shelter for other biota of the floodplain ecosystem. The diversity and abundance of biota within the site stem in large part from the geological, hydrological and biological dynamics of the floodplain environment.

The site's floodplain and upland forests comprise one of the most floristically diverse areas in the Middle Atlantic Coastal Forests biogeographic region. The heterogeneous floodplain and excellent growing conditions have facilitated the establishment of over 750 species of plants at the site, including 81 species of native trees. Wildlife populations are also quite diverse. At least 197 bird, 34 mammal, 45 reptile, 33 amphibian, and 56 fish species occur at the site, many of which depend on the highly productive, specialized habitat provided by the site's wetlands. These wetlands are especially well-noted as habitat for migratory passerines, and restrictive wetland species such as the wood duck (*Aix sponsa*) and river otter (*Lontra canadensis*).

The fertility of the floodplain, a general lack of fires and insect infestations, and absence of disturbance by man have resulted in a forest where a number of tree species grow very large. The largest trees at the site have periodically been designated as champion trees under the Big Tree Program of the American Forestry Association. Before Hurricane Hugo struck in September 1989, a total of 14 state and 7 national champion trees were recognized at the site. Hugo's intense winds destroyed many of these champion

trees and caused widespread, but variable, damage throughout the site. Despite this damage, the site still contains numerous champion trees and potential future champions. Currently, 6 species qualify as national record trees and an additional 14 species qualify as state record trees. A big tree study completed in 1996 suggests that Congaree National Park protects one of the taller temperate deciduous forests in the world. Intense competition for light has produced a canopy that ranges from 34m to 52m (110 to 170 feet) in height.

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

No plants defined as endangered or threatened under the federal Endangered Species Act of 1973 are known to occur within the Park. However, ten species of Federal or state concern are found in the Park, including: winter grapefern (*Botrychium lunarioides*), Cherokee sedge (*Carex cherokeensis*), crow's foot sedge (*Carex crus-corvi*), social sedge (*Carex socialis*), swamp cucumber (*Cayaponia boykinii*), Walter's horsebalm (*Collinsonia serotina*), toothed woodfern (*Dryopteris carthusiana*), serviceberry holly (*Ilex amalenchier*), Carolina bogmint (*Macbridea caroliniana*), and weak nettle (*Urtica chamaedryoides*) (Gaddy et al. 2000). Carolina bogmint, a species of State concern, has its largest known population at the site.

Moreover, based on site requirements and/or regional distribution, it is possible that additional species of concern occur in the Park, including the Canada moonseed (*Menispermum canadense*), awned meadowberry (*Rhexia aristosa*), and stalkless yellowcress (*Rorippa sessiliflora*) (Gaddy et al. 2000). The site is important to the preservation of rare plant species because it serves as suitable habitat for plants of limited distribution elsewhere in South Carolina.

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

The mature hardwoods within the site are especially vital to the survival and productivity of neotropical migratory birds. In addition to providing essential staging and foraging habitat for migrants that breed farther north, the site's old-growth forest provides critical nesting habitat for a number of species that require mature forest for successful breeding. The prothonotary warbler (*Protonotaria citrea*) requires cavities of the type that occur in the site's cypress and hardwood trees for nesting, while the yellow-throated warbler (*Dendroica dominica*) occupies the canopy of the tallest trees. The parula (*Parula americana*) and yellow-throated warblers are dependent upon Spanish moss (*Tillandsia usneoides*) in the forest canopy for nesting material. All of these wood warblers are very specific in their habitat requirements and need large, relatively undisturbed tracts of forested woodlands for optimum habitat conditions.

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The site contains 10 areas listed on the U.S. National Register of Historic Places. All ten are archeological sites (e.g., mounds, dikes, etc.) illustrating adaptations to a floodplain environment by early settlers. These sites are significant at the regional level of importance. Additional archeological sites have been discovered from the pre-historic period. These have not been studied in any detail, but none are currently believed to have religious significance. The site's principal social and cultural value today stems from tourism, education, and recreation.

b) Is the site 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?

No.

If Yes, tick the box and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

a) within the Ramsar site:

Congaree National Park is managed by the United States Department of the Interior, National Park Service, as a unit of the National Park System. The current boundary of the Ramsar site encompasses 10,539.07 ha (26,020.31 acres) of forested wetlands and adjacent uplands. (Of this total, 10,359.01 ha (25,586.76 acres) are federally owned and 175.53 ha (433.55 acres) are owned by The Trust for Public Land (TPL), a non-profit conservation organization. TPL is holding its acreage for eventual transfer to the National Park Service. As of March 2010, funding was being sought from the U.S. Congress to acquire all of the remaining 175.53 ha owned by TPL.

Note: the legislated boundary of Congaree National Park includes an additional 164.43 ha (404.99 acres) of private land that are not included in the proposed Ramsar site. The National Park Service will update the Ramsar site boundary if and when any of these private lands are acquired.

b) in the surrounding area:

The site is bordered on the south by the Congaree River, on the east by the Wateree River, and is otherwise surrounded by private property. The South Carolina Department of Natural Resources Heritage Trust Program owns and operates the Congaree Bluffs Heritage Preserve (81 ha) on lands overlooking the site from the south bank of the Congaree River.

25. Current land (including water) use:

a) within the Ramsar site:

No extractive uses are allowed at the site. The Park was established by Congress in 1976 (under the designation Congaree Swamp National Monument) to preserve for future generations “an outstanding example of a near-virgin southern hardwood forest situated in the Congaree River floodplain.” In 1988, Congress included 6,077 ha (15,010 acres) of Congaree Swamp National Monument in the National Wilderness Preservation System and designated another 2,769 ha (6,840 acres) as potential wilderness. These designations require the National Park Service to preserve the primeval character of the area and to

locate roads and other developed sites in non-wilderness areas. All Park lands are managed in accordance with a General Management Plan approved by the National Park Service in 1988. Congress redesignated Congaree Swamp National Monument as Congaree National Park on November 10, 2003.

b) in the surroundings/catchment:

Principal land uses include forestry, agriculture, and home sites. The City of Columbia metropolitan area is located approximately 24 km (15 miles) to the northwest.

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site:

The Park is protected from development and is managed to perpetuate natural processes. The principal threat from within the site is the spread of exotic (non-native) plants and animals. Principal threats include feral pigs (*Sus scrofa*), privet (*Ligustrum* spp.), Japanese stilt grass (*Microstegium viminum*), kudzu (*Pueraria Montana*), wisteria (*Wisteria sinensis*) and Japanese climbing fern (*Lygodium japonicum*). The site is periodically affected by hurricanes and other wind storms, but these are considered natural processes that help maintain the ecological character of the area. Long term impacts from Hurricane Hugo (1989) are being monitored.

b) in the surrounding area:

Water impoundment projects and upstream development activities pose the most serious threats to the ecological integrity of the site. The site is also affected by potential sources of pollution in upstream watersheds, including the watersheds of the Congaree River, Cedar Creek and Toms Creek. The Congaree watershed extends into the North Carolina foothills and northwestern section of South Carolina and covers an area of 2,121,790 ha (5,238,988 acres). Urban and agricultural development in this vast watershed, including development in the major urban centers of Greenville, Spartanburg, and Columbia, brings with it a potential for contamination of surface waters at the site. The quality of water entering the site during floods is of major concern because floodwaters come into direct contact with vegetation and wildlife.

27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

The site is a unit of the National Park System of the United States of America. The site is also part of the South Atlantic Coastal Plain Biosphere Reserve.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an officially approved management plan exist; and is it being implemented?:

The Park is managed in accordance with a General Management Plan approved in 1988. The plan designates approximately 90% (8,897 ha/21,975 acres) of the Park as a Natural Zone. (Note: all acreage acquired pursuant to the 2003 boundary modification is managed as a de facto part of the Natural Zone pending preparation of an updated General Management Plan.) Lands and waters in this zone are managed to ensure that natural resources and processes remain largely unaltered by human activity. An additional 45 ha (110 acres) in the upland portion of the Park are designated as a Special Management

Zone. Prescribed fire and vegetation removal are employed in this zone to create optimal habitat for the endangered red-cockaded woodpecker. (Note: No red-cockaded woodpeckers have been seen in the Park since 1997 and the species is presumed to be extirpated within the Park boundary.) The Park's Development Zone contains 91 ha (225 acres). Development is limited to dispersed recreational and management facilities that are essential for management, use and appreciation of natural resources.

d) Describe any other current management practices:

Management of the Park is directed toward the following principal objectives:

- To protect and perpetuate the Park's natural resources, including the bottomland hardwood ecosystem, by protecting the complex hydrological and biological processes of the area.
- To manage the Park as an undeveloped natural area, except for such minimal facilities as may be required for the health and safety of Park visitors.
- To encourage a range of recreational activities that do not adversely affect the Park's natural and cultural values or duplicate existing programs and facilities outside the Park.
- To manage the water resources of the Park to ensure that the water regimen is not impaired and that the adverse effects on natural resources are minimized.
- To minimize disturbance of natural land forms, vegetation, and wildlife habitat due to vehicle use, Park development, and public recreational activities at the Park, and restore natural ecological conditions to lands adversely affected by such uses and activities in the past.
- To perpetuate, free from the adverse effects of human disturbance, suitable habitat conditions to support the Park's rich flora and fauna, with particular emphasis on endangered or threatened species, or species uncommon elsewhere.
- To encourage and assist in the use of Park resources for educational purposes by schools and other groups studying river, swamp, or alluvial floodplain ecology.

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

The Park is presently seeking funds to acquire additional lands totaling approximately 175.53 ha (433.55 acres). These lands will be acquired from the Trust for Public Land as funding becomes available.

29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The site provides unparalleled opportunities for scientific research into the ecological processes of an old-growth bottomland hardwood forest. The National Park Service has commissioned numerous completed and ongoing research projects, involving scientists from such institutions as the University of Georgia (Savannah River Ecology Laboratory), University of South Carolina, North Carolina State University, and the U.S. Geological Survey. The site is also home to the Old-Growth Bottomland Forest Research and Education Center (Center), which is dedicated to understanding the systems and functions of floodplain environments and monitoring environmental change. Since its opening in 2004, the Center has hosted and coordinated more than 100 researchers while supporting research projects and activities. Most recently the Center has coordinated a comprehensive effort to locate the endangered Ivory-billed woodpecker (*Campephilus principalis*) at the site and collect data on suitable habitat for this bird. Other representative research projects at the site include an analysis of hydrology and flooding patterns, several baseline biological inventory studies, a study of the site's geology and floodplain geomorphology, and a detailed survey of the site's vegetative communities using quantitative methods. The National Park Service is also implementing a long-term natural resource inventory and monitoring program at the site and continues to sponsor a number of resource management projects.

Proposals for additional research projects are described at length in the Park's Resource Management Plan and Water Resources Management Plan. These projects will be implemented as funding becomes available.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

The site has a new visitors' center (opened in 2001) where a number of interpretive exhibits, visitor programs and informational brochures are made available to the public. The Old Growth Bottomland Forest Research and Education Center also works to communicate park research results and relevance to diverse audiences through public programs, citizen science programs, standards-based programs, and technical programs. The site is used extensively by school groups. A boardwalk of 3.9 km (2.4 miles) has been constructed and an additional 22.85 km (14.2 miles) of hiking trails have been marked in the floodplain. The Research and Education Center coordinates a summer Science Camp for children and the site hosts several public outreach events each year ("NatureFest," "SwampFest," Congaree Campfire Chronicles) that allow the public to learn about the site and the cultural traditions of the surrounding area.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Visitor activities include hiking, fishing, birdwatching, canoeing and camping. Primitive camping is also permitted throughout the site. While most visitor use takes place on the elevated boardwalk and established trail network, canoeing and kayaking within Cedar Creek and the Congaree River is gaining popularity. The Congaree River (from Columbia, SC downstream to Congaree National Park) was designated a National Recreation (Water) Trail by the U.S. Department of the Interior in June 2008. No hunting, trapping or collecting is allowed. Visitation is roughly 130,000 persons annually.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

National Park Service, United States Department of the Interior

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(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.

Tracy Swartout, Superintendent
Congaree National Park
100 National Park Road
Hopkins, South Carolina 29061
Tracy_Swartout@nps.gov
803-647-3971 phone
803-783-4241 fax

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

The above information concerning Congaree National Park was derived primarily from reference materials in the resource management library located at Park headquarters. Significant reference materials include the following:

Battaglia, L.L. and R.R. Sharitz. 2005. Effects of Natural Disturbance on Bottomland Hardwood Regeneration. *In* Fredrickson, L.H., S.L. King, and R.M. Kaminski (eds.). *Ecology and Management of Bottomland Hardwood Systems: The State of Our Understanding*.

University of Missouri-Columbia. Gaylord Memorial Laboratory Special Publication No. 10, Puxico, Mo.

Brinson, M. and Knowles, D. 1996. Water Resources Management Plan, Congaree Swamp National Monument. North Carolina State University.

Carter, R.M. 2005. An Annotated Checklist of the Birds of Congaree National Park. *The Chat* 69(1).

Gaddy, L. L. 1979. Natural Resources Inventory of the Congaree Swamp National Monument and Environs. National Park Service.

Gaddy, L. L., Kohlsaar, T.S., Laurent, E.A., Stansell, K.B. 1975. A Vegetation Analysis of Preserve Alternatives Involving the Beidler Tract of the Congaree Swamp. S.C. Wildlife and Marine Resources Department.

Gaddy, L.L., J.B. Nelson, and A.B. Pittman. 2000. Endangered, Threatened, and Rare Plants of Congaree Swamp National Monument, Richland County, South Carolina. Unpublished report to the National Park Service.

Jones, R. H. 1996. Location and Ecology of Champion Trees in Congaree Swamp National Monument. Unpublished report to the National Park Service by the Auburn University School of Forestry.

National Park Service. 1988. General Management Plan, Congaree Swamp National Monument.

National Park Service. 2003. Resource Management Plan, Congaree Swamp National Monument.

National Park Service. 2004. Congaree National Park: Checklist of the Reptiles and Amphibians.

Patterson, G. G., Speiran, G. K., and Whetstone, B. H. 1985. Hydrology and Its Effects on Distribution of Vegetation in Congaree Swamp National Monument, South Carolina. U.S. Geological Survey, Water-Resources Investigations Report 85-4256.

Rose, L. and J. Bulak. 2007. Flood Mediated Change of the Fish Community in Congaree National Park Streams. Unpublished report to the National Park Service by the South Carolina Department of Natural Resources.

The Nature Conservancy. 1998. USGS-NPS Vegetation Mapping Program: Classification of the Vegetation of Congaree Swamp National Monument.

Weakley, A., E. Dinerstein, R. Noss, B. Eichbaum, and K. Wolfe. 1999. Middle Atlantic Coastal Forests (NA0517). In Ricketts, T.H. et al. *Terrestrial Ecoregions of North America: A Conservation Assessment*. Island Press, Washington, D.C.

Explanatory Note and Guidelines for completing the *Information Sheet on Ramsar Wetlands (RIS)*

Background and context

Recommendation 4.7 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*”.

Resolution 5.3 reaffirmed that a completed “Ramsar datasheet” and site map should be provided upon designation of a Wetland of International Importance (hereafter referred to as 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.

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.

Criteria for Identifying Wetlands of International Importance were first adopted 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. The Criteria were again substantively revised and, together with detailed guidance for their application, adopted by Resolution VII.11 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) Resolution IX.1 Annex B. These Criteria and guidelines are included as Annex II of this Explanatory Note.

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 has urged Contracting Parties to revise the data provided in the RIS at least every six years.

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.

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://www.wetlands.org>).

General guidance

The RIS must be completed in one of the Convention's three working languages, namely English, French, or Spanish. The RIS and this accompanying *Explanatory Note and Guidelines* are available in each of the three working languages.

The information provided in the RIS should be clear and succinct, and the total length of a completed RIS should not normally exceed 12 pages.

In the case of a wetland which 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 (prints, transparencies or electronic images) of the wetland are also especially welcome. It is essential that the source providing any such additional information be noted.

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.

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).

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.

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.

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 which should be considered when assessing the possible impact of changes at a site) -- sections 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;
- providing information on monitoring and survey methods in place (or planned) at the site -- sections 27 and 28 of the RIS apply; 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 -- sections 18 and 26 of the RIS apply.

Guidance on information to provide in each numbered section of the *Information Sheet on Ramsar Wetlands (RIS)*

1. **Name and address of the RIS compiler:** The full name, institution/agency, and address of the person(s) who compiled the RIS, together with any telephone and fax numbers and e-mail address.
2. **Date:** The date on which the RIS was completed (or updated). Please use the *name* of the month, not its numerical equivalent. For example use 6 March [year] or March 6 [year] rather than 6/3/year or 3/6/year so as to avoid confusion arising from commonly used but differing formats for expressing dates.
3. **Country:** The official (short) version of the Contracting Party/country name.
4. **Name of the Ramsar site:** The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parenthesis after the precise name. Ensure that the site name used is the same in this section and on the maps provided. **This name will be used precisely as given when the site is added to the Ramsar List.**
5. **Designation of new Ramsar site or update of existing site:** 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 section 6 of the RIS (see below).
6. **For RIS updates only, changes to the site since its designation or earlier update:** In part a) of this section, indicate if there have or have not been any changes to the boundary delimitation and/or the area 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 not for the reduction in area or deletion from the List of sites already designated. 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. If the boundary and/or the area of the designated site is being restricted/reduced, the Contracting Party should have followed 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.

In part b) of this section, please provide a short summary description of any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS or information was supplied for the site.

7. **Map of the Ramsar Site:** The most up-to-date available and suitable map of the wetland should be appended to the RIS (in hardcopy and, if possible, also in digital format). At least a hardcopy map 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. Annex III provides detailed guidance on the provision of suitable Ramsar site maps 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. If the map has been prepared in digital (GIS) format, please send a GIS file providing geo-referenced site boundary vectors and attribute tables, and please **also** send a separate image file, showing the site boundaries, in a common image format (TIFF, BMP, JPG, GIF, etc.).
8. **Geographical coordinates:** The geographical coordinates of the *approximate* centre of the site 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, 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. Location information on larger areas should be supplemented by providing the coordinates of the southwest and northeast corners of the Ramsar site. (See also sections 7, Map and 11, Area).

*This is approximately equivalent to one (1) minute of latitude or longitude (at the equator, in the case of longitude).

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.

9. **General Location:** A description of the general location of the wetland. This should include 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 the site's distance (as either a straight line distance or distance by road) and

compass bearing from the nearest “provincial”, “district” or other significant administrative centre, town, or city. The human population of the listed centre and its administrative regions (if possible, including at least two levels of administration/ jurisdiction) should also be stated.

10. **Elevation:** The average and/or minimum and maximum elevation of the wetland in metres above mean sea level, in metres. Clearly label each elevation provided, with e.g. “average”, “maximum” or “minimum”).
11. **Area:** The total area of the designated site, 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 (see also section 7, Map).
12. **General overview of the site:** A brief paragraph about the wetland, providing a ‘word picture’ of the type of wetland and its importance, its main physical and ecological character features, its most important values and functions, and any particularly interesting features. Note also the most significant wetland types, especially if they are the most dominant as identified in 19 b).
13. **Ramsar Criteria:** Tick the box under the code for each *Ramsar Criterion for identifying wetlands of international importance* that is being applied to the designation of the site. Refer to Annex II of these guidelines for the Criteria and the detailed guidance provided for their application established by Resolution VII.11 (as updated and amended by Resolution IX.1 Annex B), *Strategic Framework and Guidelines for the future development of the List of Wetlands of International Importance*.

Note that 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 section 14 on justification of Criteria selected under this section.

14. **Justification for the application of each Criterion listed in 13 above:** For each Criterion selected under the section above listing the Ramsar Criteria applied, a specific individual explanation of how that Criterion applies to the site. This section of the RIS is central to the concept of “**international importance**”. The Criteria codes alone do not convey information on the specific way in which each Criterion applies to a particular site – therefore it is essential to provide sufficient precise description to explain and support each of the Ramsar Criteria codes selected. This text must not just restate the Criterion, but should provide the necessary details to describe the way in which a particular Criterion applies specifically at the site being designated. Refer to Annex II for the detailed guidance for the application of the Criteria (adopted by Resolution VII.11 and as amended by Resolution IX.1 Annex B).

A number of points concerning the correct use of specific Criteria and the Guidelines for their application should be particularly taken into account when preparing the justification for the application of the Criteria selected for designation:

- i) The guidelines for the application of **Criteria 1 and 3** stress that these Criteria should be applied to a wetland in the context of the biogeographic region within which it occurs, but recognises that biogeographic regions can differ between

wetland types. 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 regionalisation scheme applied should be provided in section 15, Biogeography;

- ii) Concerning **Criterion 5** the guidelines indicate that the actual total number of waterbirds should be stated, 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;
- iii) For justification of designation under **Criterion 6** it is particularly important to recognise that this Criterion must be applied to the regular occurrence of >1% of a biogeographic population of a species or subspecies of waterbird, and to recognise that in most cases the biogeographic range of waterbird populations is larger than the territory of one Contracting Party. 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. Recommended 1% thresholds for the application of Criterion 6 are provided by Wetlands International's publication *Waterbird Population Estimates* 4th Edition (2006) (available from mid-2006 at <http://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* 3rd Edition, the guidelines indicate that this Criterion may be applied if a reliable population estimate and 1% threshold is available from another source, and that in such cases the information source must be 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.
- iv) For all or some applications of **Criteria 2, 3, 4, 5, 6, 7, 8 and 9**, the name(s) of the species concerned (scientific name and vernacular name in English, French or Spanish) should be provided in the justification.
- v) The Guidelines for the application of **Criterion 7** concerning fish and shellfish diversity indicate that a species list alone is not sufficient justification for the use of this Criterion, and that other features of high diversity, including life-history stages, species interactions, and level of endemism are required for the application of this Criterion.
- vi) 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 recognised 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*” (http://ramsar.org/ris/key_ris_criterion9_2006.pdf), which also provides a description of the biogeographic range of each population. 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 that paper, the guidelines indicate that this Criterion may be applied if a reliable population estimate and 1% threshold is available from another source, and that in such cases the information source must 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.

- 15. Biogeography:** The *biogeographic region* encompassing the Ramsar site and the *biogeographic regionalisation 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 sections 13. Ramsar Criteria and 14. Justification of Criteria). In this context the guidelines for the application of the Ramsar Criteria (see Annex II) 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. It is also recognised that the nature of biogeographic regionalization may differ between wetland types according to the nature of the parameters determining natural variation (see Annex II of this *Explanatory Note and Guidelines*).

There are a variety of different global and supranational/regional biogeographic schemes in use. No single scheme may be universally appropriate or acceptable and Contracting Parties are urged (in the annex to Resolution VII.11) to apply a regionalization scheme which they determine to be the most appropriate and scientifically rigorous approach available, taking into account that the additional guidance adopted by Resolution IX.1 Annex B indicates that it is generally most appropriate to use a continental, regional or supranational scheme rather than a national or subnational one.

- 16. Physical features of the site:** A succinct description of the principal physical characteristics of the site covering the following features (where relevant):
- Geology and geomorphology (general features);
 - Soil type and chemistry range (Soil family name(s); indication of mineral vs. organic content; typical pH range of soil);
 - Sediment characteristics;
 - Origins (natural or artificial);
 - Hydrology (including seasonal water balance, inflow, infiltration and outflow, salt-water intrusion). Further detail, notably the hydrological values and functions of the site should be included in section 18, Hydrological values;
 - Water quality (typical physico-chemical characteristics);
 - Depth, fluctuations and permanence of water;

- Tidal range and variations;
- Downstream area (especially in the case of wetlands that are important in flood control);
- Climate – include here only the most significant regular climatic features, e.g., annual rainfall and average temperature range, distinct seasons, typical flooding and drought periods, and any other normal climatic factors affecting the wetland. Recent major or extreme climate events, e.g., flood, drought, hurricane, cyclone or other storm, atypical period of extreme temperatures, etc., that have had an adverse impact on the site should be detailed under section 26, Factors adversely affecting the site's ecological character).

17. Physical features of the catchment area: A succinct characterisation of the catchment area, covering:

- surface area;
- general geology and geomorphological features;
- general soil types;
- climate (including characterisation of climate type).

18. 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 section 16, Physical features of the site.

19. Wetland Type(s): 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 Annex I of this *Explanatory Note and Guidelines*) 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.

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.

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 recognised 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 (see also the guidance on sections 7, Map; 8, Geographical coordinates; and 9, Area).

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.

20. **General ecological features:** A description of the wetland ecosystem with its main habitats, wetland and vegetation types, describing any zonation, seasonal variations, and long-term changes. Briefly describe ecological processes which maintain the wetland and the ecosystem services that characterise the wetland and the benefits derived from these services. A brief note on habitats and vegetation types in adjacent areas may be appropriate. Where important, information on specific food chains should be included in this section.
21. **Noteworthy flora:** Additional/supplemental information on plant species or communities for which the wetland is particularly important or significant should be provided here. **Do not duplicate** information that has already been provided in support of the site's international importance (in section 14, Justification of Criteria) or in section 20, General ecological features. Specify *why* each species or community listed is considered noteworthy (e.g., if it is an economically important species).

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.

Also list here plant species that have been introduced (accidentally or intentionally) and/or those that are invasive. (Description of the impacts by invasive and/or alien species on the site should be provided in section 26, Factors adversely affecting the site's ecological character).

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

22. **Noteworthy fauna:** Additional/supplemental information on animal species or communities for which the wetland is particularly important or significant should be provided here. **Do not duplicate** information that has already been provided in support of the site's international importance (in section 14, Justification of Criteria) or in section 20, General ecological features. Specify *why* each species or community 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).

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 this section. Noteworthy zoogeographical features (relict populations, unusual range extensions, etc.) should be noted here.

Also list here animal species that have been introduced (accidentally or intentionally) and/or those that are invasive. (Description of the impacts by invasive and/or alien species on the site should be provided in section 26, Factors adversely affecting the site's ecological character).

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

- 23. Social and cultural values:** in section a) provide a general account of the site's principal social and economic values and functions and "wise use" features presented in Ramsar Handbooks 1 to 6 (e.g., tourism, outdoor recreation, education and scientific research, agricultural production, grazing, water supply, fisheries production) and cultural values and functions (e.g., archaeological sites, historical associations and/or religious significance, including its significance to indigenous peoples). For more information, see the *Guiding principles for taking into account the cultural values of wetlands for the effective management of sites*, annexed to Resolution VIII.19. Whenever possible, indicate which of these values are consistent with the maintenance of natural wetland processes and ecological character. In section b) indicate 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 section 26, Factors adversely affecting the site's ecological character.
- 24. Land tenure/ownership:** Details of ownership/tenure both of the Ramsar site and of the areas surrounding the site. If possible, express different tenure/ownership categories as the percentage of the site to which each applies (e.g., "50% state-owned"). Explain any complex tenure arrangements or formulas. Also explain terms which have a special meaning in the country or region concerned. In the next section (25, Current land use), describe the linkages between the different land tenures described in this section and specific land uses.
- 25. Current land (including water) use:** All of the principal human activities in (a) the Ramsar site itself and (b) in the surroundings and catchment. Give information on the human population in the area, with a description of the principal human activities and main forms of land and water use at the wetland, e.g., water supply for domestic and industrial use, irrigation, agriculture, livestock grazing, forestry, fishing, aquaculture and hunting. Also mention here activities and uses related to research, education and recreation/tourism at the site, but provide the details about each of these in sections 29, 30 and 31, respectively). Some indication of the relative importance, scale and trend of each land and water use should be given whenever possible. Make note if activities or uses are restricted to certain distinct parts of the site (e.g., in only part of a large site or in distinct zones or within particular wetland types). In (b), summarize land and water use in the areas surrounding the site and in its greater catchment that may directly or indirectly affect the status of the designated wetland, and any land uses in downstream areas likely to be affected by the wetland. For further reference on water use, see the *Guidelines for the allocation and management of water for maintaining the ecological functions of wetlands* adopted by Resolution VIII.1; Resolution IX.1, Annex C (*An Integrated Framework for the Ramsar*

Convention's water-related guidance); Annex Ci (*River basin management: additional guidance and a framework for the analysis of case studies*); and Annex Cii (*Guidelines for the management of groundwater to maintain wetland ecological character*).

- 26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:** 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. For all adverse and change factors reported, supply measurable/quantifiable information (when such data exist), as well as information on the scale, extent and trend of the change factor and its impact: this information should provide a basis for monitoring of ecological character of the site.

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. One should also 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.

Provide information on the history of introductions (accidental or deliberate) of invasive and/or alien species identified in sections 21, Noteworthy flora and 22, Noteworthy fauna and the impacts of any invasions.

- 27. Conservation measures taken:** Provide details in the following areas, if appropriate.
- a) Mention any nationally relevant protected area status, international conservation designations (in addition to Ramsar site status), and, in the case of transboundary wetlands, bilateral or multilateral conservation measures which pertain to all or part of the site. If a reserve has been established, give the date of establishment and size of the protected area. If only a part of the wetland is included within a protected area, the area of wetland habitat that is protected should be noted.
 - b) If appropriate, list the IUCN (1994) protected areas management category/ies which apply to the site. These are as follows:

Category	Definition
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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 managed mainly for conservation through management intervention	Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of 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: “An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means”.

- c) Describe here the management planning process for the site, including any management plan, if this has been developed and is being implemented, including whether it has been officially approved. Cite the management plan document(s) in section 34, Bibliographic references, and whenever possible provide a copy of the management plan as supplementary information to the RIS.
- d) Also describe any other conservation measures taken at the site, such as restrictions on development, management practices beneficial to wildlife, closures of hunting, etc.

Include information here on any monitoring schemes and survey methods in place at the site. Describe any application at the site of the Ramsar *Conceptual Framework for the wise use of wetlands and the maintenance of their ecological character* (Resolution IX.1 Annex A), or any other instance of the application of the Convention's guidance as compiled in the Ramsar 'toolkit' of Wise Use Handbooks ("wise use", i.e., sustainable use, is a central concept of the Ramsar Convention).

When updating the RIS for an existing Ramsar site, mention if the site is included on, or has been removed from, the Montreux Record and provide details of any Ramsar Advisory Missions that have been undertaken to the site.

Any application of integrated basin-scale/catchment management planning, or integrated coastal/marine zone management planning, involving or affecting the site should be noted. Provide a brief assessment of the effectiveness of protected area legislation or status of any protected areas whenever possible. Involvement of local communities and indigenous people in the participatory management of the site should also be described, in the context of the Ramsar guidelines on this process (Resolution VII.8).

28. **Conservation measures proposed but not yet implemented:** 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. Also mention any management plan which is in preparation but has not yet been completed, approved or implemented.
29. **Current scientific research and facilities:** Describe here any current scientific research programmes, including monitoring, and projects taking place in the site, and provide information on any special facilities for research that were mentioned in section 25. Current land (including water) use.
30. **Current communications, education and public awareness (CEPA) activities related to or benefiting the site:** Describe here any existing programmes, activities and facilities for communications, education and public awareness (CEPA), including training, that were mentioned in section 25, Current land (including water) use. Also provide comment on the educational potential of the wetland. For further information on CEPA issues and the Convention on Wetlands, see the Ramsar Web site at http://ramsar.org/outreach_index.htm.
31. **Current recreation and tourism:** Provide details of any present use of the wetland for recreation and tourism that was mentioned in section 25, Current land (including water) use. Provide details of existing or planned visitor facilities or centres for recreation and tourism, and indicate the annual number of tourists visiting the site, if known. Also indicate the type of tourism and whether the tourism is seasonal.
32. **Jurisdiction:** Provide the full name and address of the government authority with a) *territorial jurisdiction* over the wetland, e.g., the state, region or municipality; and b) the name

of the authority with *functional jurisdiction* for conservation purposes, e.g., the Department of Environment or Department of Fisheries, etc.

33. **Management authority:** 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. Also provide details of any special or unique arrangements that pertain to the site's management.

34. **Bibliographical References:** 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 Web site addresses dedicated to the Ramsar site or which prominently feature the site (e.g., a Web site detailing all of a country's Ramsar sites), and include the date that the Web site 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.

Annex I

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 herein 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 section 19 of the RIS, the Secretariat has provided below a tabulations for Marine/Coastal Wetlands and Inland Wetlands of 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**.
- 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
		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	Herb-dominated	Tp
			Shrub-dominated	W
		Seasonal/intermittent	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 (alpine)	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)	

Annex II

Criteria for Identifying Wetlands of International Importance and Guidelines for their application

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.

Guidelines for the application of the Criteria

(based on the *Strategic Framework and Guidelines for the future development of the List of Wetlands of International Importance*)

Criterion 1:

- 1a) In applying this Criterion systematically, Contracting Parties are encouraged to:
 - i) determine biogeographic regions within their territory or at the supranational/regional level;
 - ii) within each biogeographic region, determine the range of wetland types present (using the Ramsar Classification System for wetland type), 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.
- 1b) When selecting a biogeographic regionalisation scheme to apply, it is generally most appropriate to use a continental, regional, or supranational scheme rather than a national or subnational one.
- 1c) Objective 1 and, in particular 1.2 of the *Strategic Framework*, 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. In terms of hydrological functioning, the following is provided to assist Contracting Parties consider this aspect of determining priority sites under this Criterion. For guidance relevant to biological and ecological roles refer to Criterion 2 following.
- 1d) **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.

Criterion 2:

- 2a) Ramsar sites have an important role in the conservation of globally threatened species and ecological communities. Notwithstanding the small numbers of individuals or sites that may be involved, or poor quality of quantitative data or information that 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 Criterion 2 or 3.
- 2b) General Objective 2.2 of the Strategic Framework urges Contracting Parties to seek to include in the Ramsar List wetlands that include threatened ecological communities or are critical to the survival of species identified as vulnerable, endangered or critically endangered under national endangered species legislation/programmes or within international frameworks such as the IUCN Red Lists or Appendix I of CITES and the Appendices of CMS.
- 2c) 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 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 through 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.
- 2d) 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 which 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.
- 2e) When selecting a biogeographic regionalisation scheme to apply under paragraph 2d (i) and/or (ii), it is generally most appropriate to use a continental, regional, or supra-national scheme rather than a national or subnational one.
- 2f) Note also the issues concerning habitat diversity and succession in paragraphs 46 to 49 of the Strategic Framework, “Boundary definition of sites”.
- 2g) Be aware also of the biological importance of many karst and other subterranean hydrological systems.

Criterion 3:

- 3a) 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.
- 3b) Be aware also of the biological importance of many karst and other subterranean hydrological systems.
- 3c) When selecting a biogeographic regionalisation scheme to apply, it is generally most appropriate to use a continental, regional, or supranational scheme rather than a national or subnational one.

Criterion 4:

- 4a) 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.

- 4b) 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.

Criterion 5:

- 5a) 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.
- 5b) Non-native waterbirds should not be included within the totals for a particular site.
- 5c) 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.
- 5d) 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.
- 5e) 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. Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is reached, if such data are available.
- 5f) 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.
- 5g) However, accurate estimation of turnover and total number of individuals of a population or population using a wetland is difficult, and several methods (e.g., cohort marking and resighting, or summing increases in a count time-series) which have at times been applied do not yield statistically reliable or accurate estimates.

- 5h) The only currently available method which is considered to provide reliable estimates of turnover is that of unique capture/markings 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.
- 5i) 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 of ensuring that their management planning for the site fully recognizes this importance.

Criterion 6:

- 6a) 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. Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is reached, if such data are available.
- 6b) To ensure international comparability, where possible, 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. As urged by Resolutions VI.4 (Ramsar COP6) and Resolution VIII.38 (COP8), 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 also support the national implementation and development of Wetlands International's International Waterbird Census, which is the source of much of these data.
- 6c) 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.
- 6d) 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 of 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.
- 6e) Note that this guidance applies just during the period of population mixing (often, but not exclusively, this is during periods of migration). At other times, it is generally possible to assign a 1% threshold accurately to the single population that is present.

- 6f) 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 5f-5i.

Criterion 7:

- 7a) 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.
- 7b) Criterion 7 indicates that a wetland can be designated as internationally important if it has a high diversity of fishes and 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. Species counts alone are thus not sufficient to assess the importance of a particular wetland. In addition, the different ecological roles that species may play at different stages in their life cycles needs to be considered.
- 7c) Implicit in this understanding of biological diversity is the importance of high levels of endemism and of biodisparity. Many wetlands are characterised by the highly endemic nature of their fish fauna.
- 7d) 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.
- 7e) Over 734 species of fish are threatened with extinction worldwide, and at least 92 are known to have become extinct over the past 400 years. The occurrence of rare or threatened fish is catered for in Criterion 2.
- 7f) An important component of biological diversity is biodisparity, i.e., the range of morphologies and reproductive styles in a community. The biodisparity of a wetland community will be determined by the diversity and predictability of its habitats in time and space, i.e., the more heterogeneous and unpredictable the habitats, the greater the biodisparity of the fish fauna. For example, Lake Malawi, a stable, ancient lake, has over 600 fish species of which 92% are maternal mouthbrooding cichlids, but only a few fish families. In contrast, the Okavango Swamp of Botswana, a palustrine floodplain that fluctuates between wet and dry phases, has only 60 fish species but a wider variety of morphologies and reproductive styles, and many fish families, and therefore has a greater biodisparity. Measures of both biological diversity and biodisparity should be used to assess the international importance of a wetland.

Criterion 8:

- 8a) 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.
- 8b) 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.
- 8c) This is for guidance only and does not interfere with the rights of Contracting Parties to regulate fisheries within specific wetlands and/or elsewhere.

Criterion 9:

- 9a) 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. 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 (see guidance in paragraphs 5f-5i related to waterbirds which is also applicable to Criterion 9 in relation to non-avian animals).
- 9b) To ensure international comparability, where 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. An initial list of populations and recommended 1% thresholds is provided in the paper "*Population estimates and 1% thresholds for wetland-dependent non-avian species, for the application of Criterion 9*" (http://ramsar.org/ris/key_ris_criterion9_2006.pdf).
- 9c) 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.

- 9d) It is anticipated that this Criterion will be 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 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.

Annex III

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, and also 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: <http://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 recognises 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 far as possible, and as high priority attributes:
 - i) 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;
 - ii) 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;
 - iii) clearly show the boundary of the Ramsar site, and distinguish this from any existing or proposed buffer zones;
 - 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; and
 - 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.

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 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. A map having all the above attributes, including being at the appropriate scale (see guidance below), will facilitate digitization of maps for inclusion in a Geographic Information System (GIS) if the map (or maps) are supplied only in printed form (i.e., when no digital coordinates are available).
8. To allow for subsequent digitization to be undertaken accurately and without distortion, the map should be an original print (two copies of which should be supplied) and not a photocopy.
9. Additionally, to facilitate copying and presentation, it is extremely helpful to include two other versions of the principal map(s):
 - i) a colour photocopy of the map reduced to A4 size;
 - ii) a GIS file providing geo-referenced site boundary vectors and attribute tables, if possible;
 - iii) a TIFF, JPG, BMP, GIF or other common digital image file..

Scale of maps

10. 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

11. 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.
12. 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.
13. When the site is large or complex and/or when it is composed of several sub-sites with discrete boundaries, a larger-scale map of each section or sub-site should be provided, accompanied by a smaller 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)

14. When detailed topographical maps are not available, a description of the boundaries of the site should be 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.
15. 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 or paper file listing each GPS latitude/longitude way-point determined and identifying these on a printed copy of the site map.
16. 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.

Boundary description (digital)

17. Contracting Parties are encouraged, where possible, to submit geographic information about the Ramsar site in digital form, suitable for incorporation into a Geographic Information System (GIS).
18. For boundary and buffer zone delineation, data should be presented in vector form, prepared at the largest scale.
19. 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 largest scale possible.
20. Metadata concerning the digitised formats should accompany the digital map(s) and should include digitising scale, projection system, attribute tables for each map layer, file format(s), and layering conventions used to prepare the data layers.
21. The primary native format files generated by the “Arc-Info” family of GIS (ESRI Corporation) or by “MapInfo” (Corporation) GIS enjoy increasingly wide use and can be imported and used by many GIS applications.
22. The Open GIS Consortium (OGC), a large group of GIS organizations including industry leaders, is addressing the issue of incompatible standards in geographic information technology. Progress on GIS standards, compatibility, and interoperability achieved under the OGC initiative should be noted and will be considered in the preparation of any updated advice on GIS file specifications for provision of digital maps for Ramsar sites.