Information Sheet on Ramsar Wetlands (RIS)

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 for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.

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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1. Name and address of the Official Respondent:

FOR OFFICE USE ONLY.

DD MM YY

Designation date | Site Reference Number

Joint Nature Conservation Committee
Monkstone House
City Road
Peterborough
Cambridgeshire PE1 1JY
UK
Telephone/Fax: +44 (0)1733 – 562 626 / +44 (0)1733 – 555 948
Email: RIS@JNCC.gov.uk

Name and address of the compiler of this form:
Updated by UK Overseas Territories Conservation Forum, 102 Broadway, Peterborough, PE1 4DG, UK
(with assistance from Bermuda Dept. of Conservation Services)

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2. Date this sheet was completed/updated:
Designated: 10 May 1999

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3. Country:
UK (Bermuda)

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4. Name of the Ramsar site:
Paget Marsh

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

This RIS is for: Updated information on an existing Ramsar site

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

a) Site boundary and area:

** 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:

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7. Map of site included:

Refer to Annex III of the *Explanatory Notes 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) **hard copy** (required for inclusion of site in the Ramsar List): *yes* ✓ -or- *no* □;
ii**) an electronic format** (e.g. a JPEG or ArcView image)
iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** *yes* ✓ -or- *no* □;

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 site boundary is the same as, or falls within, an existing protected area.

For precise boundary details, please refer to paper map provided at designation

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8. Geographical coordinates (latitude/longitude):

32 16 00 N 64 46 00 W

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9. General location:

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

Nearest town/city: Hamilton

Located at Middle Road, Paget Parish. 1 km SSE of Hamilton.

Administrative region: Bermuda

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10. Elevation (average and/or max. & min.) (metres): 11. Area (hectares): 11.35

Min. No information available
Max. No information available
Mean 0.5

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12. General overview of the site:

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

The largest surviving remnant of Bermuda's pre-colonial swamp forest inclusive of marshy savannah, mangrove swamp and peat marsh forest showing all seral stages. The endemic palmetto, endemic sedge and endemic cedar occur on the site.

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13. Ramsar Criteria:

Circle or underline 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).

1, 2, 3

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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

The site is of international importance as it is an undisturbed pre-colonial peat marsh in which three endemic species are represented. The site is also a relict mangrove swamp in a nearly non-tidal freshwater peat basin, at the northerly limit for mangrove in the Atlantic.

Criterion 2

The swamp forest contains the endemic Bermuda cedar *Juniperus bermudiana*, the endemic Bermuda palmetto *Sabal bermudana*, and the endemic sedge *Carex bermudiana*, the endemic understorey shrub St. Andrews cross *Hypericum macrosepalum*, and the endemic succulent herb wild pepper *Peperomia septentrionalis*.

Criterion 3

The swamp forest contains the endemic Bermuda cedar *Juniperus bermudiana* and the endemic Bermuda palmetto *Sabal bermudana; Myrica cerifera* bushes with the endemic sedge *Carex bermudiana* and 11 species of fern, mainly osmunda in the understorey; marshes with *Cladium jamaicensis, Typha augustifolia, Scirpus americanus* and *Acrostichum exelsum*. There are also mangrove swamps with *Rhizophora mangle*.

See Sections 21/22 for details of noteworthy species

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:

Bermuda / mid-North Atlantic Islands

b) biogeographic regionalisation scheme (include reference citation):

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.

Soil & geology	peat
Geomorphology and landscape	lowland, coastal
Nutrient status	
pH	acidic, alkaline
Salinity	fresh
Soil	
Water permanence	usually permanent
Summary of main climatic features	Subtropical; mild, humid; gales, strong winds common in winter.

General description of the Physical Features:

No information available

17. Physical features of the catchment area:

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

Marsh located on valley bottom interdune low. Surrounded on all four sides by high dune hills (Aeolian limestone); formerly connected by underwater caves to Hamilton Harbour. Caves now buried under peat accumulation.

Forms catchment for east central Paget Parish, including runoff from heavily-used Middle Road, agricultural fields and residential areas.

18. Hydrological values:

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

No special values known

19. Wetland types:

Human-made wetland, Inland wetland

Code	Name	% Area
Xp	Forested peatland	35
Xf	Freshwater, tree-dominated wetlands	35
2	Farm ponds, small tanks	10
U	Peatlands (including peat bogs swamps, fens)	10
Tp	Freshwater marshes / pools: permanent	10
I	Mangrove / tidal forest	

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.

One of Bermuda's larger undisturbed peat basins with a complete representation of all seral stages of marshland ranging from land-locked mangrove swamp to peat marsh forest.

Ecosystem services

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in **12**. 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.*

Higher Plants.

The swamp forest contains the endemic Bermuda cedar *Juniperus bermudiana* and the endemic Bermuda palmetto *Sabal bermudana*; *Myrica cerifera* bushes with the endemic sedge *Carex bermudiana* and 11 species of fern, mainly *Osmunda* in the understorey; marshes with *Cladium jamaicensis*, *Typha angustifolia*, *Scirpus americanus* and *Acrostichum exelsum*. There are also mangrove swamps with *Rhizophora mangle*.

Also contains endemic St. Andrew's cross *Hypericum macrosepalum* (largest Bermuda population), and endemic wild pepper *Peperomia septentrionalis*.

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in **12**. 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.*

Birds

Species Information

Of limited importance for waterfowl, although green heron *Butoroides virescens* (=*B. striatus*), blue-winged teal *Anas discors*, sora rail *Porzana carolina*, common moorhen *Gallinula chloropus* and common snipe *Gallinago gallinago* occur on passage and in winter. Yellow-rumped warblers overwinter in the wax-myrtle *Myrica cerifera* thickets.

Non-native amphibian species also occur.

23. Social and cultural values:

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.

Aesthetic
Environmental education/ interpretation
Non-consumptive recreation
Religious
Tourism

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, 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:

Ownership category	On-site	Off-site
Non-governmental organisation (NGO)	+	+

25. Current land (including water) use:

Activity	On-site	Off-site
Recreation	+	
Urban development		+

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

Explanation of reporting category:

1. *Those factors that are still operating, but it is unclear if they are under control, as there is a lag in showing the management or regulatory regime to be successful.*
2. *Those factors that are not currently being managed, or where the regulatory regime appears to have been ineffective so far.*

NA = Not Applicable because no factors have been reported.

Adverse Factor Category	Reporting Category	Description of the problem (Newly reported Factors only)	On-Site	Off-Site	Major Impact?
Introduction/invasion of non-native plant species	1	Although many of the invasive species affecting the upland areas of Bermuda are optimized for alkaline soils and do not do well in the acidic peat soils of Paget Marsh, there are some exceptions. These include guava *Psidium guajava*, ardisea or marl-berry *Ardisea polyponoacea*, Chinese fan palm *Livistona chinensis* and shefflera *Shefflera umbellatum*.	+	+	
Pollution – unspecified	2	Evidence of road and possibly agricultural rain runoff introducing pollutants into open water ponds, that may be responsible for high mortality and mutation rates among tadpoles of Suriname/cane toads *Bufo marinus*.	+	+	+
Salination of groundwater	1	Sea levels may now be rising faster than the marshes can keep up with at normal levels of peat formation and deposition. This can cause salt water to invade what is mainly a fresh-water wetland and inundate the root systems of trees comprising the hammock forest which covers much of the surface of this marsh. This occurred for several months during 2002, when high tides combined with the effects of a strong gyre or ocean current circulation to produce unusually high sea levels in the western Atlantic, centered on the Bermuda area. This caused water levels in the marsh to remain 30 cm or more above normal for over 4 months, coupled with an influx of salt water into the marsh. This resulted in the death within six months of over 90% of all Bermuda cedars in the hammock forest, many of them mature trees 200 or more years of age, and the weakening of others. Cedar death from inundation was also recorded in Devonshire Marsh and Shelly Bay Marsh. It is noteworthy that this was the longest duration and highest sea levels recorded for any such event since records have been kept, and points to the potential of further sea level rise having further detrimental effects on these wetlands in the future.	+		+

What measures have been taken / are planned / regulatory processes invoked, to mitigate the effect of these factors?

Introduction/invasion of non-native plant species - Regular culling of the entire marsh to selectively remove all aggressive invasive non-native plant species. Now cleared of most invasive species.
Long-term botanical monitoring at 5, 10x10 metre quadrats to measure the benefits of culling invasive plant species.

Pollution – unspecified - Efforts to reduce this problem have so far been confined to the installation of settling-out reservoirs under the main drainage pipes to reduce direct flow of run-off into the marsh.

Is the site subject to adverse ecological change? YES

27. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

Conservation measure	On-site	Off-site
National Nature Reserve (NNR)	+	
Land owned by a non-governmental organisation for nature conservation	+	
Management plan in preparation	+	

b) Describe any other current management practices:

28. Conservation measures proposed but not yet implemented:

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

Introduction/invasion of non-native plant species - Monitoring of invasive non-native plant species is required.

29. Current scientific research and facilities:

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

No facilities. Long-term botanical monitoring at 5, 10x10 metre quadrats to measure the benefits of culling invasive plant species.

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

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

The nature trail is used regularly by educational guided tours and for informal recreational use.

31. Current recreation and tourism:

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

Nature-oriented recreation. There are guided field trips for locals and tourists.

32. Jurisdiction:

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

Ministry of the Environment
Government of Bermuda, Government House,
Hamilton, Bermuda

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.

Bermuda National Trust, 'Waterville', Paget, PG 05, Bermuda
Bermuda Audubon Society, P.O. Box HM 1328, Hamilton HM FX, Bermuda
Conservation Officer (Terrestrial), Dept. of Conservation Services, P.O. Box FL588, Flatts FLBX, Bermuda

34. Bibliographical references:

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

Site-relevant references

Bacon, D & Fort, J (2004) The Bermuda Amphibian Project: A comprehensive approach to assessing ecotoxicological impacts on Bermuda's amphibians. In: *Society of Environmental Toxicology and Chemistry, 25th Annual Meeting, 14-18 November 2004, Portland, Oregon*. http://abstracts.co.allenpress.com/pweb/setac2004/document/?ID=41474

Hayward, SJ, Gomez, FH & Sterrer, W (eds.) (1981) *Bermuda's delicate balance: people and environment*. Bermuda National Trust, Paget

Pienkowski, M (ed.) (2003) *A sense of direction: a conference on conservation in UK Overseas Territories and other small island communities, Bermuda 22nd–27th March 2003*. UK Overseas Territories Conservation Forum, Peterborough. www.ukotcf.org

Pienkowski, MW (ed.) (2005) *Review of existing and potential Ramsar sites in UK Overseas Territories and Crown Dependencies*. (Contractor: UK Overseas Territories Conservation Forum, Peterborough.) Final report on Contract CR0294 to the UK Department for Environment, Food and Rural Affairs, Bristol. www.ukotcf.org

Proctor, D & Fleming, LV (eds.) (1999) *Biodiversity: the UK Overseas Territories*. Joint Nature Conservation Committee, Peterborough

Scott, DA & Carbonell, M (eds.) (1986) *A directory of neotropical wetlands*. IUCN/IWRB, Cambridge/Slimbridge

Thomas, MLH (1993) Mangrove swamps in Bermuda. *Atoll Research Bulletin*, **386**, 1-17

Wingate, DB (1984) *Taking stock of Bermuda's wetland heritage*. Department of Agriculture and Fisheries, Hamilton

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