

Review of existing and potential Ramsar sites in UK Overseas Territories and Crown Dependencies

Final Report from the UK Overseas Territories Conservation Forum

Annex 1: Updated Ramsar Information Sheets for existing sites, organised by Territory

This is an original contract requirement, and is also needed for UK's report to the Ramsar Convention Conference of the Parties.

As part of this project, the Ramsar Information Sheets for designated sites were examined, and revised in conjunction with local workers. The extent of revisions necessary for each site varied greatly, generally with those recently designated or recently revised generally needing fewest changes.

Revised RISs follow for the existing designated sites. In addition, three new sites were designated as this report was in final revision, and these have been transferred from Annex 3 to this Annex.

Ramsar code	Site name	Country	Area (ha)	Date designated	Page
UK23001	South East Coast of Jersey, Channel Islands	Jersey	3210.50	25/09/2000	154
UK23002	Les Minquiers	Jersey	9575.00	02/02/2005	165
UK23003	Les Écréhous & Les Dirouilles	Jersey	5459.00	02/02/2005	171
UK23004	Les Pierres de Lecq (the Paternosters)	Jersey	512.00	02/02/2005	177
UK32001	Akrotiri	Western Sovereign Base Area of Cyprus	2171.00	20/03/2003	183
UK41002	Hungry Bay Mangrove Swamp	Bermuda	2.01	10/05/1999	191
UK41003	Lover's Lake Nature Reserve	Bermuda	2.10	10/05/1999	199
UK41004	Paget Marsh	Bermuda	11.35	10/05/1999	203
UK41005	Pembroke Marsh East	Bermuda	7.82	10/05/1999	209
UK41006	Somerset Long Bay Pond	Bermuda	1.10	10/05/1999	217
UK41007	Spittal Pond	Bermuda	9.53	10/05/1999	222
UK41010	Warwick Pond	Bermuda	2.30	10/05/1999	231
UK42001	Booby Pond and Rookery	Cayman Islands	82.00	21/09/1994	236
UK43001	North, Middle and East Caicos Islands	Turks and Caicos	58617.00	27/06/1990	243
UK44003	Western Salt Ponds of Anegada	British Virgin Islands	1071.00	10/05/1999	259
UK54001	Bertha's Beach	Falkland Islands	3191.00	24/09/2001	267
UK54005	Sea Lion Island	Falkland Islands	1556.00	24/09/2001	275
UK61002	Diego Garcia	British Indian Ocean Territory	35424.05	04/07/2001	285

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

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DD MM YY		

Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

25 September 2000 / 11 November 2004

3. Country:

UK (Jersey)

4. Name of the Ramsar site:

South East Coast of Jersey, Channel Islands

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional):

6. Geographical coordinates (latitude/longitude):

49 09 00 W

02 02 00 N

7. General location:

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

The site is adjacent to the capital of Jersey, St. Helier, which holds a population of 27,523 (1996 Census).

Located on the south and east coasts of the Channel Island of Jersey. Situated in Le Golfe Normano-Breton, 22.4 km west of Normandy (France), 48 km north of Brittany (France) and 136 km south of Weymouth (England).

The site extends from the port of St Helier on the south coast, to Gorey Harbour on the east coast, encompassing the south-east corner of the Island.

Bailiwick of Jersey

Administrative region: Jersey

8. Elevation (average and/or max. & min.) (metres):	9. Area (hectares): 3210.5 [++]
Min. -14.58	
Max. 14.12	
Mean No information available	

10. Overview:

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

The site comprises various habitats; reefs, boulder fields, mud, sandy and shingle shores not covered by water at low tide, combined with shallow tidal lagoons, seagrass beds and a constellation of outlying reefs. Amongst the largest intertidal reef sites in Europe. A maximum spring tide range of 12 metres exposes in excess of 17.5 sq km of wave-cut rock platforms, extensive areas of reef at varying elevations, expansive rocky shores and a complex system of soft substrate gullies. The area also features a large, shallow, depositing, soft sediment bay, containing seagrass meadows, which provide important winter habitat for nationally important populations of waders and wildfowl. These factors, combined with Jersey's biogeographical position produce great biodiversity, a rich and diverse range of biotopes and some uncommon species assemblages. The flora and fauna is characterised by limit-of-range species at the northern and southern margins of their distributions that are not present on shores either to the north or south respectively. Fishing within the site, is of great cultural, social and traditional importance to the population of Jersey. To the north of the site lies Gorey Harbour, a small port used principally for recreational boating. To the west of the site lies St Helier, Jersey's capital and principal port with associated facilities and shoreline development.

11. 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, 4, 7, 8

12. Justification for the application of each Criterion listed in 11. 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).

1	The site has the one of the largest tidal ranges in the world, that can exceed 12 metres, a shallow sloping shore profile, a wide range of substrata and wave exposure. Its shallow waters are relatively warm due to the influence of the Gulf Stream and surrounding oceanographic conditions. These factors combine to produce a site considered to have great ecological value due to the diverse range of habitats, communities and species found in a comparatively small area. Within the site, the Violet Bank is one of the largest igneous intertidal reef sites in Europe, comprising approximately 8 sq km of rocky shore exposed at low water on spring tides divided by an extensive network of gullies and separated in places by mud and sand flats. Grouville Bay is a large shallow bay containing mudflats and sandflats that are exposed at low water and contain <i>Zostera</i> beds.
2	The extensive rocky shores found within the site are identified as being of priority for conservation at an international level due to the rarity and perceived threat to this type of habitat and its associated faunal and floral communities. The extensive mudflats and sandflats found in the site are likewise considered of significant value at a European level. <i>Zostera</i> beds found in the embayed shallow waters are of great importance to a wide range of vulnerable species in their early life stages and thus merit the highest level of protection available. Adjacent to the Baie de Mont St Michel (62,000 ha designated in 1994), the site represents the last vestiges of a former land bridge to continental Europe and plays a major role in the continued ecological functioning of the Golfe Normano-Breton with many species of wintering shorebirds visiting the area during annual migration passages. One of the largest breeding groups of bottlenose dolphins <i>Tursiops</i>

	<i>truncatus</i> in the British Isles is regularly sited within the boundaries of the site.
3	Jersey is situated in Le Golfe Normano-Breton between England and France, on the convergence of Boreal (cold temperate) and Lusitanian (warm temperate) marine biogeographical regions. Overlap of these regions promotes increased species richness and allows species to exist at the northern and southern limits of their distributions. This enables the site to support some species which are rare or absent from British coasts as they are normally associated with the warmer waters of southern Europe, e.g. ormer <i>Haliotis tuberculata</i> , as well as species that are normally associated with the colder northern waters of the United Kingdom, e.g. beadlet anemone <i>Actinia equina</i> . The overlap of the Boreal and Lusitanian biogeographical regions, produces many limit-of-range populations. It has been hypothesised that such limit-of-range populations contain unique alleles or a combination of alleles arisen through adaptation to local, more extreme environmental conditions than core populations. Monitoring of these habitats for environmental change is crucial.
4	The Baie de St Malo experiences huge movements of water diurnally with a relatively closed anti-clockwise current around Jersey. This factor, when combined with the warming influence of the Gulf Stream and the physical characteristics of the site assists in enhancing the local recruitment and subsequent offshore migration of many animals that have planktonic early life stages, especially commercially important Crustacea. The large areas of rocky shore are important to many species, providing shelter, protection and food for both larval and adult stages. Similarly the rich infaunal communities of the sand and mudflats are important for their range of mollusc and worm species. These areas are important nurseries for a wide variety of organisms. <i>Zostera</i> beds and wide, shallow gullies dividing the rocky platforms also provide critical habitat for many other forms and stages of life, as do the extensive and diverse algal communities found within the site.
7	The extensive areas of shallow water and huge number of intertidal pools found within the site provide habitat for many species of fish. To date 107 species of fish have been recorded from the site and adjacent waters. The enormous water exchanges and consequent strong tidal streams combined with high and low energy wave conditions and substrate variability mean a wide diversity of species and life history stages are present. The biogeographic location of the site allied with the surrounding oceanographic circulation and physical features serve to enhance species variety and abundance. The site contributes much to the continued viability of the Golfe Normano Breton ecosystem, which undoubtedly plays a major role in the functioning of English Channel fisheries and biodiversity.
8	On the south coast, several headlands of varying elevation extend into the residual inshore anti-clockwise current, creating sheltered areas in their western lee. Here, recruitment of planktonic larvae onto extensive areas of rocky shore and water-filled soft sediment gullies occurs. Many species of fish take advantage of elevated summer water temperatures to feed and grow on the rich food supply in fertile, shallow waters before making an Autumn migration to spawn in offshore waters. Conversely, other species are absent in summer but present in winter for similar reasons. A range of small fish species spend their entire life within the site. Adjacent to the site is a sandbank known as the Banc du Chateau where large rafts of seabirds and the bottlenose dolphins <i>Tursiops truncatus</i> often feed on a plentiful supply of sand-eels <i>Ammodytes</i> sp. and other pelagic fish.

13. 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:

Atlantic

b) biogeographic regionalisation scheme (include reference citation):

[Council Directive 92/43/EEC]

14. 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	acidic, alluvium, basic, boulder, clay, cobble, granite, gravel, igneous, maerl, metamorphic, mud, nutrient-rich, peat, pebble, sand, sandstone/mudstone, sedimentary, shingle, slate/shale
Geomorphology and landscape	coastal, crags/ledges, enclosed coast (including embayment), geos (rocky inlets), intertidal rock, intertidal sediments (including sandflat/mudflat), islands, lowland, open coast (including bay), pools, shingle bar, subtidal rock (including rocky reefs), subtidal sediments (including sandbank/mudbank), surge gullies, tidal rapids
Nutrient status	mesotrophic
pH	circumneutral
Salinity	saline / euhaline
Soil	
Water permanence	
Summary of main climatic features	No information available.

15. 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).

No information available

16. Hydrological values:

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

Shoreline stabilisation and dissipation of erosive forces, Sediment trapping

17. Wetland types

Code	Name	% Area
A	Shallow marine waters	33.4
B	Marine beds (e.g. sea grass beds)	2.3
D	Rocky shores	25.3
E	Sand / shingle shores (including dune systems)	37.5
Other	Other	1.4

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

The site contains a diverse array of habitats and micro-habitats. Extensive mud sand flats and pools stretching into shallow waters support extensive beds of eelgrasses *Zostera noltei* and *Zostera marina*. Intertidal rocky platforms bear luxuriant growth of furoid species. Low tide levels reveal large stands

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of *Laminaria* species. All of these communities also support rich epiphytic growth. The shallow water-filled gullies and intertidal rockpools contain dense colonies of the non-native alga *Sargassum muticum*, first recorded in Jersey in 1980. At times *Ulva lactuca* is abundant.

19. 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.*

Internationally important species occurring on the site:

Habitat Type

Zostera beds

Higher Plants

Zostera marina, *Zostera noltei*

Nationally important species occurring on the site

Habitat Type

Ascophyllum nodosum colonies

Lower plants

Bifurcaria bifurcata, *Codium fragile* subsp. *tomentosoides*, *Codium tomentosum*, *Cystoseira baccata*, *Cystoseira foeniculaceus*, *Cystoseira nodicaulis*, *Cystoseira tamariskolia*, *Halopteris scoparia*, *Stilophora tenella*, *Calliblepharis jubata*, *Choreocolax polysiphoniae*, *Falkenbergia rufolansa*, *Gigartina teedei*, *Gracilaria bursa-pastoris*, *Grateloupia filicina* var. *filicina*, *Griffithsia corallinoides*, *Halopithys incurvus*, *Halurus equisetifolius*, *Kallymenia reniformis*, *Lomentaria clavellosa*, *Mesophyllum lichenoides*, *Polysiphonia nigrescens*.

20. 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.*

Hippocampus hippocampus, *Gobius cobitis*

Molluscs

Modiolus modiolus, *Ostrea edulis*, *Haliotis tuberculata*, *Gibbula pennanti*, *Maetra glauca*,

Ocinebrina aciculata, *Rissoa guernei*

Crustaceans

Pisa tetraodon, *Thia scutellata*

21. Social and 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

Aquatic vegetation (e.g. reeds, willows, seaweed)

Archaeological/historical site

Conservation education

Current scientific research

Fisheries production

Non-consumptive recreation

Sport fishing

Subsistence fishing

Tourism

Traditional cultural

Transportation/navigation

22. Land tenure/ownership:

Ownership category	On-site	Off-site
Non-governmental organisation	+	+

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Local authority, municipality etc.	+	+
National/Crown estate	+	+
Private		+
Public/communal		+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+	+	Small-scale
Tourism	+	+	Large-scale
Recreation	+	+	Large-scale
Research	+	+	Small-scale
Collection of non-timber natural products: (unspecified)	+		Small-scale
Fishing: (unspecified)	+		Small-scale
Fishing: commercial	+	+	Small-scale
Fishing: recreational/sport	+	+	Large-scale
Fishing: subsistence	+	+	Small-scale
Marine/saltwater aquaculture	+	+	Large-scale
Gathering of shellfish	+	+	Large-scale
Shell collection	+	+	Small-scale
Bait collection	+	+	Large-scale
Permanent arable agriculture		+	Small-scale
Grazing (unspecified)		+	Small-scale
Rough or shifting grazing		+	Small-scale
Industrial water supply	+		Small-scale
Industry		+	Small-scale
Sewage treatment/disposal		+	Small-scale
Harbour/port	+	+	Small-scale
Mineral exploration	+	+	Small-scale
Transport route	+	+	Small-scale
Urban development	+	+	Small-scale
Military activities		+	Small-scale
Other	+	+	Large-scale

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

Activity	On-site	Off-site	Scale
No factors reported			

25. 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
Other	+	+
Management plan in preparation	+	

26. Conservation measures proposed but not yet implemented:

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

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27. Current scientific research and facilities:

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

DAILY

- Sea temperature is monitored from an automated station at St Helier Harbour and at another location east of the site.
- Tides from two gauges, recording date, time and height (m), to gather real time data to measure tidal surges for flood warnings.

MONTHLY

- The States of Jersey's Agriculture and Fisheries and Public Health Departments monitor fish farm concession areas, i.e., oysters and clams for *Escherichia coli*, presumptive coliforms and *Salmonella*.
- Société Jersiaise Ornithology Section conduct shorebird counts within specific sectors of the site. Undertaken at least once a month, with up to 3 counts per month during the winter (from December through to March).

QUARTERLY.

- Common limpet *Patella vulgata* and serrated wrack *Fucus serratus* are tested for Cd, Pb, Cu, Cr, Zn, As and Hg. Samples collected in January, April, July and October from La Collette/ Havre des Pas and Gorey since July 1996.
- Beach profiles taken Feb/May/Aug/Nov. 20 profiles taken at 20 metre intervals from MHW to MLW across the site.

BIANNUALLY.

- Slipper limpet *Crepidula fornicata* tested since July 1996 for heavy metal content in January and July. Sites east of St Helier Harbour and in Grouville Bay.
- Pollack *Pollachius pollachius* tested for radioactivity (Gross Beta and Gamma scan) spring and autumn.

ANNUALLY

- Seawater tested for radioactivity (Caesium 134 and 137, plus Tritium).
- Oyster *Crassostrea gigas* tested for radioactivity - Total beta, Gamma spectrometry and transuranics: Pu-238, Pu-239+240, Am-241 + where detected Cm-242 and Cm-243 + 244.
- Sediment (inshore and fine 200 u sieve) tested for radioactivity - Total beta, Gamma spectrometry and transuranics: Pu-238, Pu-239+240, Am-241 + where detected Cm-242 and Cm-243 + 244.

SEASONAL.

- Société Jersiaise Ornithology Section conduct monthly brent goose *Branta bernicla* counts during the winter from November through to April.
- Société Jersiaise Ornithology Section conduct fortnightly wader counts during the winter from November through to April.
- Bathing waters are monitored for a period of 20 weeks over the main tourist bathing season. Total coliform, faecal coliform and faecal *streptococci*, plus other physical and chemical parameters in compliance with EC Bathing Water Directive.

CONTINUOUS.

- Jersey's Department of Agriculture and Fisheries monitor usage of the site, commercial fisheries landings, recreational activity, farmed shellfish production, all imports and exports of farmed shellfish, occurrence and frequency of rare fish sightings and occurrence and frequency of fish kills.
- Sightings and mortalities of marine mammals recorded by the Zoology Section of the Société Jersiaise and the States of Jersey Department of Agriculture and Fisheries.
- Société Jersiaise Ornithology Section bird ringing project ongoing.

CURRENT STUDIES BEING UNDERTAKEN

- 3 year study on the importance of *Zostera* habitats to fisheries. Focussing on Jersey shores and funded by the States of Jersey Department of Agriculture and Fisheries.
- 3 year study on sediment dynamics and physical oceanography of Jersey's coastal waters. Funded by the States of Jersey Environmental Services Unit.

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- Monitoring of populations of the ormer *Haliotis tuberculata* following significant mortality in 1999.
- Trials underway in an attempt to enhance populations of scallop *Pecten maximus* within the site.
- Marine Conservation Society sublittoral biotope survey - Sea Search.

UNDERTAKEN AND COMPLETED: Pollution.

- University of Wales. Laser ablation study of a collection of historic to modern limpet shells for 11 elements, including Zn, Cu, Cd, Pb and As.
- Non-marine waters of south-east coast monitored monthly between January 1995 and November 1997. Outfalls at Le Hurel Slipway and La Rocque monitored since January 1994. Other sites - Le Bourg, Grouville Bay, Le Hurel and Gorey Harbour. Bacterial analysis occurred from January 1995 and full analysis for: NH₃, NO₃⁻, NO₂⁻, Na, K, Ca, Mg, P, SO₄, Cl, COD, BOD, suspended solids, total coliform, faecal coliform, faecal *streptococci*, from July 1995.

- CREH. (1995). Further Assessment of Non-outfall Sources of Bacterial Indicator Organisms to the Coastal Zone of the Island of Jersey.

UNDERTAKEN AND COMPLETED: Physical aspects -

- Various hydraulic studies have been carried out on the area surrounding St Helier. For example:

1. Coode & Partners (1980) *St Helier Harbour land reclamation west of Albert Pier. Report on tidal model studies*. Surrey, Harbours Office, Jersey.
2. Coode & Partners (1981) *St Helier harbour roll on roll off harbour and land reclamation. Report on wave model tests*. Surrey, Harbours Office, Jersey.
3. HR Wallingford (December 1989) *St Helier Hydraulic Studies*. 3 studies included sediment samples, beach profiles, waves, seasonal wave height exceedence, tidal flow measurements, suspended solids and bed sampling.

- Various reports describing Anneport Bay and Fauvic (Grouville Bay). (1991 – 1997). Examining wave regime, turbidity, pre and post recharge beach profiles, sediment transport patterns and an assessment of coastal protection options. For example:

4. HR Wallingford (December 1991) *Jersey Coastal Management Study*.
5. Bird, ECF (GeoStudies) (July 1995) *Report on survey of the Jersey Coast with reference to erosive problems*. (Includes studies on beach erosion problems at Fauvic and Anneport.)

- Various studies on coastal protection. For example:

6. Thorton, VA (September 1993) *Coast protection study*. (Baseline survey on the seawalls around the island.)
7. Young, J (March 1996) *Report on coastal protection and management*. Public Services Committee.

- Various inshore bathymetry studies have been carried out on the east of the Island.

8. Navy. UK Admiralty (November 1963) *Report of Survey Jersey, St Helier*.
9. Navy. UK Admiralty (April 1973) *Survey of North and East Coast, Jersey*.
10. HMS HECATE. BFPO Ships. UK Admiralty. (October 1983). *Report of Survey - Jersey East Coast Grouville Bay Shoal Investigation*.
11. Naval party 1016, *MV Proud Seahorse*. UK and French Admiralty. (December 1997). *Passage De La Deroute*.

- Le Hir, PBP *et al.* (October 1987) *Golfe Normono-Breton, Etude Regionale Integree*. IFREMER: 269. Studied hydrodynamics and sedimentology, deep water pelagic, sub-tidal biology, foreshore and wet zones, socio-economic aspects and a particular study of the Bay of Mont St Michel.

- HR Wallingford (December 1997 – June 1998). Wave buoy deployed off east coast to monitor height and period.

- Arup Economics and Planning (1998) *Jersey Mineral Study*. Investigated marine mineral resources.

- Turbidity monitored at 5 stations weekly during development of the St Helier Marina.

UNDERTAKEN AND COMPLETED: Flora and fauna.

A number of studies have been undertaken examining the biodiversity of Jerseys coastal zone. Some areas of the south-east coast have been studied in detail:

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1. Thomas, NS & Culley, MB (1988) *The macroinvertebrate fauna of the sandy shores adjacent to La Collette, Jersey*. Portsmouth Polytechnic, Marine Laboratory, unpublished report to States of Jersey
2. Culley, MB & English, P (1992) *A preliminary investigation into the macroinvertebrates of the soft sediments at La Rocque, Jersey, October 1990*. University of Portsmouth, Marine Laboratory, unpublished report to the States of Jersey
3. Save our Shoreline (1994) *A case for preserving the shoreline and Bay of Havre des Pas from any further development (landfill, reclamation schemes or marina) and a recommendation for making 'La Carriere' and associated causeway a Site of Special Interest*. (Presentation to Members of the States of Jersey). Save our Shoreline, St Helier
4. Culley, M, Farnham, W & Thorp, C (1996) *An assessment of the marine communities present on the south coast of Jersey from St Helier to La Rocque, July, 1994*. University of Portsmouth, Marine Laboratory, unpublished report to States of Jersey
5. Culley, MB, Thorp, CH, Farnham, WF & Romeril, MG (1996) *Proposal for the designation of the southern shore of Jersey from La Collette to La Rocque as a Site of Special Interest*. University of Portsmouth, Marine Laboratory, unpublished report to States of Jersey
6. Culley, MB & Thorp, CH (1996) *An Investigation of the macroinvertebrate communities inhabiting the sediments of the shore of Jersey from La Collette to La Rocque, April 1995*. University of Portsmouth, Marine Laboratory, unpublished report to States of Jersey
7. Mercer, T (1998) *Intertidal survey La Collette to Le Dicq, south-east coast of Jersey. Volume 1 – main report* Wildfowl and Wetlands Trust, Wetlands Advisory Service, Slimbridge, report to States of Jersey
8. Bruce, J (1998) *Assessment of wintering waterfowl populations, La Collette to Le Dicq, Jersey, Channel Islands*. Wildfowl and Wetlands Trust, Wetlands Advisory Service, Slimbridge, report to States of Jersey
 - Kindleysides, D (1995) *Conserving the intertidal biodiversity of Jersey: a strategy*. Unpublished MSc dissertation, University College London.
 - Crutchley, S (1997) *Designation of a Marine Protected Area in Jersey: Recommendations with special reference to molluscs*. Unpublished MSc dissertation, University College London
 - Jewell, S (1995) *An identification and analysis of key criteria for the sustainable development of Jersey's coastal zone*. Unpublished MSc dissertation, Heriot-Watt University, Institute of Offshore Engineering, Edinburgh
 - Southampton University study on radionuclides in molluscs and algae. Samples taken from St Helier and La Rocque.
 - Short report completed following significant mortality of razor shells *Ensis arcuatus* within site in 1998

28. Current conservation education:

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

A small range of published material is available on Jersey's wider marine environments. Several information panels are situated within the site. The States of Jersey and various NGO's organise regular guided walks across the site for all ages and abilities from infant to postgraduate level. Visiting groups of students regularly use the site for field studies. Fisheries regulations are explained in several information leaflets. A publication focused on the site, its value and future management is planned.

29. Current recreation and tourism:

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

Non-exploitive recreational activity is very important within the site. A wide range of activities take place, including for example: Walking (also with dogs), bird watching, horse-riding, sunbathing and beach games. Exploitive recreational activities centre on low water fishing for crustaceans, molluscs and fish, recreational angling, bait collection, spear-fishing and algae collection. Watersports are important within the site with water skiing, jet-skiing, windsurfing, canoeing, sailing, rowing, swimming all popular. Facilities within the site include non-marina boat moorings, a tidal swimming pool, beach kiosks, cafes and associated retail outlets. Piers, jetties and slipways are also found spread along the entire landward boundary of the site. On the whole there is currently little conflict within user groups; bar overfishing and threats from coastal development, the site suffers relatively little

activity of major environmental consequence. Most activities run throughout the year depending on weather and tides, but activity tends to peak in the summer months. The main tourist season is April to October. The estimated number of visitors to Jersey from 1994-1997 was 663,250. Some directed fisheries are subject to seasonal closures: *Maja squinado* and *Haliothis tuberculata*. There is a strong cultural attachment to the site within a significant proportion of Island residents - the continued ecological health of the site is held as sacrosanct by many.

30. Jurisdiction:

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

States of Jersey,

Policy and Resources Department, South Hill, St Helier, Jersey, JE2 4US

31. 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.

Environment Department, Howard Davis Farm, La Route de la Trinite, Jersey C.I. JE3 5JP

Tel: +44-1534-866228

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

- Anon. (1995) *Biodiversity: The UK Steering Group Report. Volume 2: Action plans*. HMSO, London
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- Mercer, T (1998) *Intertidal survey La Collette to Le Dicq, south-east coast of Jersey. Volume 1 – main report* Wildfowl and Wetlands Trust, Wetlands Advisory Service, Slimbridge, report to States of Jersey
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- Save our Shoreline (1994) *A case for preserving the shoreline and Bay of Havre des Pas from any further development (landfill, reclamation schemes or marina) and a recommendation for making 'La Carriere' and associated causeway a Site of Special Interest*. (Presentation to Members of the States of Jersey). Save our Shoreline, St Helier
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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Bureau. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

FOR OFFICE USE ONLY.

DD MM YY

Designation date Site Reference Number

1. Name and address of the compiler of this form: M. Freeman

Environment Department, Howard Davis Farm, Trinity Jersey JE4 8UF

2. Date this sheet was completed/updated: June 2004

3. Country: UK (Jersey)

4. Name of the Ramsar site: Les Minquiers, Jersey

5. Map of site included:

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

a) hard copy (required for inclusion of site in the Ramsar List): yes

b) digital (electronic) format (optional): yes

6. Geographical coordinates (latitude/longitude): 48 58' 27"N - 2 07' 14"W

7. General location:

The site lies 34Km due south from the port of St. Helier in the Channel Island of Jersey. The island is situated in the English Channel, 22.4 km west of Normandy (France) and 136 km south of Weymouth (England).

8. Elevation: -15m - +15m

9. Area: (in hectares) 9575ha

10. Overview:

The site complex consists of an extensive shoal area approximately 16Km long and 11Km wide. At high tide only rocky heads and a small supralittoral area, La Maitresse Isle which supports some small stone dwellings are exposed. The tidal range can exceed 12 m. At low tide various habitats are exposed, including reefs, boulder fields, sandy shores and shingle banks. The area is fed clean well oxygenated water and this factor, together with the range of habitats and the site's biogeographical position supports a wide range of rich and diverse biotopes and some unusual species assemblages. The flora and fauna is characterised by limit-of-range species at the northern and southern margins of their distributions which are not present on shores either to the north or south respectively. Fishing within the site is of great cultural, social and traditional importance to the population of Jersey.

11. 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).

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
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12. Justification for the application of each Criterion listed in 11. above:

1. The site has the one of the largest tidal ranges in the world which can exceed 12 metres, and a wide range of substrata and wave exposure. Its waters are relatively warm due to the influence of the Gulf Stream and surrounding oceanographic conditions. Habitat-based evaluations using comparisons with the nearby SE coast of Jersey Ramsar site (designated 2000) indicate that due to the diverse range of habitats, communities and species the site has great ecological value which play a substantial ecological role in the natural functioning of the system.

2. The extensive rocky intertidal areas in this site are of international importance because of the rarity and possible threats to this type of habitat and its associated communities. . Situated in Le Golfe Normano-Breton, in the same region as the Baie de Mont St Michel (designated Ramsar site 1994), the site is part of the last vestiges of a former land bridge to continental Europe and plays a major role in the continued functioning of the Golfe.

Different locations within the site support a number of species of wintering and passage waders and wildfowl with important feeding and roosting locations. The number of birds found within the site contribute to Jersey's nationally significant populations of 3 species. .

3. Jersey is situated in Le Golfe Normano-Breton between England and France on the boundary between the cold and warm temperate marine biogeographical regions. . Overlap between these regions promotes increased species richness and provides assemblages which include species at the limits of their respective distributions. Species associated with warmer southern European waters such as the Ormer (*Haliotis tubercula*) which are rare or absent from British coasts thus coexist with those normally associated with colder northern waters such as the Beadlet Anemone (*Actinia equina*). It has been hypothesised that such limit-of-range populations may eventually, through adaptation to local, more extreme environmental conditions than core populations undergo allopatric speciation which arises through reproductive isolation. Monitoring of these habitats for environmental change is therefore crucial. (Taylor and Cook 1981). One of the largest breeding populations of Bottlenosed Dolphins (*Tursiops truncatus*) in the British isles are recorded in the area.

4. The Baie de St Malo experiences huge diurnal movements of relatively warm, closed waters moved by a residual inshore anti-clockwise current around Jersey. This enhances local recruitment of many species of planktonic larvae, especially Crustacea. The large rocky platforms are important to

many invertebrate and vertebrate organisms, providing shelter, protection and food for both larval and adult stages. Likewise the rich infaunal communities of the mud and sand flats are important for their range of mollusc and worm species. These areas are important nursery zones for shore and shallow sublittoral fish communities. The wide shallow gullies dividing the rocky platforms also provide critical habitat for many other forms and stages of life as do the extensive and diverse algal assemblages.

7. The areas of shallow water and the large number of intertidal pools within the site provide habitat for many species of fish. The SE coast of Jersey surveys recorded 107 marine fish species of which 10 are of EU or UK importance and 34 priority marine invertebrates of which 14 are rare or scarce (UK). There is no reason to suppose that this site supports fewer. The enormous water exchanges, strong tidal streams, a wide variety of wave energy conditions and substrate variation provide ideal conditions for the support of a wide diversity of organisms. The combination of biogeographic location, oceanographic circulation and physical features enhances biodiversity. The site contributes to the biodiversity of the Golfe Normano-Breton and thence to the English Channel.

8. The topographical diversity of the site creates a range of sheltered areas which provide conditions favouring recruitment of planktonic larvae. Many species of fish feed and grow in the warm fertile shallows before commencing their autumn migration to spawn elsewhere. Conversely, other species winter in the area and leave during the summer. The site also provides habitat for the entire life cycle of many smaller marine organisms. This wide diversity provides feeding for dolphins and seabirds.

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

a) **biogeographic region:** Atlantic; Lusitanian -Boreal

b) **biogeographic regionalisation scheme** Indicative Map of the Biogeographical regions EUR15+20; Hiscock, K., ed 1996 *Marine Nature Conservation Review: rationale and methods* Peterborough JNCC (MNCR series)

14. Physical features of the site:

The majority of the exposed rock can be termed a foliated granodiorite. It is probable that the site was part of a land bridge to continental Europe which was inundated at the end of the last ice age. At low tide rocky reefs, shingle and sand banks are exposed, together with sub-angular to sub-rounded boulders of all sizes, and sedimentary mud, sand and gravel. Underlying peat and clay beds are of likely archaeological significance. Exposed and sheltered rocky shores, rockpools, intertidal overhangs and caves all present.

The site has the one of the largest tidal ranges in the world which can exceed 12 metres. The climate of the region is temperate oceanic.

15. Physical features of the catchment area:

N/A

16. Hydrological values:

The site provides a settlement area for sediment moving in the Golfe Normano-Breton and large volumes of coarse sediment form extensive shifting banks.

17. 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:

<u>A</u>	<u>B</u>	C	<u>D</u>	<u>E</u>	F	<u>G</u>	H	I	J	K	Zk(a)
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Inland:

L	M	N	O	P	Q	R	Sp	Ss	Tp	Ts	U	Va	Vt	W	Xf	Xp	Y	Zg	Zk(b)
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Human-made:

1	2	3	4	5	6	7	8	9	Zk(c)
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b) dominance:

A,D,B,E,G.

18. General ecological features:

The site contains a diverse array of habitats and micro-habitats. Luxuriant growth of fucoid species on intertidal rocky platforms, rockpools and gullies with a variety of algae, crustaceans and fish, intertidal channels with sponge and ascidian communities and some intertidal sediment communities all occur on the site

19. Noteworthy flora:

Intertidal rocky platforms bear luxuriant growth of Fucoid species (algae). Stands of *Laminaria* species (kelp) also occur. Intertidal rock pools contain dense colonies of the introduced alga *Sargassum muticum*, first recorded in Jersey in 1980..

20. Noteworthy fauna:

Nationally important species include the molluscs *Modiolus modiolus*, *Haliotis tuberculata*, *Gibbula pennanti* and *Maetra glauca*. Crabs include *Pisa tetraodon* and *Thia scutellata*. The extensive areas of shallow water and huge numbers of intertidal pools found within the site provide habitat for many species of fish such as *Hippocampus hippocampus* and *Gobius cobitis*.

21. Social and cultural values:

. The site has great cultural significance for the people of Jersey although until recently it was relatively unvisited except for the users of the huts. An amount of low water fishing and angling takes place. The boating community now makes extensive use of the Islets and increasing numbers of day trippers from Jersey and France visit the reefs .

22. Land tenure/ownership:

(a) within the Ramsar site: Property of the English Crown

(b) in the surrounding area: States of Jersey

23. Current land (including water) use:

(a) within the Ramsar site: amateur low-water fishing . Low key recreation

(b) in the surroundings/catchment: Commercial fishing

24. 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: None identified at present .

(b) in the surrounding area: None identified at present.

25. Conservation measures taken:

A Marine Protection Zone was established in 1995. This presumes no development between mean high water mark and the seaward extent of Jersey's territorial seas, other than for fish farming purposes. Major developments now require a full environmental impact assessment under the Island's planning laws. A range of sea fisheries regulations apply and are enforced across the site. To deal with the potential for serious damage from marine pollution, an Oil Spill Contingency Plan is in place. Alterations to the Island Planning Law and the development of the Conservation of Wildlife (Jersey) Law 1999 afford the potential for enhanced legal protection of the site. Jet Skis are banned from the area

26. Conservation measures proposed but not yet implemented:

Proposed site of special interest under the Planning (Jersey) Law 1964.

27. Current scientific research and facilities:

Difficulties in accessing the site and resource limitations currently preclude research

28. Current conservation education:

An information booklet on the importance of Jersey's Ramsar site is currently available.

29. Current recreation and tourism:

Low key recreation by visitors from France and Jersey . The increase in these visits is a cause for concern and negotiations are in progress to control this

30. Jurisdiction:

Functional jurisdiction resides with Bailiwick of Jersey. Functional administration is by the Environment Department , States of Jersey.

31. Management authority:

Environment Department , Howard Davis Farm, Trinity Jersey JE3 5JP. Officer currently responsible :M.Freeman (Principal Ecologist)

32. Bibliographical references:

Anon. (1997). *Anthropogenic radionuclides in the region of Jersey*. Report to the States of Jersey, Southampton Oceanography Centre, Geosciences Division.

Bishop A.C., Bisson G. (1989) *Classical areas of British geology- Jersey*. British Geological Survey H.M.S.O.

Crutchley, S. (1997). *Designation of a marine protected area in Jersey: Recommendations with special reference to molluscs*. Unpublished MSc thesis, University College London.

Culley, M.B. (1979). *An investigation into some aspects of the fisheries of Jersey*. Report to the States of Jersey, University of Portsmouth.

Culley, M., Farnham, W., Fletcher, R. and Thorp, C. (1993). *The marine ecology of Maitresse Ile, Les Minquiers*. Report to the States of Jersey, University of Portsmouth

Farnham, W.F. (1991). *Marine fauna of Jersey*. Report to the States of Jersey, University of Portsmouth.

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Jewell, S. (1995). *An identification and analysis of key criteria for the sustainable development of Jersey's coastal zone*. Unpublished MSc thesis, Heriot-Watt University.

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Rodwell .W.J. (1996) *Les Écréhous Jersey* Société Jersiaise

Taylor, P.D., & Cook, P.L., (1981.) *Hippoporidra edax* (Busk, 1859) and a revision of some fossil and living *Hippoporidra* (Bryozoa). *Bulletin of the British Museum (Natural History) (Geology)*, 35: 243-251.

Indicative Map of the Biogeographical regions EUR15+20

**Please return to: Ramsar Convention Bureau, Rue Mauverney 28, CH-1196 Gland, Switzerland
Telephone: +41 22 999 0170 o Fax: +41 22 999 0169 o e-mail: ramsar@ramsar.org**

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Bureau. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

FOR OFFICE USE ONLY.

DD MM YY

Designation date Site Reference Number

1. Name and address of the compiler of this form: M. Freeman

Environment Department, Howard Davis Farm, Trinity Jersey JE4 8UF

2. Date this sheet was completed/updated: June 2004

3. Country: UK (Jersey)

4. Name of the Ramsar site: Les Écréhous & Les Dirouilles, Jersey

5. Map of site included:

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

a) hard copy (required for inclusion of site in the Ramsar List): yes

b) digital (electronic) format (optional): yes

6. Geographical coordinates (latitude/longitude): 49 17' 32"N - 1 57' 56"W

7. General location: The site is situated 20 Km to the North-East of Gorey harbour on the East of the Channel Island of Jersey. The island is situated in the English Channel, 22.4 km west of Normandy (France) and 136 km south of Weymouth (England).

8. Elevation: (average and/or max. & min.) -15m -+15m

9. Area: 5459ha

10. Overview:

The site complex consists of two reefs which form an extensive shoal area 11 Km long and 3.7Km wide. At high tide only a group of rocky heads and an islet, Le Maitre Isle, are exposed. Four of the heads are large enough to support buildings :La Marmotière , Le Blianche Îsle, La Grande Breque and La Petit Breque. The tidal range can exceed 12 m. At low tide various habitats are exposed , including reefs, boulder fields, sandy shores and shingle banks The area is fed clean well oxygenated water and this factor , together with the range of habitats and the site's biogeographical position supports a wide range of rich and diverse biotopes and some unusual species assemblages. The flora and fauna is characterised by limit-of-range species at the northern and southern margins of their distributions which are not present on shores either to the north or south respectively. Fishing within the site is of great cultural, social and traditional importance to the population of Jersey.

11. Ramsar Criteria:

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
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12. Justification for the application of each Criterion listed in 11. above:

1. The site has the one of the largest tidal ranges in the world which can exceed 12 metres, and a wide range of substrata and wave exposure. Its waters are relatively warm due to the influence of the Gulf Stream and surrounding oceanographic conditions. Habitat-based evaluations using comparisons with the nearby SE coast of Jersey Ramsar site (designated 2000) indicate that due to the diverse range of habitats, communities and species the site has great ecological value which play a substantial ecological role in the natural functioning of the system

2. The extensive rocky intertidal areas in this site are of international importance because of the rarity and possible threats to this type of habitat and its associated communities. . Situated in Le Golfe Normano-Breton, in the same region as the Baie de Mont St Michel (designated Ramsar site 1994), the site is part of the last vestiges of a former land bridge to continental Europe and plays a major role in the continued functioning of the Golfe.

Different locations within the site support a number of species of wintering and passage waders and wildfowl with important feeding and roosting locations. The number of birds found within the site contribute to Jersey's nationally significant populations of 3 species. .

3. Jersey is situated in Le Golfe Normano-Breton between England and France on the boundary between the cold and warm temperate marine biogeographical regions . Overlap between these regions promotes increased species richness and provides assemblages which include species at the limits of their respective distributions. Species associated with warmer southern European waters such as the Ormer (*Haliotis tubercula*) which are rare or absent from British coasts thus coexist with at those normally associated with colder northern waters such as the Beadlet Anemone (*Actinia equina*). It has been hypothesised that such limit-of-range populations may eventually , through adaptation to local, more extreme environmental conditions than core populations undergo allopatric speciation which arises through reproductive isolation. Monitoring of these habitats for environmental change is therefore crucial. (Taylor and Cook 1981). A small population of Grey Seals (*Halichoerus erypus*) and one of the largest breeding populations of Bottle nosed Dolphins (*Tursiops truncatus*) in the British isles are recorded in the area.

4. The Baie de St Malo experiences huge diurnal movements of relatively warm, closed waters moved by a residual inshore anti-clockwise current around Jersey. This enhances local recruitment of many species of planktonic larvae, especially Crustacea. The large rocky platforms are important to many invertebrate and vertebrate organisms, providing shelter, protection and food for both larval and

adult stages. Likewise the rich infaunal communities of the mud and sand flats are important for their range of mollusc and worm species. These areas are important nursery zones for shore and shallow sublittoral fish communities. The wide shallow gullies dividing the rocky platforms also provide critical habitat for many other forms and stages of life as do the extensive and diverse algal assemblages.

7. The areas of shallow water and the large number of intertidal pools within the site provide habitat for many species of fish. The SE coast of Jersey surveys recorded 107 marine fish species of which 10 are of EU or UK importance and 34 priority marine invertebrates of which 14 are rare or scarce (UK). There is no reason to suppose that this site supports fewer. The enormous water exchanges, strong tidal streams, a wide variety of wave energy conditions and substrate variation provide ideal conditions for the support of a wide diversity of organisms. The combination of biogeographic location, oceanographic circulation and physical features enhances biodiversity. The site contributes to the biodiversity of the Golfe Normano-Breton and thence to the English Channel.

8. The topographical diversity of the site creates a range of sheltered areas which provide conditions favouring recruitment of planktonic larvae. Many species of fish feed and grow in the warm fertile shallows before commencing their autumn migration to spawn elsewhere. Conversely, other species winter in the area and leave during the summer. The site also provides habitat for the entire life cycle of many smaller marine organisms. This wide diversity provides feeding for dolphins and seabirds.

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

a) biogeographic region: Atlantic; Lusitanian -Boreal

b) biogeographic regionalisation scheme Indicative Map of the Biogeographical regions EUR15+20; Hiscock, K., ed 1996 *Marine Nature Conservation Review: rationale and methods* Peterborough JNCC (MNCR series)

14. Physical features of the site:

The majority of the exposed rock can be termed a foliated granodiorite. It is probable that the site was part of a land bridge to continental Europe which was inundated at the end of the last ice age. At low tide rocky reefs, shingle and sand banks are exposed, together with sub-angular to sub-rounded boulders of all sizes, and sedimentary mud, sand and gravel. Underlying peat and clay beds are of likely archaeological significance. Exposed and sheltered rocky shores, rockpools, intertidal overhangs and caves all present.

The site has the one of the largest tidal ranges in the world which can exceed 12 metres. The climate of the region is temperate oceanic.

15. Physical features of the catchment area:

N/A

16. Hydrological values:

The site provides a settlement area for sediment moving in the Golfe Normano-Breton and large volumes of coarse sediment form extensive shifting banks

17. Wetland Types

a) presence:

.

Marine/coastal:

<u>A</u>	<u>B</u>	C	<u>D</u>	<u>E</u>	F	<u>G</u>	H	I	J	K	Zk(a)
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Inland:

L	M	N	O	P	Q	R	Sp	Ss	Tp	Ts	U	Va	Vt	W	Xf	Xp	Y	Zg	Zk(b)
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Human-made:

1	2	3	4	5	6	7	8	9	Zk(c)
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b) dominance:

A,D,B,E,G.

18. General ecological features:

The site contains a diverse array of habitats and micro-habitats. Luxuriant growth of fucoid species on intertidal rocky platforms, rockpools and gullies with a variety of algae, crustaceans and fish, intertidal channels with sponge and ascidian communities and some intertidal sediment communities all occur on the site

19. Noteworthy flora:

Intertidal rocky platforms bear luxuriant growth of Furoid species (algae). Stands of *Laminaria* species (kelp) also occur. Intertidal rock pools contain dense colonies of the introduced alga *Sargassum muticum*, first recorded in Jersey in 1980..

20. Noteworthy fauna:

Nationally important species include the molluscs *Modiolus modiolus*, *Haliotis tuberculata*, *Gibbula pennanti* and *Maetra glauca*. Crabs include *Pisa tetraodon* and *Thia scutellata*. The extensive areas of shallow water and huge numbers of intertidal pools found within the site provide habitat for many species of fish such as *Hippocampus hippocampus* and *Gobius cobitis*.

21. Social and cultural values:

Important archaeologically for the Neolithic and medieval sites. The site has great cultural significance for the people of Jersey although until recently it was relatively unvisited except for the users of the huts. An amount of low water fishing and angling takes place. The boating community now makes extensive use of the Islets and increasing numbers of day trippers from Jersey and France visit the reefs .

22. Land tenure/ownership:

(a) within the Ramsar site: Property of the English Crown

23. Current land (including water) use:

(a) within the Ramsar site: Commercial fishing and amateur low-water fishing . Low key recreation

24. 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: None identified at present .

(b) in the surrounding area: None identified at present.

25. Conservation measures taken:

A Marine Protection Zone was established in 1995. This presumes no development between mean high water mark and the seaward extent of Jersey's territorial seas, other than for fish farming purposes. Major developments now require a full environmental impact assessment under the Island's planning laws. A range of sea fisheries regulations apply and are enforced across the site. To deal with the potential for serious damage from marine pollution, an Oil Spill Contingency Plan is in place. Alterations to the Island Planning Law and the development of the Conservation of Wildlife (Jersey) Law 1999 afford the potential for enhanced legal protection of the site. Jet Skis are banned from the area

26. Conservation measures proposed but not yet implemented:

Proposed site of special interest under the Planning (Jersey) Law 1964.

27. Current scientific research and facilities:

Difficulties in accessing the site and resource limitations currently preclude research

28. Current conservation education:

An information booklet on the importance of Jersey's Ramsar site is currently available.

29. Current recreation and tourism:

Low key recreation by visitors from France and Jersey . The increase in these visits is a cause for concern and negotiations are in progress to control this

30. Jurisdiction:

Functional jurisdiction resides with Bailiwick of Jersey. Functional administration is by the Environment Department , States of Jersey.

31. Management authority:

Environment Department , Howard Davis Farm, Trinity Jersey JE3 5JP Officer currently responsible :M.Freeman (Principal Ecologist)

32. Bibliographical references:

Anon. (1997). *Anthropogenic radionucleides in the region of Jersey*. Report to the States of Jersey, Southampton Oceanography Centre, Geosciences Division.

Bishop A.C., Bisson G. (1989) *Classical areas of British geology- Jersey*. British Geological Survey H.M.S.O.

Crutchley, S. (1997). *Designation of a marine protected area in Jersey: Recommendations with special reference to molluscs*. Unpublished MSc thesis, University College London.

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Culley, M., Farnham, W., Fletcher, R. and Thorp, C. (1993). *The marine ecology of Maitresse Ile, Les Minquiers*. Report to the States of Jersey, University of Portsmouth

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Kindleysides, D. (1995). *Conserving the intertidal biodiversity of Jersey: a strategy.* Unpublished MSc thesis, University College London.

Rodwell .W.J. (1996) *Les Écréhous Jersey* Société Jersiaise

Taylor, P.D., & Cook, P.L., (1981.) *Hippoporidra edax* (Busk, 1859) and a revision of some fossil and living *Hippoporidra* (Bryozoa). *Bulletin of the British Museum (Natural History) (Geology)*, 35: 243-251.

Indicative Map of the Biogeographical regions EUR15+20

**Please return to: Ramsar Convention Bureau, Rue Mauverney 28, CH-1196 Gland, Switzerland
Telephone: +41 22 999 0170 o Fax: +41 22 999 0169 o e-mail: ramsar@ramsar.org**

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Bureau. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

FOR OFFICE USE ONLY.

DD MM YY

Designation date Site Reference Number

1. Name and address of the compiler of this form: M. Freeman

Environment Department, Howard Davis Farm, Trinity Jersey JE2 5JP

2. Date this sheet was completed/updated: June 2004

3. Country: UK (Jersey)

4. Name of the Ramsar site: Les Pierres de Lecq (the Paternosters)

5. Map of site included:

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

a) hard copy (required for inclusion of site in the Ramsar List): **yes**

b) digital (electronic) format (optional): **yes**

6. Geographical coordinates (latitude/longitude): 49 17' 36N - 2 12' 15"W

7. General location:

The site lies approximately 16 Km due north of Grève de Lecq on the North –West coast of the Channel Island of Jersey. The island is situated in the English Channel, 22.4 km west of Normandy (France) and 136 km south of Weymouth (England).

8. Elevation: -15m - +15m

9. Area: (in hectares) 512ha

10. Overview:

At high water only four heads are uncovered. At low tide an extensive reef is uncovered. Great Rock, which is ten metres high and Sharp Rock, four metres high, are the largest rocks and are situated in the middle of the bank..

11. 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).

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	5	6	<u>7</u>	<u>8</u>
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12. Justification for the application of each Criterion listed in 11. above:

1. The site has the one of the largest tidal ranges in the world which can exceed 12 metres, and a wide range of substrata and wave exposure. Its waters are relatively warm due to the influence of the Gulf Stream and surrounding oceanographic conditions. Habitat-based evaluations using comparisons with the nearby SE coast of Jersey Ramsar site (designated 2000) indicate that due to the diverse range of habitats, communities and species the site has great ecological value which play a substantial ecological role in the natural functioning of the system

2. The extensive rocky intertidal areas in this site are of international importance because of the rarity and possible threats to this type of habitat and its associated communities. .

3. Jersey is situated in Le Golfe Normano-Breton between England and France on the boundary between the cold and warm temperate marine biogeographical regions . Overlap between these regions promotes increased species richness and provides assemblages which include species at the limits of their respective distributions. Species associated with warmer southern European waters such as the Ormer (*Haliotis tubercula*) which are rare or absent from British coasts thus coexist with at those normally associated with colder northern waters such as the Beadlet Anemone (*Actinia equina*). It has been hypothesised that such limit-of-range populations may eventually , through adaptation to local, more extreme environmental conditions than core populations undergo allopatric speciation which arises though reproductive isolation. Monitoring of these habitats for environmental change is therefore crucial. (Taylor and Cook 1981).

4. The Baie de St Malo experiences huge diurnal movements of relatively warm, closed waters moved by a residual inshore anti-clockwise current around Jersey. This enhances local recruitment of many species of planktonic larvae, especially Crustacea. The large rocky platforms are important to many invertebrate and vertebrate organisms, providing shelter, protection and food for both larval and adult stages. These areas are important nursery zones for shore and shallow sublittoral fish communities. The wide shallow gullies dividing the rocky platforms also provide critical habitat for many other forms and stages of life as do the extensive and diverse algal assemblages.

7.The areas of shallow water and the large number of intertidal pools within the site provide habitat for many species of fish. The enormous water exchanges , strong tidal streams , a wide variety of wave energy conditions and substrate variation provide ideal conditions for the support of a wide diversity of organisms. The combination of biogeographic location , oceanographic circulation and physical features enhances biodiversity. The site contributes to the biodiversity of the Golfe Normano-Breton and thence to the English Channel .

8. The topographical diversity of the site creates a range of sheltered areas which provide conditions favouring recruitment of planktonic larvae. Many species of fish feed and grow in the warm fertile

shallows before commencing their autumn migration to spawn elsewhere. Conversely, other species winter in the area and leave during the summer. The site also provides habitat for the entire life cycle of many smaller marine organisms. This wide diversity provides feeding for dolphins and seabirds.

13. 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:** Atlantic; Lusitanian –Boreal

b) **biogeographic regionalisation scheme** Indicative Map of the Biogeographical regions EUR15+20; Hiscock, K., ed 1996 *Marine Nature Conservation Review: rationale and methods* Peterborough JNCC (MNCR series)

14. Physical features of the site:

The majority of the exposed rock can be termed a foliated granodiorite. The site has the one of the largest tidal ranges in the world which can exceed 12 metres. The climate of the region is temperate oceanic.

15. Physical features of the catchment area:

N/A

16. Hydrological values:

The site provides a settlement area for sediment moving in the Golfe Normano-Breton and large volumes of coarse sediment form shifting banks

17. 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:

<u>A</u>	<u>B</u>	C	<u>D</u>	<u>E</u>	F	G	H	I	J	K	Zk(a)
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Inland:

L	M	N	O	P	Q	R	Sp	Ss	Tp	Ts	U	Va	Vt	W	Xf	Xp	Y	Zg	Zk(b)
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Human-made:

1	2	3	4	5	6	7	8	9	Zk(c)
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b) **dominance:**

D, A, B.

18. General ecological features:

The site contains a diverse array of habitats and micro-habitats. Luxuriant growth of furoid species on intertidal rocky platforms, rockpools and gullies with a variety of algae, crustaceans and fish, intertidal channels with sponge and ascidian communities all occur on the site

19. Noteworthy flora:

Intertidal rocky platforms bear luxuriant growth of Furoid species (algae). Stands of *Laminaria* species (kelp) also occur. Intertidal rock pools contain dense colonies of the introduced alga *Sargassum muticum*, first recorded in Jersey in 1980..

20. Noteworthy fauna:

Nationally important species include the molluscs *Modiolus modiolus*, *Haliotis tuberculata*, *Gibbula pennanti* and *Macra glauca*. Crabs include *Pisa tetraodon* and *Thia scutellata*. The extensive areas of shallow water and huge numbers of intertidal pools found within the site provide habitat for many species of fish such as *Hippocampus hippocampus* and *Gobius cobitis*.

21. Social and cultural values:

The number of visitors to this reef is very low. The main cultural significance is the visibility of the reef from the Island's north coast and the stories associated with the reef.

22. Land tenure/ownership:

(a) within the Ramsar site: Property of the English Crown

(b) in the surrounding area: States of Jersey

23. Current land (including water) use:

(a) within the Ramsar site: Low-key recreation

(b) in the surroundings: Commercial fishing

24. 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: None identified at present .

(b) in the surrounding area: None identified at present .

25. Conservation measures taken:

A Marine Protection Zone was established in 1995. This presumes no development between mean high water mark and the seaward extent of Jersey's territorial seas, other than for fish farming purposes. Major developments now require a full environmental impact assessment under the Island's planning laws. A range of sea fisheries regulations apply and are enforced across the site. To deal with the potential for serious damage from marine pollution, an Oil Spill Contingency Plan is in place.. Alterations to the Island Planning Law and the development of the Conservation of Wildlife (Jersey) Law 1999 afford the potential for enhanced legal protection of the site. Jet Skis are banned from the area

26. Conservation measures proposed but not yet implemented:

Proposed site of special interest under the Planning (Jersey) Law 1964.

27. Current scientific research and facilities:

Difficulties in accessing the site and resource limitations currently preclude research

28. Current conservation education:

An information booklet on the importance of Jersey's Ramsar site is currently available.

29. Current recreation and tourism:

Infrequent visits by small boats and

30. Jurisdiction:

Functional jurisdiction resides with Bailiwick of Jersey. Functional administration is by the Environment Department, States of Jersey.

31. Management authority:

Environment Department, Howard Davis Farm, Trinity Jersey JE3 5JP. Officer currently responsible: M. Freeman (Principal Ecologist)

32. Bibliographical references:

Anon. (1997). *Anthropogenic radionuclides in the region of Jersey*. Report to the States of Jersey, Southampton Oceanography Centre, Geosciences Division.

Bishop A.C., Bisson G. (1989) *Classical areas of British geology- Jersey*. British Geological Survey H.M.S.O.

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Indicative Map of the Biogeographical regions EUR15+20

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Telephone: +41 22 999 0170 o Fax: +41 22 999 0169 o e-mail: ramsar@ramsar.org**

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note for compilers:

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2. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

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

Updated by:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 4DG
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

DD MM YY		

Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

20 March 2003 / 11 November 2004

3. Country:

UK (Western Sovereign Base Area of Cyprus)

4. Name of the Ramsar site:

Akrotiri

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional): Yes

6. Geographical coordinates (latitude/longitude):

34 37 00 N 32 58 00 E

7. General location:

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

Akrotiri Ramsar site is located on Akrotiri Peninsula, the southernmost part of Cyprus. The site is located 5 km south-west of the city of Limassol (population circa 150,000). It also borders Akrotiri village (population circa 800) and RAF Station Akrotiri to the south and Asomatos village (population circa 350) to the north.

Administrative region: Western Sovereign Base Area of Cyprus

- 8. Elevation** (average and/or max. & min.) (metres): **9. Area** (hectares): 2171
- | | |
|------|------|
| Min. | -3 |
| Max. | 2 |
| Mean | -0.5 |

10. Overview:

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

The Akrotiri Ramsar site is composed of two distinct areas that are hydrologically connected. The first and largest area is the large salt lake and sand flats that are situated in the centre of the Akrotiri peninsula. Over the last three centuries, this former lagoon has been isolated from the sea and a number of saltmarsh vegetation communities have developed and now surround the lake. The lake and surrounding saltmarsh is important for a range of wetland birds, in particular greater flamingo *Phoenicopterus ruber*. A eucalyptus forest borders the northern side of the lake and this is an important raptor roosting area. The second distinct area is the Fassouri marshes that lie to the north-east of the salt lake. This area is made up of a matrix of freshwater habitat types including grazing marsh and reedbeds. Rain water is the key hydrological input for both areas, although the lake does get occasional input from the sea during storms. The two areas are hydrologically linked and the Fassouri marshes provide important water inputs to the seasonal salt lake.

11. 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, 6

12. Justification for the application of each Criterion listed in 11. 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).

1	The site qualifies under Criterion 1 of the Ramsar Convention as it is one of the very few major salt lakes within the eastern Mediterranean in semi-natural condition that exhibits a wide range of saline and freshwater influences. The site contains many good examples of inland saline and freshwater wetland habitats, a combination that is unique within the biogeographic region of the eastern Mediterranean, including permanent and seasonal saline pools, salt marsh, sand flats and freshwater marshes. The site is the largest aquatic system in Cyprus.
2	The site qualifies under Criterion 2 as it supports an appreciable number of rare, vulnerable or endangered species or subspecies of plant or animal including 13 endemic and rare plant species such as <i>Ophrys kotschy</i> and <i>Linum maritimum</i> , as well as over 32 bird species listed on Annex I of the European Birds Directive.
3	The site qualifies under Criterion 3 as it supports populations of plant and animal species that are important for maintaining the biological diversity of the eastern Mediterranean biogeographic region. Many species of plant and animal, including a number of endemic plant and invertebrate species, are wholly dependent on habitat types represented within the site of which there are few remaining examples on Cyprus.
6	The site qualifies under Criterion 6 by regularly supporting an internationally important wintering population of greater flamingo <i>Phoenicopterus ruber</i> . In the five-winter period 1998-2002, an average peak count of 6,000 was recorded, being approximately 2% of the eastern Mediterranean/SW& S Asian population. Species occurring at levels of international importance (as identified at designation): Over winter the area regularly supports: <i>Phoenicopterus ruber</i> : 6000 individuals, representing an average of 1% of the population (1993-2002)

13. 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:

Mediterranean

b) biogeographic regionalisation scheme (include reference citation):

Council Directive 92/43/EEC (as amended)

14. 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, sand
Geomorphology and landscape	basins, lagoon, lowland, pools
Nutrient status	oligotrophic
pH	strongly alkaline
Salinity	brackish / mixosaline
Soil	mainly mineral
Water permanence	usually seasonal / intermittent
Summary of main climatic features	No information available.

15. 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).

No information reported.

16. Hydrological values:

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

Flood water storage / desynchronisation of flood peaks

17. Wetland types

Code	Name	% Area
E	Sand / shingle shores (including dune systems)	4.2
H	Salt marshes	4.1
Ts	Freshwater marshes / pools: seasonal / intermittent	7.8
W	Shrub-dominated wetlands	44.8
R	Saline / brackish lakes: seasonal / intermittent	33.3
9	Canals and drainage channels	0.1
Other	Other	5.7

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Salt lake and small depressions holding water and plants. The main plants are *Ruppia maritima* and *Chara* spp. Unicellular algae are also present in the salt lake.

Reed beds and sedges: *Phragmites australis*, *Imperata cylindrica*, *Calystegia sepium*, *Cladium mariscus*, *Saccharum ravennae*, *Juncus* spp., *Scirpus maritimus*.

Salicornia and other annuals colonizing mud and sand: *Salicornia europaea*, *Halopeplis amplexicaulis*, *Suaeda maritima*, *Cressa cretica*, *Frankenia pulverulenta*, *Hordeum marinum*, *Parapholis marginata*, *Sphenopus divaricatus*, *Spergularia marina*.

Mediterranean salt meadows (*Juncetalia maritimi*): *Juncus maritimus*, *Juncus acutus*, *Juncus articulatus*, *Juncus heldreichianus*, *Juncus hybridus*, *Juncus littoralis*, *Juncus rigidus*, *Juncus subulatus*, *Aeluropus lagopoides*, *Agropyron elongatum*, *Bolboschoenus maritimus*, *Carex distans*, *Carex divisa*, *Carex extensa*, *Centaurium pulchellum*, *Centaurium tenuiflorum*, *Crypsis factorovskii*, *Hordeum marinum*, *Imperata cylindrica*, *Limonium mucronulatum*, *Linum maritimum*, *Parapholis marginata*, *Plantago maritima* subsp. *crassifolia*, *Saccharum ravennae*, *Schoenoplectus littoralis*, *Schoenus nigricans*, *Scirpoides holoschoenus*, *Triglochin bulbosa*.

Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcoconetea fruticosi*): *Arthrocnemum macrostachyum*, *Salicornia fruticosa*, *Salicornia perennis*, *Atriplex portulacoides*, *Halocnemum strobilaceum*, *Inula crithmoides*, *Spergularia marina*, *Suaeda vera*, *Limonium mucronulatum*.

Dune sclerophyllous scrubs (*Cisto-Lavenduletalia*): *Thymus capitatus*, *Teucrium micropodioides*, *Helianthemum stipulatum*, *Cistus* spp., *Echium angustifolium*, *Fumana thymifolia*, *Pistacia lentiscus*, *Asparagus stipularis*, *Rhamnus oleoides* ssp. *graecus*, *Thymelaea hirsuta*, *Lycium sweinfurthii*, *Noaea mucronata*, *Phagnalon rupestre*, *Echium angustifolium*.

Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.: *Chara* spp.

Arborescent matorral with *Juniperus* spp.: *Juniperus phoenicea*, *Ceratonia siliqua*, *Cistus* spp., *Myrtus communis*, *Olea europaea*, *Pistacia lentiscus*, *Prasium majus*, *Rhamnus oleoides* subsp. *graecus*, *Thymus capitatus*, *Thymelaea hirsuta*.

Sarcopoterium spinosum phryganas: *Sarcopoterium spinosum*, *Thymus capitatus*, *Cistus* spp., *Convolvulus oleifolius*, *Fumana* spp., *Helianthemum obtusifolium*, *Helianthemum* spp., *Helichrysum conglobatum*, *Lithodora hispidula* ssp. *versicolor*, *Micromenia* spp., *Noaea mucronata*, *Onosma fruticosa*, *Phagnalon rupestre*, *Teucrium* spp.

Mediterranean tall humid grasslands of the *Molinio-Holoschoenion*: *Panicum repens*, *Baldellia ranunculoides*, *Teucrium scordium* ssp. *scorpioides*, *Centaurea calcitrapa* ssp. *angusticeps*, *Cyperaceae* spp., *Juncus* spp., *Lotus corniculatus*, *Lythrum junceum*, *Mentha aquatica*, *Ononis spinosa*, *Pulicaria dysenterica* ssp. *uliginosa*, *Ranunculus peltatus*, *Saccharum ravennae*, *Schoenus nigricans*, *Scirpoides holoschoenus*, *Euphorbia pubescens*.

Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*): *Tamarix tetragyna*, *Asparagus stipularis*.

Olea and *Ceratonia* forests: *Pistacia lentiscus*, *Rhamnus oleoides* ssp. *graecus*, *Olea europaea* ssp. *silvestris*, *Ceratonia siliqua*, *Calycotome villosa*, *Genista fasselata*, *Myrtus communis*, *Pistacia terebinthus*, *Prasium majus*.

Eucalyptus/Acacia: *Eucalyptus gomphocephala*, *Eucalyptus camaldulensis*, *Acacia saligna* and other *Acacia* spp., *Casuarina cunninghamiana*.

19. 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.*

Habitats of International Importance:

1150 Coastal lagoons [EC Habitats Directive Annex I *Priority habitat]

1310 *Salicornia* and other annuals colonizing mud and sand [EC Habitats Directive Annex I]

1410 Mediterranean salt meadows (*Juncetalia maritimi*) [EC Habitats Directive Annex I]

1420 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcoconetea fruticosi*) [EC Habitats Directive Annex I]

2260 Dune sclerophyllous scrubs (*Cisto-Lavenduletalia*) [EC Habitats Directive Annex I]

- 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [EC Habitats Directive Annex I]
 5210 Arborescent matorral with *Juniperus* spp. [EC Habitats Directive Annex I]
 5420 *Sarcopoterium spinosum* phryganas [EC Habitats Directive Annex I]
 6420 Mediterranean tall humid grasslands of the *Molinio-Holoschoenion* [EC Habitats Directive Annex I]
 92D0 Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*) [EC Habitats Directive Annex I]
 9320 *Olea* and *Ceratonia* forests [EC Habitats Directive Annex I]

Higher plants of National Importance:

- Ophrys kotschy* Endemic (Listed Bern)
Anthemis tricolor Endemic
Centaurea calcitrapa angusticeps Endemic
Convolvus cyprius Endemic
Dianthus strictus Endemic
Odontites cypria Endemic
Onopordum cyprium Endemic
Teucrium micropodioides Endemic
Ipomea sagittata Rare
Linum maritimum Rare
Lotus cytisoides Rare
Mentha aquatica Rare
Juncus maritimus Uncommon

20. 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 occurring at levels of international importance:

- 6,000 Greater Flamingo *Phoenicopterus ruber*, Count period 1993-2002, representing 1% of the biogeographical population
 Conservation status Annex I EC Birds Directive

Species occurring at levels of national importance:

- 2 Pallid Harrier *Circus macrourus* Count period 2002, Conservation status Near Threatened IUCN
 3 Lesser Kestrel *Falco naumanni* Count period 2001, Conservation status Vulnerable IUCN
 60-750 Common shelduck *Tadorna tadorna* Count period 1993-2002, Conservation status EC Birds Directive Annex I

Assemblages of national importance:

- 45 bird species included on Annex I of the EC Birds Directive have been recorded from 1998-2002.

Important Bird Area (Birdlife International) congregations of waterbirds of global and European Importance.

The area typically supports, in winter, about 600 Shelducks, 400 Svoveler, 200 Pintail, 500 Wigeon, 600 Mallard, 1000 Teal, hundreds of Grey Herons, Glossy Ibis and Little Egrets, as well as many migrant shorebirds.

21. Social and 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

Aquatic vegetation (e.g. reeds, willows, seaweed)
 Conservation education
 Current scientific research
 Livestock grazing
 Non-consumptive recreation
 Tourism
 Traditional cultural

22. Land tenure/ownership:

Ownership category	On-site	Off-site
National/Crown estate	+	+
Private	+	+
Public/communal	+	+
Other	+	+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+	+	Small-scale
Tourism	+	+	Large-scale
Recreation	+	+	Large-scale
Research	+	+	Small-scale
Collection of non-timber natural products: (unspecified)	+	+	Small-scale
Collection of non-timber natural products: commercial	+	+	Large-scale
Cutting for firewood		+	Large-scale
Cutting of vegetation (small scale/subsistence)	+	+	Small-scale
Fishing: (unspecified)		+	Small-scale
Fishing: commercial		+	Small-scale
Fishing: recreational/sport		+	Small-scale
Arable agriculture (unspecified)		+	Large-scale
Shifting arable agriculture		+	Large-scale
Permanent arable agriculture		+	Large-scale
Livestock watering hole/pond	+	+	Large-scale
Grazing (unspecified)	+	+	Small-scale
Rough or shifting grazing	+	+	Large-scale
Permanent pastoral agriculture	+	+	Large-scale
Hunting: recreational/sport	+	+	Large-scale
Industrial water supply		+	Large-scale
Sewage treatment/disposal		+	Large-scale
Harbour/port		+	Large-scale
Flood control	+	+	Small-scale
Irrigation (inc agricultural water supply)	+	+	Small-scale
Transport route		+	Small-scale
Domestic water supply	+	+	Large-scale
Urban development		+	Large-scale
Military activities	+	+	Large-scale

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

Activity	On-site	Off-site	Scale
Water diversion for irrigation/domestic/industrial use		+	Large-scale
Reservoir/barrage/dam impact: loss of wetland due to restriction	+	+	Large-scale
Salination of groundwater	+	+	Large-scale

25. 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
Management plan being developed	+	
Policing of illegal hunting being enforced	+	
Rubbish removal being implemented	+	

26. Conservation measures proposed but not yet implemented:

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

The site should be extended to include the nesting beaches of vulnerable turtles (mainly Green, with some Loggerhead).

27. Current scientific research and facilities:

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

- Bird flight line surveys including infrared monitoring at night.
- Monitoring of bird collisions on aerals.
- Monitoring of cranes and flamingos.
- Monitoring of translocated habitat.
- Research by the Department of Forests in relation to invasive non-native plant species and bird flight lines.
- Ph.D. research on the flora of Akrotiri Peninsula.
- Studies carried out this year in the context of Project Pluto Supplementary Environmental Work including Hydrogeology and Hydrology, Vegetation and Flora, Mammals and Herpetofauna, Ornithology, Terrestrial Invertebrates, Benthic Macro-invertebrates and Archaeological Desk-Based, Geophysical and Geological Assessment.

28. Current conservation education:

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

Occasional TV documentaries.

29. Current recreation and tourism:

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

A. Lady's Mile beach, which is adjacent to the Akrotiri Ramsar Site, is visited by thousands of sea bathers during the summer. Their activities are confined to the area east of the beach road. There are also six restaurants on the beach, which mainly operate during the summer period. The beach track is maintained yearly using local materials, but not hard-topped to encourage traffic. Parking on the beach is prohibited and is limited in parking areas east of the track. However occasional encroachment and parking west of the track is observed, which needs to be stopped under the management plan.

There is a regular rubbish collection service, which removes the rubbish generated by visitors and restaurants to an approved tip in Limassol.

B. There is a permanent station at the south-eastern end of the site, which is used for model-aircraft flying. This activity will be assessed by the management plan and appropriate action recommended.

C. Car-racing competitions had been organised in the past in the area between Lady's Mile Beach and the salt lake. These competitions have recently been discouraged by the Administration, and organisers informed that such activity in this area would not be allowed in the future. Again this issue will be addressed by the management plan.

D. The site is regularly visited by bird-watchers and other wildlife enthusiasts. Although they do not appear to be causing disturbance, their access to the site will be better managed in the future for mutual benefit.

E. Hunting within the site itself is not allowed. Measures are in place against illegal hunting. In the future, these will be improved under the management plan. Also seasonal hunting, which is allowed in areas adjacent to the site, will be assessed appropriately under the management plan.

30. Jurisdiction:

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

Administrative Secretary, Ministry of Defence,
Sovereign Base Areas Administration,
BFPO 53, Episkopi, Cyprus

31. 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.

Ministry of Defence,
Defence Estates Conservation Office, Blandford House, Farnborough Road, Aldershot, Hants.,
GU11 2HA, UK

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

Government of Cyprus (2000) *Natura 2000 Standard Data Form for 'Alyki Akrotiriou - Ygroviotopos Fasouriou' (Akrotiri Salt Lake – Fassouri Wetlands)*

Defence Estates and RPS (2002) *Supplementary environmental work for Project Pluto, June 2002*

Jalon Consultants and Engineers Ltd & Phedonos Consultants Ltd (1992) *Environmental study and management plan for the Akrotiri Salt Lake and Wetlands, Balasha*

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1DG
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

DD MM YY		

Designation date

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Site Reference Number

(updated with the help of Bermuda Dept of Conservation Services from an earlier version compiled by the Joint Nature Conservation Committee)

2. Date this sheet was completed/updated:

11 November 2004 (updated from 10 May 1999)

3. Country:

UK (Bermuda)

4. Name of the Ramsar site:

Hungry Bay Mangrove Swamp

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): *yes* -or- *no*

b) **digital (electronic) format** (optional):

6. Geographical coordinates (latitude/longitude):

32 16 00 N 64 45 00 W

7. 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

Hungry Bay Mangrove Swamp is located on the south shore at Hungry Bay, Paget Parish, 2 km east of Hamilton.

Administrative region: Bermuda

8. Elevation (average and/or max. & min.) (metres): 9. Area (hectares): 2.01

Min. 0
Max. 0
Mean 0

10. Overview:

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

A tidal mangrove swamp (Bermuda's largest) in a shallow sea bay with a relatively narrow opening to the sea. Supports important populations of endangered native crabs.

11. 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, 4, 8

12. Justification for the application of each Criterion listed in 11. 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).

- 1 The largest example of the most northerly mangrove swamp in the Atlantic
- 2 The last Bermuda refuge for several crustacean species
- 3 The last Bermuda refuge for several crustacean species in addition to supporting wintering birdlife.
- 4 Supporting wintering birdlife, especially herons, egrets and North American wood warblers
- 8 The swamp supports important populations of endangered native crabs (the last Bermudan refuge for several crustacea — including largest remaining population of Land Crab *Cenobita clypeatus* and Giant Land Crab *Cardisoma guahumi*).

13. 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):

14. 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	mud, peat
Geomorphology and landscape	coastal, enclosed coast (including embayment) – interdune low area
Nutrient status	
pH	
Salinity	Sea
Soil	Mix of clay soil, mangrove peat and marine sands
Water permanence	usually permanent
Summary of main climatic features	No information available.

15. 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).

A tidal mangrove swamp up to 1 m deep at high water, in a shallow sea bay with a relatively narrow opening to the sea.

16. Hydrological values:

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

No special values known

17. Wetland types

Code	Name	% Area
I	Mangrove / tidal forest	99
Sp	Small salt marsh area on fringe of mangroves	1

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Mangrove swamps with *Avicennia germinans*, *Conocarpus erectus*, *Rhizophora mangle* and some *Salicornia* sp. Bermuda's largest tidal mangrove swamp located in a shallow (mostly c. 1 m deep) sea bay with a relatively narrow opening to the sea. It is the largest example of Bermuda's mangrove swamps, which are the most northerly in the world.

Has the longest continuous sequence of mangrove peat layers in the Atlantic, and the first documented evidence of significant forest retreat caused by contemporary sea-level rise.

The swamp supports important populations of endangered native crabs (the last Bermudan refuge for several crustacea — including largest remaining population of Land Crab *Cenobita clypeatus* and Giant Land Crab *Cardisoma guahumi*), as well as wintering birds.

19. 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.*

Both the two mangrove species to occur on Bermuda are found here: Black Mangrove *Avicennia germinans* and Red Mangrove *Rhizophora mangle*. Surrounding woodlands have a range of other trees including Buttonwood *Conocarpus erectus*,

On the south-east edge of the mangrove swamp there are areas of marsh plants, with Large Marsh Rush *Juncus acutus*, Sea Purslane *Sesuvium portulacastrum*, Sea Ox-eye *Borrchia arborescens*, Sea Lavender *Limonium carolinianum*, *Paspalum vaginatum*, *Sporobolus virginicus*, Woody Grasswort *Salicornia perennis* and West Indian Grass *Eustachys petraea*. These areas are not extensive, but are of interest as they illustrate the position of Bermuda on the northern margin of tropical mangrove distribution and on the southern margins of temperate saltmarsh distribution.

20. 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.*

A wintering area for Great Blue Heron *Ardea herodias*, Yellow-crowned Night Heron *Nyctanassa violacea*, Snowy Egret *Leucophoyx thula*, Mallard *Anas platyrhynchos*, Belted Kingfisher *Ceryle alcyon* and Northern Waterthrush *Seirus noveboracensis*.

The swamp supports the only significant surviving populations on Bermuda of the Giant Land Crab *Cardisoma guanhumii* (two colonies on the upper fringes of the mangrove swamp) and is the only location in Bermuda for the Land Hermit Crab *Cenobita clypeatus* (total of 54 individuals in 1990). The Mangrove Crab *Goniopsis cruentatus* also occurs. A numbers of other mangrove-living crustacea occur.

21. Social and 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.

Mangroves traditionally used as refuge for fishing boats during hurricanes.

22. Land tenure/ownership:

Ownership category	On-site	Off-site
National/Crown estate	+	
Private		+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Transport route	+		Large-scale
Urban development		+	Large-scale

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

Activity	On-site	Off-site	Scale
Erosion	+	+	Large-scale (mainly from hurricane waves/surge)
Pollution - unspecified	+		Large-scale

This area has suffered significant degradation of the Mangrove Swamp over the last 3 decades, culminating in the almost total destruction of the outer (western) third of the swamp, representing 25% to 30% of the total area of Mangroves, during hurricane 'Fabian' in Sept. 2003. The factor is partly a natural process, but exacerbated by global warming, the control of which is outwith the powers of the site managers. There is considerable evidence, in the form of layers of mangrove peat and stumps underlying the outer portion of Hungry Bay, that this Mangrove swamp has been in retreat for hundreds, if not thousands, of years. This is largely due to natural causes, in particular the continuing rise in sea levels. Much of the recent damage is being caused by the eroding of the protective peninsula which separates the Mangrove swamp from the open ocean and the formation of a new tidal channel/over wash area which enables huge waves and storm surge from hurricanes to break directly into the outer third of the swamp. In this area, more than 75% of the Red Mangroves *Rhizophora Mangle* were completely washed out by the roots and destroyed. Although most of the large, mature Black Mangroves *Avicenia nitida* were not uprooted, more than 50% have subsequently died after being smothered by a deep layer of sand and rubble swept into this area by the ocean surge during Fabian.

In addition to the catastrophic damage resulting from hurricanes and storms, there is also evidence of long-term erosion of the organic peat/sediment substrate that underlies the present swamp and that the living Mangroves actually grow in. Although this may be caused in part by sea-level rise, it appears to have been greatly accelerated by the cutting of a boat channel through the mangroves approximately 40 to 50 years ago. This has had the effect of concentrating and increasing the speed of tidal flow through the mangroves, sweeping away leaf fall from the mangroves and other vegetation as well as fine sediment that otherwise would be trapped and deposited around the prop root complexes. As a result, peat and substrate build-up has not been able to keep up with sea level rise and their continuing erosion, especially along the margins of the boat channels, has resulted in undermining and exposure of the mangrove root systems, making them less able to survive catastrophic storm events.

An additional factor adversely affecting the mangrove swamp is the large amount of floating debris that comes in off the ocean and is swept into, and becomes trapped within the mangroves. The majority of this debris consists of a variety of plastic containers and products, some of them, like fuel containers and ice chests, quite large in size. There are also heavier items such as car and motorcycle wheels, refrigerators and heavy lumber that are also swept into the mangroves, especially during storms, and can cause significant damage to the supporting prop roots of the trees. The majority of the plastic debris is not of local origin but comes in from the open ocean, although some of the heavier items such as household appliances, car and motorcycle parts, have their origin at the solid waste dump at the Bermuda International Airport in Castle Harbour. Source is oceanic pollution, outwith control of site managers.

25. 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
NNR	+	
Management plan in preparation	+	

The combination of sea-level rise, storms and human disturbance in the last few decades have caused the retreat of the mangroves and the future of the forest is threatened. Mangroves formerly extended some 80 m further into the bay than they do now, and the present seaward fringe of mangroves is dying due to peat erosion and wind-felling of trees during storms and hurricanes. Turbulent ocean water is affecting this sensitive mangrove zone through a new gap in the peninsula.

Construction of mangrove creeks in the last 40 years (to enable boats to reach private properties bordering the swamp) has channelled and accelerated inter-tidal water movements within the forest. The ebb currents are particularly rapid and strip the mangrove peat surface of leaf litter that normally contributes to peat formation, and also causes creek bank erosion.

Human disturbance enhances creek bank erosion, particularly from the effects of motor propellers and the mooring of boats during stormy conditions to sensitive creek-fringing roots. Peat erosion from the inter-tidal mangrove swamp and sediment deposition sub-tidally in Hungry Bay are classic sedimentary responses to rising sea-levels. This has resulted in a shallowing of Hungry Bay.

Some suggested management responses include:

- Stabilisation of the eroding outer edge of swamp
- Replanting of mangrove propagules on eroding swamp edge and creek banks
- A ban on motorised boats and jet-skis in mangrove creeks
- Closure of the new gap in the peninsula to reduce water flows in bay
- Boom across creek mouth to increase litter retention within the swamp
- Infilling of creeks no longer used

Active management at this swamp will contribute to knowledge of how to assist global mangrove swamps during sea-level rises predicted for the next decades.

Feature of importance/issue	Approach to solving problems	Measurable conservation objective
Integrity of mangroves is breached through the formation of channels to increase boat access	Mangrove replanting within the channels in order to block incoming marine debris	Re-establish and conserve mangrove integrity

26. Conservation measures proposed but not yet implemented:

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

Hungry Bay Mangrove Swamp is a hugely important site - the most northerly mangrove swamp in the world and with a documented stratigraphic record of sea level changes in the peat deposit there. The site is being eroded by rising sea levels. There has been significant research undertaken there which documents. It is clear that aside from its intrinsic importance, the site has great international significance as a baseline for sea-level rise/climate studies. However, the designated site boundary is much smaller than the original proposal (just the immediate extent of the mangroves, and excluding adjacent coastal areas – at least some of which are domestic nature reserves). This may not help in addressing management of some of the erosion issues.

The Management and protection of the Mangrove swamp would be greatly enhanced by the extension of the boundaries of the Reserve to include the peninsula that separates the swamp from the ocean. This area is however at present privately owned and would require either government purchase or the consent of the landowner. (Note: there was an attempt in the early 1990's to purchase this land for addition to the Nature Reserve, but this was unsuccessful as the government was unwilling to pay the price asked by the property owners).

Feature of importance/issue	Approach to solving problems	Measurable conservation objective
Areas of interest are outside of the Ramsar site. Impact of activities within and outside of the site require additional protection	Extension of the Ramsar site designation to include areas currently excluded, but which form an integral part of the wetland complex, in order better to conserve the ecological and hydrological integrity of the site. Areas to be included are a peninsula, a shallow area currently degraded as a result of increased tidal activity and areas adjacent to the mangrove within the bay	Prevent further erosion and restore mangroves to former condition and extent
<i>Casuarina sp.</i> are crowding areas within fringe of the mangrove swamp, potentially impacting giant land and hermit crabs. May also have an impact on endemic snails found within. Area provides habitat for the highest concentration of crabs on island	Removal of <i>Casuarina</i> and replanting with native succulent or fruity species which may provide food for local species of interest	Minimally maintain the crab population size and feasibly enhance in the future
<i>Casuarina</i> is widespread along the peninsula which was formerly intact and now is breached by the creation of a new inlet. This is promoting the loss of mangroves along portions of the bay and potentially the loss of longtail (= White-tailed Tropicbird <i>Phaethon lepturus</i>) nesting sites	Removal of <i>Casuarina</i> from the peninsula with ongoing maintenance subsequently to reduce further breakage of substrate and reduction of nesting sites	Promote values of the natural breakwater and conserve integrity of the site from further erosion
Feral pigeons are displacing	Trapping in other places where it	Promote re-colonization and

tropic bird nest displacement within the site Rock doves or pigeons, <i>Columb livia</i> , are displacing native tropic birds, <i>Phaethon lepturus catsbyii</i> from cliff hole and ledge nests on peninsula	may be feasible to do so. Shoot pigeons within the area	nesting; installation of artificial tropic bird nests
Public access to the site is limited and only possible through private lands. Debris and garbage found within limited areas within the site	Public access will not be encouraged. Periodic clean ups, education of adjacent landowners will be undertaken, plan for pollution control will be developed	Reduce rubbish accumulation and minimize pollution presently and in the future
There is built heritage presently covered by vegetation	Need to remove vegetation to expose ruins (this issue is viewed as a low priority)	Conserve and restore heritage. Secondly, sea bird nesting may be encouraged
Dredging may have occurred resulting in the loss of sea grasses and potentially promoting the loss of mangroves along the western corner	Ban dredging in order to avoid continued deepening of bay, with consequent redistribution of sediments from shallow areas to deeper areas. Explore possible local replanting with mangroves from local stock (already experimentally demonstrated) to help retain sediments within bay.	Restoration of mangrove integrity and potentially, the restoration of seagrass community
Colonization by invasive large marsh rush (<i>Junctus acutus</i>) along the second largest salt marsh. <i>Casuarina</i> colonization along the fringe of the mangrove. Loss of rare endemic Bermudan palmetto trees <i>Sabal bermudana</i> from the site.	Phased removal of invasive species and replanting with local trees such as Bermuda cedar, palmetto and olive wood	Restore natural communities in lands adjacent to the mangrove swamp

27. Current scientific research and facilities:

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

Research conducted by J. Ellison into effects of sea-level changes on mangrove swamps.

28. Current conservation education:

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

None.

29. Current recreation and tourism:

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

Activities: Some recreational boat traffic.

30. Jurisdiction:

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

Government of Bermuda,
Hamilton, Bermuda

31. 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.

Dept. of Conservation Services, P. O. Box FL588, Flatts FLBX, Bermuda
Dept. of Parks, Botanical Gardens, 169 South Shore Rd, Paget DV04, Bermuda

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

- Ellison, J.C. 1991. *Hungry Bay Mangrove Swamp, Bermuda. Present condition and future management*. Report of Bermuda Biological Station for Research, Inc. 27 pp.
- Ellison, JC (1993) Mangrove retreat with rising sea level, Bermuda. *Estuarine, coastal and shelf science*, **37**(1), 75-87
- Hayward, SJ, Gomez, FH & Sterrer, W (eds.) (1981) *Bermuda's delicate balance: people and environment*. Bermuda National Trust, Paget
- Hepburn, I, Oldfield, S & Thompson, K (1992) *UK Dependent Territories Ramsar study: Stage 1*. Unpublished report to Department of the Environment, European and International Habitat Protection Branch, Bristol, from International Waterfowl and Wetlands Research Bureau/ NGO Forum for Nature Conservation in UK Dependent Territories, Slimbridge/ Sandy (Research contract, No. 7/2/126)
- Scott, DA & Carbonell, M (eds.) (1986) *A directory of neotropical wetlands*. IUCN/IWRB, Cambridge/Slimbridge
- Syvret, A., Smith-Abbot, J., Glasspool, A.F. & Stroud, D. 2003. Hungry Bay Mangrove Swamp. pp 212-216 in *A Sense of Direction: a conference on conservation in UK Overseas Territories and other small island communities* (ed. M. Pienkowski). UK Overseas Territories Conservation Forum, www.ukotcf.org
- Wingate, DB (1984) *Taking stock of Bermuda's wetland heritage*. Department of Agriculture and Fisheries, Hamilton
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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1DG
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

DD MM YY		
Designation date		

Site Reference Number							

(updated with the help of Bermuda Dept of Conservation Services from an earlier version compiled by the Joint Nature Conservation Committee)

2. Date this sheet was completed/updated:

11 November 2004 (updated from 10 May 1999)

3. Country:

UK (Bermuda)

4. Name of the Ramsar site:

Lover`s Lake Nature Reserve

5. Map of site included:

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

a) hard copy (required for inclusion of site in the Ramsar List): *yes* -or- *no*

b) digital (electronic) format (optional):

6. Geographical coordinates (latitude/longitude):

32 21 00 N 64 42 00 W

7. 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: St. George`s town

Located at Ferry Point, St. George`s Island, 3.5 km WSW of St. George`s town.

Administrative region: Bermuda

8. Elevation (average and/or max. & min.) (metres): **9. Area** (hectares): 2.1

Min. 0.1

Max. 2

Mean No information available

10. Overview:

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

A 2 m-deep lake, fringed with predominantly black mangrove. The water level is tidal and falls via subterranean channels. Important for an endemic fish and both wintering and passage waterfowl.

11. 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, 7

12. Justification for the application of each Criterion listed in 11. 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).

- 1 The site's saline nature and tidal flows permit the coexistence of marine and brackish species. One species of mangrove, *Avicemica germinans*, is represented.
- 2 The site supports a population of an endemic killifish
- 7 The site supports a population of an endemic killifish

13. 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):

14. 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	limestone
Geomorphology and landscape	coastal, lagoon, lowland
Nutrient status	
pH	
Salinity	hypersaline / hyperhaline
Soil	Red clay overlaid with organic
Water permanence	usually permanent
Summary of main climatic features	No information available.

15. 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).

A saline lake in an enclosed valley on the coast, up to 2 m deep lake, with fringing black mangrove swamp. The water level rises and falls with the tides via subterranean channels.

16. Hydrological values:

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

No special values known

17. Wetland types

Code	Name	% Area
J	Coastal brackish / saline lagoons	100

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

The only saline pond bordered by a pure stand of black mangrove *Avicennia germinans*. The open-water pond supports a mixed brackish and marine community.

19. 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.

Pure stands of fringing black mangrove *Avicennia germinans*; submerged beds of *Ruppia maritima* and *Thalassia testudinum*; the most extensive stands of *Salicornia* spp. and *Sesuvium portulacastrum*. Bermuda is the most northerly location of mangrove growth in the Atlantic.

20. 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.*

Assemblage.

The site supports the only known population of the endemic killifish *Fundulus relictus*. It is important for wintering and passage birds, especially pied-billed grebe *Podilymbus podiceps*, and northern waterthrush, and for the reintroduced yellow-crowned night heron *Nyctanassa violacea*. It also provides seasonal habitat for passage waterfowl, and, in winter, for the belted kingfisher *Ceryle alcyon*. There is also an interesting invertebrate fauna. The site is the only Bermudan pond/lake where non-native *Gambusia* spp. has not yet been introduced.

21. Social and 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

Non-consumptive recreation

22. Land tenure/ownership:

Ownership category	On-site	Off-site
National/Crown estate	+	

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+		Large-scale
Recreation	+		Small-scale

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

Activity	On-site	Off-site	Scale
No factors reported			

25. 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
NNR	+	
Management plan in preparation	+	

26. Conservation measures proposed but not yet implemented:

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

27. Current scientific research and facilities:

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

A detailed study of the lake was conducted by Thomas *et al.* (1991).

The *Fundulus* population has been sampled for taxonomic studies.

28. Current conservation education:

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

The site is visited by tours from the nearby Bermuda Biological Station.

29. Current recreation and tourism:

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

Access is via a walking trail through Ferry Reach park and is used by locals and tourists, including birdwatching groups.

30. 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,
Hamilton, Bermuda

31. 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.

Dept. of Conservation Services, P. O. Box FL588, Flatts FLBX, Bermuda
Dept. of Parks, Botanical Gardens, 169 South Shore Rd, Paget DV04, Bermuda

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

Hepburn, I, Oldfield, S & Thompson, K (1992) *UK Dependent Territories Ramsar study: Stage 1*. Unpublished report to Department of the Environment, European and International Habitat Protection Branch, Bristol, from International Waterfowl and Wetlands Research Bureau/ NGO Forum for Nature Conservation in UK Dependent Territories, Slimbridge/ Sandy (Research contract, No. 7/2/126)

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

Thomas, MLH, Eakins, KE & Logan, A (1991) Physical characteristics of the Anchialine Ponds of Bermuda. *Bulletin of Marine Science*, 48(1), 125-136

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

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

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1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1DG
UK
Email: pienkowski@cix.co.uk

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Designation date		

Site Reference Number							

(updated with the help of Bermuda Dept of Conservation Services from an earlier version compiled by the Joint Nature Conservation Committee)

2. Date this sheet was completed/updated:

11 November 2004 (updated from 10 May 1999)

3. Country:

UK (Bermuda)

4. Name of the Ramsar site:

Paget Marsh

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional):

6. Geographical coordinates (latitude/longitude):

32 16 00 N 64 46 00 W

7. 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

8. Elevation (average and/or max. & min.) (metres): 9. Area (hectares): 11.35

Min. No information available

Max. No information available

Mean 0.5

10. Overview:

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.

11. 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

12. Justification for the application of each Criterion listed in 11. 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).

- 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.
- 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 septentriolnalis*.
- 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*.

13. 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):

14. 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 (former tidal salt pond infilled by peat buildup)
Geomorphology and landscape	lowland interior valley bottom
Nutrient status	
pH	3.5-5.5
Salinity	Low salinity
Soil	Alkaline sandy loam around margin of marsh; acidic peat within
Water permanence	usually permanent
Summary of main climatic features	No information available.

15. 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

16. Hydrological values:

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

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

17. Wetland types

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

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

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.

19. 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 understory; marshes with *Cladium jamaicensis*, *Typha augustifolia*, *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, *Pepperomia septentrionalis*.

20. 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.*

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. Non-native amphibian species also occur. Yellow-rumped warblers overwinter in the wax-myrtle thickets.

21. Social and 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
Conservation education
Non-consumptive recreation
Religious
Ecological tourism

22. Land tenure/ownership:

Ownership category	On-site	Off-site
Private (Conservation NGOs)	+	+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Recreation	+		Small-scale
Urban development		+	Large-scale

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

Activity	On-site	Off-site	Scale
Introduction/invasion of exotic plant species	+	+	Small-scale
Pollution - unspecified	+	+	Large-scale

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*.

Sea-level rise, exacerbated by global warming, resulting in (a) failure of peat-development to keep pace and (b) major tree death.

Paget Marsh has remained the least affected of all large peat marsh basins on Bermuda by the wholesale rubble and trash dumping or clearing of vegetation that destroyed or severely damaged all other similar sites. Nevertheless, there have been both human-related and natural events which have adversely affected this area, which are summarized as follows:

- 1) although large-scale trash dumping never occurred on most of Paget Marsh, there was some localized dumping in the 1920's and 1930's at the southeast corner of the marsh, where a small open water pond was filled in as a private dumpsite by the nearby Elbow Beach Hotel and area residents. This area was dredged out and restored in 2000 as an open pond habitat with boardwalk.
- 2) The close proximity of the Middle Road, one of Bermuda's busiest, to the south edge of the marsh poses risks from oils/fuels contained in road rainwater run-off flowing almost directly into the marsh. Evidence supporting this concern was collected through the Bermuda amphibian project, which has been attempting to document and find causes for high percentages of tadpole mortality and adult deformities of the introduced Marine Toad *Bufo marinus* which breeds in many wetlands on Bermuda. The research seems to indicate that there are sharp increases in tadpole/juvenile mortality and deformities after heavy rainfall events, with one of the main causative agents being heavy, diesel-family fuels which are washed into the pond from road run-off at these times. 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.

- 3) The threat of rising sea level flooding the low-lying peat basins was not seriously considered until recently, when it was realized that 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 is what 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 12 or more inches higher than normal for over 4 months, coupled with an influx of salt water into the marsh. This resulted in the death within 6 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
- 4) One adverse effect has been the increased invasion of Paget Marsh by introduced invasive species of vines trees and shrubs. 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 *Livistonia chinensis* and Shefflera *Shefflera umbellatum*. This has resulted in a need for regular culling of the entire marsh to selectively remove all aggressive invasive introduced plant species.

25. 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
NNR	+	
Land owned by 2 NGOs for nature conservation	+	
Management plan in preparation	+	
Cleared of most invasive non-native plant species.	+	

26. Conservation measures proposed but not yet implemented:

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

Monitoring of invasive non-native plant species is required.

27. 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 species.

28. Current conservation education:

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.

29. 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.

30. 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,
Hamilton, Bermuda

31. 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

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

Hayward, SJ, Gomez, FH & Sterrer, W (eds.) (1981) *Bermuda's delicate balance: people and environment*. Bermuda National Trust, Paget
Scott, DA & Carbonell, M (eds.) (1986) *A directory of neotropical wetlands*. IUCN/IWRB, Cambridge/Slimbridge
Wingate, DB (1984) *Taking stock of Bermuda's wetland heritage*. Department of Agriculture and Fisheries, Hamilton

Please return to: **Ramsar Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1DG
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

DD MM YY		
Designation date		

Site Reference Number							

(updated with the help of Bermuda Dept of Conservation Services from an earlier version compiled by the Joint Nature Conservation Committee)

2. Date this sheet was completed/updated:

11 November 2004 (updated from 10 May 1999)

3. Country:

UK (Bermuda)

4. Name of the Ramsar site:

Pembroke Marsh East

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): *yes* -or- *no*

b) **digital (electronic) format** (optional):

6. Geographical coordinates (latitude/longitude):

32 17 00 N 64 46 00 W

7. 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

Pembroke Marsh East is located on the north-east edge of Hamilton, Pembroke Parish.

Administrative region: Bermuda

8. **Elevation** (average and/or max. & min.) (metres): 9. **Area** (hectares): 7.82

Min. 0.5

Max. 2

Mean No information available

10. Overview:

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

An extensive freshwater *Typha* sp. and *Calidium* sp. marsh with some open water channels up to 3 m deep. Supports a wide variety of passage and wintering waterfowl.

11. 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

12. Justification for the application of each Criterion listed in 11. 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).

- 1 A good example of a *Typha* marsh that drains as an estuarine system into the sea and supports juvenile populations of certain fish species. The site regularly supports passage and wintering waterfowl and is an important breeding area for moorhen.

13. 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):

14. 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
Nutrient status	
pH	
Salinity	Low: open water forms part of central freshwater lens on Bermuda
Soil	
Water permanence	usually permanent
Summary of main climatic features	No information available.

15. 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 forms catchment area in the most heavily populated part of Bermuda and city of Hamilton; large interdune basin surrounded by steep dune hills. Surrounding land use is high density residential, industrial and landfill/dump site.

16. Hydrological values:

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

The large capacity of the marsh buffers flooding from Hamilton city runoff during heavy rains.

17. Wetland types

Code	Name	% Area
------	------	--------

Tp	Freshwater marshes / pools: permanent	33
U	Peatlands (including peat bogs swamps, fens)	67

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

A freshwater marsh in a peat basin connected to the sea by a 2 km drainage channel. The quality of the water is very significantly adversely affected by leachate from the adjacent dump (although this is no longer actively used for domestic waste disposal). A good example of a *Typha* marsh that drains as an estuarine system into the sea and supports juvenile populations of certain fish species. It is Bermuda's only estuary.

The site regularly supports passage and wintering waterfowl and is an important breeding area for moorhen.

The large capacity of the marsh buffers flooding from Hamilton city runoff during heavy rains.

19. 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.*

The largest surviving cattail *Typha augustifolia* marsh on Bermuda, with some *Ceratophyllum demersum* and *Calidium jamaicensis*.

20. 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.*

Several species of endemic freshwater snails, clams and a limpet were recorded in 1910, but not since. Common eel, *Anguilla anguilla* has been recently recorded (2004) in the Pembroke drainage canal.

Formerly the most important breeding area in Bermuda for moorhen *Gallinula chloropus* (6 prs +) and American coot *Fulica americana* (1-2 prs). A wide variety of waterfowl are recorded on passage and in winter, including pied-billed grebe *Podilymbus podiceps*. American bittern *Botaurus lentiginosus*, least bittern *Ixobrychus exilis*, black-crowned night heron *Nycticorax nycticorax*, green heron *Butorides virescens* (= *B. striatus*), great blue heron *Ardea herodias*, common teal *Anas crecca*, blue-winged teal *A. discors*, ring-necked duck *Aythya collaris*, lesser scaup *A. affinis* sora rail *Porzana carolina* and purple gallinule *Porphyryula martinica*.

The introduced minnow *Gambusia affinis* occurs, and the marsh supports Bermuda's largest populations of North American eel and tarpon juveniles, which gain access to the pond via a drainage ditch connecting to Mill Creek 1.6 km to the west.

21. Social and 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.

22. Land tenure/ownership:

Ownership category	On-site	Off-site
National/Crown estate	+	

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+		Large-scale
Urban development		+	Large-scale

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

Activity	On-site	Off-site	Scale
Pollution - unspecified	+	+	Large-scale

Pembroke Marsh East used to be one of the richest wetland areas in Bermuda up until the early 1900s, being a good example of a deep peat-filled basin covered with a mature peat hammock forest dominated by Bermuda Cedar, Bermuda Palmetto Palm *Sabal bermudana*, Wax-myrtle *Myrica cerifera* and Cinnamon Fern *Osmunda cinnamomoea*. There were also some wetter parts of this marsh dominated by Cattail *Typha sp.* Much of this marsh began to be used as a site for dumping garbage and rubble from construction and excavation projects, initially from the City of Hamilton and Pembroke Parish but eventually from the whole island as other marsh dumpsites were either protected from dumping or filled in completely. The eastern two-thirds of this marsh basin was completely destroyed and buried under the main solid waste dumpsite for the entire island, a situation that continued until the early 1990s when this dumpsite was closed down and turned into a horticultural waste processing centre. The western third of this marsh basin, comprising 19.33 acres and making up the present Nature Reserve area, was never used for large-scale garbage dumping but was the site of a reclamation project in the 1920s and 1930s to make into horse-racing tracks. Thousands of tons of rubble fill were dumped into this area but as the depth of peat was so great at up to 90' (almost 30m) the weight of rubble caused the peat to compress and the whole area sunk below water level again. As this area is underlain by a large fresh water lens or layer, this eventually created Bermuda's largest fresh pond, surrounded by large areas of Cattail and Saw grass *Cladium jamaicense*.

This area has suffered greatly from toxic leachate and run off from the dump which, although it has probably decreased since the closing of the solid waste dump, still continues to some extent from the thousands of tons of waste already present on site and entombed beneath rubble. The extent of pollution still occurring in the pond and marsh is unknown, although testing is planned for the near future. The last sampling carried out in the late 1990s confirmed that there was very little life in the pond at that time.

In addition, there has been continued sporadic small, incremental dumping and infilling of the remaining marsh, particularly on the eastern side bordering the dump, but in 2003 on the west side bordering Dutton Avenue. Most of this illegal infilling was carried out by the Government Department of Works & Engineering, often because of poor communication between equipment operators and supervisors, and poor communication between the Parks Department and the Dept. of W&E. There has also been a small amount of illegal dumping by private trucking operators.

The area around Pembroke Marsh East is now the most heavily populated and developed on Bermuda, resulting in a large amount of rain water run off directly into the marsh from surrounding roads, car parks and industrial areas. This in all likelihood carries pollutants such as oils and fuels from normal sump drippings, fuel spills, incorrectly disposed of oil changes etc.

The Pembroke Canal was built in the early 1930s to help maintain drainage and water flow from the Pembroke Marsh East basin to the ocean at Mill's Creek. This canal was neglected and choked with trash and vegetation for many years, resulting in almost no water flow or drainage function, but is now undergoing extensive clearing and removal of pollutants (including fuel oil from the Bermuda Electric

Light Company B.E.L.C.O.). This will hopefully help to restore some of its drainage function and be beneficial to the water quality in the marsh.

There has also been some restoration of canals, open water ponds and marsh vegetation on the south and east sides of the former dump area. In July 2004, following recommendations for years from the Govt. Conservation Division and solid waste managers, an amphibious ditch digging machine was purchased by the Dept. of W&E to enable proper management of open water ditches in wetlands around Bermuda, in particular at Pembroke Marsh East. At this location it is intended to increase the amount of open water habitat and dig more ditches that will direct water flow through the areas of Cattail and Saw grass to enable them to help filter out remaining pollutants.

This site is a small area of reed-swamp immediately adjacent to the major 'land-fill' site on the island. It is a fragment of a formerly more extensive wetland. A few years ago, a major incineration plant was constructed which now deals with the island's refuse - thus the refuse tip is not currently active. However, abandonment of tipping was not soon enough to prevent the refuse site now towering perhaps 10m above the adjacent wetland. The site was designated both on habitat grounds, and because it held a population of an endemic fish. The wetland has clearly suffered major and chronic pollution from toxic leachate from the refuse site. The resulting pollution seems to have killed off the killifish population at the site. Whether the site still qualifies on habitat grounds is uncertain. There is clearly a major issue regarding the management of the site with respect to the adjacent refuse area. Some years ago a major project was planned which foresaw the re-development of the whole area following the closure of the tip. This has not happened.

As a result of the severe pollution impacts at Pembroke Marsh East which have resulted in the ecological quality of the wetland having severely deteriorated, the field-group at the 2003 Conference (Brooke *et al* 2003) had doubts as to whether the site still qualified under Ramsar criteria. It seemed that the endemic Killifish *Fundulus bermudae* and the clam population are probably already extinct (although surveys would be needed to confirm this).

Given the Government of Bermuda's demonstrated commitment to the sustainable and wise-use of the wetland apparent through its listing in 1999 as a Ramsar site, an appropriate next step would be to seek the listing of Pembroke Marsh East Ramsar site on the Convention's 'Montreux Record'. This would then facilitate the provision of further management guidance through the input of a visiting group under Ramsar's Management Guidance Procedure. Such a group could provide more in-depth analysis of problems and solutions than was possible by the short visit by the Conference participants. Such a visiting group might also be able to advise on problems at other Ramsar sites on Bermuda.

25. 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
NNR	+	
Management plan in preparation	+	

The landfill site was closed in 1992.

Windblown refuse and leachate from the former landfill site have polluted the remaining marsh.

Site has been subject to a long history of land-claim and use as land-fill for rubbish. This was initially driven by desire to eliminate mosquito breeding habitats (as Yellow fever vectors). The marsh was included in a wide-scale scheme, launched in 1987, to rehabilitate the Pembroke Marsh Basin so as to improve local social and environmental conditions, especially through the relocation of rubbish disposal operations then occurring within the basin. A major development plan was established

for the basin but appears not to have been implemented because industrial activities impinge heavily on this site.

Other issues include:

- Potential to increase open water habitat and flushing ability
- Expensive equipment needed to do this, but resulting soil and peat could be sold to offset costs
- Former waste dump
- Residents living behind a dump for decades – stench *etc.*
- Currently dump for horticultural waste
- Ability for underlying rock to absorb and neutralise waste

The landfill site is under restoration as parkland.

26. Conservation measures proposed but not yet implemented:

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

Feature of importance/issue	Approach to solving problems	Measurable conservation objective
<i>Typha</i> and saw-grass reedbeds (dump encroachment)	Stabilise the physical interface between the dump and wetland, stopping active dumping at the wetland edge which is currently resulting in encroachment on the site.	Wetland area constant or enlarged (note a need to monitor the extent of the wetland area so as to be able to assess).
<i>Typha</i> and saw-grass reedbeds (impacts from alien species)	Clearing vegetation and active restoration (through transplantation of native species <i>etc.</i>)	Reduce extent of aliens (in terms of coverage and species numbers); greater numbers/extent of native species (note monitoring requirement to be able to assess this)
Extent and quality of open water for birds and ?fish	Leachate from the adjacent road and rubbish dump is polluting the site with nutrient, heavy metals and oil-based chemicals. There is also increased sedimentation into the wetland encouraging reed encroachment in turn reducing the extent of open water. <ul style="list-style-type: none"> • Creation of an impermeable barrier is necessary to impede lateral leaching from the dump • Dredge parts of the marsh to extend open water areas to benefit of waterbird and fish populations. • Manage road and urban run-off. [Note: it is not clear if there are any remaining fish in the wetland owing to the high pollution levels. This needs to be assessed. In the event of extinction of fish, re-establishment from other sites might be an appropriate action once water quality has improved sufficiently.]	Reduced levels of key nutrients, heavy metals and pesticides in the wetland. Larger populations of birds and fish (see note). Constant or increased open water extent, with higher edge ratio.
'Green Lung' for Hamilton: including educational potential of wetland close to major population centres	Need to physically stabilise and physically plant the dump area. This will require an alternative location for the disposal of garden refuse. Initial steps will require stakeholder meetings to plan the reorganisation of the current garden refuse site. This might involve the use of chippers	Creation of open recreational space adjacent to the wetland, including boardwalk and hide within wetland, with associated signage. Close/reduce activity at the tip-sign to levels that are sustainable in context of

Feature of importance/issue	Approach to solving problems	Measurable conservation objective
	to create raw organic inputs for a biogas plant creating methane/methanol	long-term conservation of adjacent wetland.
Flood management and hydrological linkage of the marsh to the sea	<p>The site is part of the only 'estuarine' system in Bermuda. It should be a long-term objective to re-establish the functional linkage between the marsh and the sea. Currently poor drainage leads to flooding. There is thus a need to clean-up the existing canal linkage to the sea, possibly through dredging. This activity might additionally involve:</p> <ul style="list-style-type: none"> • creation of over-spill ponds within the catchment to contain floodwaters; • restoration of bank-side vegetation; • improvement of ecological conditions for fish populations; and • re-creation of a functional estuary. 	<p>Clean, flowing freshwater linkage between Pembroke Marsh East and the sea, used by fish populations and other wetland species.</p> <p>Reduced incidence of flooding.</p>

27. Current scientific research and facilities:

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

Thomas (1997) studied the limnology of the Pembroke Canal. There have been various engineering studies on drainage problems in the marsh.

28. Current conservation education:

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

None

29. Current recreation and tourism:

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

None

30. Jurisdiction:

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

Government of Bermuda,
Hamilton, Bermuda

31. 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.

Dept. of Parks, Botanical Gardens, 169 South Shore Rd, Paget DV04, Bermuda
Dept. of Conservation Services, P. O. Box FL588, Flatts FLBX, Bermuda

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

Brooke, M., Ryan, P., Furbert, J. & Stroud, D. 2003. Pembroke Marsh East. pp 223-225 in *A Sense of Direction: a conference on conservation in UK Overseas Territories and other small island communities* (ed. M. Pienkowski). UK Overseas Territories Conservation Forum, www.ukotcf.org

Chasemore (nd [1960]) *Drainage arrangements for the Pembroke Marsh/ Mill Creek Basin*. Unpublished report for Bermuda Government Public Works Department

Department of Planning (1987) *The Pembroke Marsh Plan*. Department of Planning, Bermuda

- Hayward, SJ, Gomez, FH & Sterrer, W (eds.) (1981) *Bermuda's delicate balance: people and environment*. Bermuda National Trust, Paget
- Hepburn, I, Oldfield, S & Thompson, K (1992) *UK Dependent Territories Ramsar study: Stage 1*. Unpublished report to Department of the Environment, European and International Habitat Protection Branch, Bristol, from International Waterfowl and Wetlands Research Bureau/ NGO Forum for Nature Conservation in UK Dependent Territories, Slimbridge/ Sandy (Research contract, No. 7/2/126)
- Scott, DA & Carbonell, M (eds.) (1986) *A directory of neotropical wetlands*. IUCN/IWRB, Cambridge/Slimbridge
- Thomas, MLH (1997) Summary and recommendations. *In: Report on the ecological conditions of Pembroke Canal and the inner part of Mill Creek, 1996*. Bermuda Zoological Society, Flatts
- Wingate, DB (1984) *Taking stock of Bermuda's wetland heritage*. Department of Agriculture and Fisheries, Hamilton
-

Please return to: **Ramsar Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1DG
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

DD MM YY		
Designation date		

Site Reference Number							

(updated with the help of Bermuda Dept of Conservation Services from an earlier version compiled by the Joint Nature Conservation Committee)

2. Date this sheet was completed/updated:

11 November 2004 (updated from 10 May 1999)

3. Country:

UK (Bermuda)

4. Name of the Ramsar site:

Somerset Long Bay Pond

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): *yes* -or- *no*

b) **digital (electronic) format** (optional):

6. Geographical coordinates (latitude/longitude):

32 17 50 N 64 51 50 W

7. 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

A back-beach pond on the edge of a shallow marine bay on Somerset Islands.

Administrative region: Bermuda

8. Elevation (average and/or max. & min.) (metres): 9. Area (hectares): 1.1

Min.	0
Max.	2
Mean	0.5

10. Overview:

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

A former tidal mangrove swamp that was filled in as a garbage dump and then restored into a brackish to freshwater pond with mangrove islets, separated from the sea by a beach dune.

11. 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

12. Justification for the application of each Criterion listed in 11. 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).

- 1 Although small, this is an unusually fine example of a fresh/brackish pond with islets behind a beach, in which American coot, moorhen and pied-billed grebe nest with regularity.

13. 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):

14. 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, sand
Geomorphology and landscape	coastal
Nutrient status	
pH	
Salinity	Usually very low, can be high after storm/hurricane flooding events
Soil	Thin, underlain by rubble fill
Water permanence	usually permanent
Summary of main climatic features	No information available.

15. 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).

Low-lying sandy/peaty back-beach area.

16. Hydrological values:

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

17. Wetland types

Code	Name	% Area
E	Sand / shingle shores (including dune systems)	50
K	Coastal fresh lagoons	50

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Open pond with beds of *Ruppia maritima* and mangrove islets.

19. 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.*

Red mangrove *Rhizophora mangle*, black mangrove *Avicennia germinans* and widgeon grass *Ruppia maritima*.

20. 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.*

Top-minnows *Gambusia holbrookii* are present in the pond. Moorhen *Gallinula chloropus*. American coot *Fulica americana* and pied-billed grebe *Podilymbus podiceps* breed in the pond. Important stopover and wintering site for migrant ducks, herons and egrets.

21. Social and 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.

Tourism

22. Land tenure/ownership:

Ownership category	On-site	Off-site
Privately owned (Bermuda Audubon Society, an environmental charity)	+	

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+		Small-scale
Tourism	+		Large-scale
Recreation (bird watching and aesthetic value)	+		Small-scale
Urban development		+	Large-scale

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

Activity	On-site	Off-site	Scale
General disturbance from human activities	+		Small-scale
Pollution – unspecified	+	+	Small-scale

There is a potential threat of pollution from rain run-off, from Long Bay Lane, for pollutants such as diesel, transmission oil, etc. Also because of former use of pond area as a garbage dump, metal pollutants such as lead and iron may be present as leachate in pond.

Increased residential and tourism development in area poses potential for cesspit seepage of nutrients into the pond, although there is no significant evidence for this at this time.

This pond is separated from the ocean only by low sand dunes therefore the storm or tidal surge experienced during hurricanes, such as that experienced during hurricane “Emily” in 1987, can flood it with sea water, destroying or disrupting the freshwater ecosystem of the pond for many months. The sea flooding experienced during Emily disrupted the breeding of water birds such as gallinules and American coots. It was many months before the salt water seeped out of the pond.

Recently, illegal activities (such as long-term camping, motor cycle/ motor-cross “scrambling”, dumping, and digging for antique bottles) have taken place on the reserve in close proximity to the pond. Trash has occasionally been blown or dumped into the pond in small quantities from the camping while the motor-cross usage carries the potential for fuel or oil leaks or spill that could pollute the pond. Stolen motorcycles have also been occasionally dumped in the pond resulting in small spills of gasoline; however these normally disperse quickly. Domestic mallard *Anas* sp. Are fed by the public and overpopulate.

25. 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
Land owned by a NGO for nature conservation	+	
Management plan in preparation	+	

26. Conservation measures proposed but not yet implemented:

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

It would be desirable to extend the boundaries as the seagrass bed in the area outside but adjacent to the present Ramsar site is particularly large and healthy.

27. Current scientific research and facilities:

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

Records of breeding/migratory waterfowl using the Pond have been kept since 1980s.

28. Current conservation education:

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

Neighbourhood schools use the site for environmental education on wetlands.

29. Current recreation and tourism:

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

The local population and tourists utilize the beach area while there are occasional ecotourist visits to the pond.

Regular use by local and visiting birdwatchers

30. 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,
Hamilton, Bermuda

31. 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 Audubon Society, P.O. Box HM 1328, Hamilton HM FX, Bermuda
Dept. of Conservation Services, P. O. Box FL588, Flatts FLBX, Bermuda
Dept. of Parks, Botanical Gardens, 169 South Shore Rd, Paget DV04, Bermuda

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

Bermuda Audubon Society newsletters. www.audubon.bm/Newsletters.htm

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

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

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1DG
UK
Email: pienkowski@cix.co.uk

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DD MM YY

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Designation date

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Site Reference Number

(updated with the help of Bermuda Dept of Conservation Services from an earlier version compiled by the Joint Nature Conservation Committee)

2. Date this sheet was completed/updated:

11 November 2004 (updated from 10 May 1999)

3. Country:

UK (Bermuda)

4. Name of the Ramsar site:

Spittal Pond

5. Map of site included:

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

a) hard copy (required for inclusion of site in the Ramsar List): *yes* -or- *no*

b) digital (electronic) format (optional):

6. Geographical coordinates (latitude/longitude):

32 18 00 N 64 43 00 W

7. 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 on South Shore, Smith's Parish.

Administrative region: Bermuda

8. Elevation (average and/or max. & min.) (metres): **9. Area** (hectares): **9.53**

Min. 0.1

Max. 4

Mean No information available

10. Overview:

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

The only Bermudan example of a non-tidal permanent shallow brackish lagoon with fringing mudflats and saltmarshes. The site is subject to periodic sea flooding and the mudflats are exposed at low water levels. The most important Bermudan wetland for wintering waterfowl.

11. 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, 3, 4

12. Justification for the application of each Criterion listed in 11. 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).

- 1 This is Bermuda's only example of a non-tidal permanent brackish lagoon. It includes also mangrove and wet grassland ecosystems.
- 3 It is the most important wetland for wintering waterfowl and transient shorebirds.
- 4 The site is important for eels *Anguilla anguilla*.

13. 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):

14. 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	mud, nutrient-rich
Geomorphology and landscape	cliffs, coastal, lagoon
Nutrient status	eutrophic
pH	
Salinity	brackish / mixosaline
Soil	
Water permanence	usually permanent
Summary of main climatic features	No information available.

15. 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).

A permanent shallow brackish lagoon with fringing mudflats and saltmarshes bordering the coast. The water level fluctuates by about 75 cm with rainfall and periodic flooding from the sea, and mudflats are exposed at low water levels. Two small freshwater ponds were excavated in 1966.

16. Hydrological values:

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

Drainage for Knapton Hill and dairy farm; small freshwater lens underlays hills that separate pond from ocean

17. Wetland types

Code	Name	% Area
G	Tidal flats	6
H	Salt marshes	3
Sp	Permanent coastal brackish / saline lagoons	80
D	Rocky marine shores (including cliffs)	1
Tp	Adjacent woodlands	10

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

An extremely nutrient-rich but unstable community with wide fluctuations in salinity. There is low species diversity in the pond but very high productivity in boom and bust cycles.

The only Bermudan example of a non-tidal permanent shallow brackish lagoon with fringing mudflats and salt marshes. The land area comprises a natural valley containing a brackish pond of 36.4 ha and some 1.4 km of rugged coastline. The site is subject to periodic sea flooding with mudflats exposed at low water levels. The water level fluctuates by about 75 cm with rainfall and periodic flooding. Two freshwater ponds were excavated in 1966.

The Pond holds an extremely nutrient rich but unstable community with wide fluctuations in salinity. There is low species diversity in the pond but very high productivity in boom and bust cycles.

The most important Bermudan wetland for wintering waterfowl and migrant shorebirds.

Spittal Pond features some of the best representation of geological formations in Bermuda.

19. 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.

Submerged beds of *Ruppia maritima* and fringing *Paspalum vaginatum*. Adjacent woodland and pasture.

20. 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.*

The pond is a major refuge for passage shorebirds, notably species of *Tringa*, *Limnodromus* and *Calidris*. It is of principal importance as a wintering area for many species of North American heron, egrets, ducks, coot and moorhen. Pied-billed grebe *Podilymbus podiceps*, little blue heron *Egretta caerulea*, Louisiana (tri-colored) heron, *E. tricolor*, snowy egret *E. thula*, great egret, *Casmerodius albus*, American black duck *Anas rubripes*, common teal *A. crecca*, American widgeon *A. americana*, blue-winged teal *A. discors*, ring-necked duck *Aythya collaris*, lesser scaup *A. affinis* and American coot *Fulica americana*.

The eel *Anguilla anguilla* is common; *Mugil* sp. occasionally become established. The fish *Gambusia holbrooki* is abundant, serving both as mosquito control and food for herons.

The coastal cliffs support a nesting population of white-tailed tropicbirds *Lepturus catesbyi*.

21. Social and 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 is one of Bermuda's most important passive recreation areas, used for both walking and birdwatching. The outstanding scenic, historic and natural history value of this area was recognised from the late 19th century, with the listing of the area in many early tourist guides to the island.

Aesthetic
Conservation education
Livestock grazing
Non-consumptive recreation
Tourism

22. Land tenure/ownership:

Ownership category	On-site	Off-site
National/Crown estate		+
Other	+	

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+		Small-scale
Recreation	+		Small-scale
Grazing (unspecified)	+	+	Small-scale
Permanent pastoral agriculture		+	Large-scale
Urban development		+	Large-scale

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

Activity	On-site	Off-site	Scale
Eutrophication	+	+	Large-scale
Pollution - unspecified	+		Large-scale

Spittal Pond is suffering chronic nutrient-pollution from effluent derived from an adjacent, off-site dairy farm - manures are piped-washed by rain runoff into the lake resulting in major nutrient pollution (floating mats of green algae were present on 23 March 2003). There is clearly eutrophication of the waterbody. The ecological character of the waterbody has clearly either already changed or is (still) changing.

Spittal Pond has been adversely affected by nutrient enrichment in the past, most of which can be traced back to the presence of a dairy cattle farm just uphill of the north and northwest edges of the pond. Poor husbandry practices and overgrazing on this farm from the 1950s until the 1990s resulted in the total loss of grass and vegetation cover on large fields directly uphill from the pond, resulting in erosion of soil and cattle manure from the fields directly into the pond. In addition, the cattle themselves were poorly enclosed, and often escaped or were allowed to graze (and defecate) right around the pond edge itself. The result was severe nutrient enrichment of the pond, resulting in eutrophication, algal blooms and anaerobic conditions which killed most life in the pond and led to numerous complaints about strong smells emanating from the pond. There were documented blooms of blue-green and red algae's toxic to most pond life every year during the summer season, and confirmed outbreaks of botulism which caused the deaths of numerous waterfowl, including Mallards, other wild ducks and possibly Herons and Egrets. This problem was largely addressed through recommendations set down in the management plan for Spittal Pond, which included the following management actions:

- 1) reduction in the number of cattle kept at the dairy farm;
- 2) moving the cattle off the bottom fields closest to the pond and only allowing these to be used for growing fodder crops; this provides a vegetative barrier that water run-off has to filter through before reaching the pond;
- 3) the digging of 3 sump or overspill ditches that intercept rain run-off from the farm before it reaches the pond;
- 4) the construction of a drainage channel through the east basin of the pond, leading to a drainage pipe with a sluice-gate valve which connected directly to the ocean through an outcrop of rock. If water quality in the pond decreased to dangerous levels, then the valve could be opened at low tide to allow the anaerobic water to flush out to sea; the valve would be opened again at high tide to allow the pond to be recharged with unpolluted salt water. This process, if repeated, could flush much of the excess nutrient load out of the pond;
- 5) All cattle to be properly enclosed with fencing, to prevent access by the animals to areas near or around the edge of the pond.

These actions actually were somewhat effective in reducing the nutrient load in the pond, provided that the dairy farmer followed the terms that were laid down in the management plan. The most effective actions proved to be the reduction of the number of animals allowed to be kept on the farm (thus reducing the amount of manure produced, and the amount of erosion and rain run-off), and confining the cattle to areas as far away from the pond as the site allowed. The result has been that Spittal Pond has actually exhibited generally greater health in recent years, with only the growth of mainly green algae and widgeon-grass which are a normal component of a healthy brackish/salt lagoon, and which provide food for waterfowl and pond life. There has been some infringement of the lower fields since the late 1990s by the dairy farmer for grazing, raising once again the risk of manure run-off reaching the pond and pointing to a need for greater enforcement, but the pond still seems to be in generally better health than was the case in the 1960s to 1980s. Blooms of the more toxic blue-green and red algae, once common and long-lasting, are now rare and brief, except following major catastrophic events such as hurricanes.

The greatest natural factor affecting the ecological character of Spittal Pond is the impact of strong hurricanes. The pond is located on the exposed South Coastline of Bermuda, where the protective reef line is located only 100-200m offshore, offering little protection from the impact of hurricane waves and tides. In addition, the pond is only separated from the ocean by a thin line of small hills, with 3 low-lying overwash areas between them where waves can break through directly into the pond during hurricanes. The waves breaking into the pond during hurricane Fabian in 2003 reached over 36' (12m) in height, sweeping boulders, sediment and scores of large trees, up to 70' in height, into the pond. Hurricanes appear to affect the pond in 3 main ways:

- 1) The huge input of sea water (which raised pond levels 12 to 15' (4-5m) above normal in Fabian, caused huge disruption to the pond's ecology. Many species of ocean life, including Parrot Fish, Blue Tangs and even a Green Turtle, were swept into the pond and survived for several months, but eventually died as the water slowly returned to the normal brackish state. It appears to take at least 6 to 12 months for the pond to return to its normal state following a major hurricane flooding event.
- 2) During a hurricane a huge amount of vegetation and organic matter is either swept into the pond by wave and tidal surge action, or is blown into the pond by the extreme winds. This material can vary from tons of *Sargassum* seaweed, to foliage from the surrounding vegetation, to whole trees complete with root mass. This huge input of organic material causes nutrient enrichment and anaerobic conditions for 6 months or more following hurricane events, as already described.
- 3) The waves and surge of a hurricane can sweep large boulders and tons of sand, soil and sediment into the pond, which can reduce its depth, especially near the overwash areas. The massive amount of erosion that occurs has literally reshaped the landform between the pond and the ocean. For example, the east overwash area (the lowest of the 3 overwash areas), appears to be developing a permanent tidal channel, while at the western overwash area near

the checkerboard, the entire western hillside (and the *Casuarina* forest that covered it) was washed away, doubling the width of the low-lying area here that is subject to overwash.

The other main factor that has affected the ecology of the pond and its drainage basin is the change in forest/vegetation cover surrounding the pond. Originally comprising a pure endemic/native forest dominated by Bermuda Cedar *Juniperus bermudiana*, which suffered almost 100% mortality following the accidental introduction of scale insects to Bermuda in the late 1940s, this area was extensively replanted with the Australian Whistling-pine of *Casuarina C. equisetifolia* in the early 1950s. These trees grow rapidly to a much greater height than the original native forest, and also drop a dense carpet of highly acidic needles or foliage, cutting down species diversity on the forest floor and possibly affecting the pond itself through acidic run-off. The greater height of the *Casuarina* trees make them much more prone to uprooting or snapping off during hurricanes, with up to 50% blowdown of some parts of the forest at Spittal Pond during 1987's hurricane Emily and over 80% blowdown of *Casuarinas* during hurricane Fabian in 2003. The present and future management strategy will involve the removal of felled trees and replanting with mainly hardy native and endemic species, and the gradual phasing out of remaining areas of *Casuarina* forest and reforestation with Native, endemic and selected non-invasive ornamentals where appropriate.

Occasional occurrences of botulism occur in the summer. Domestic pigeons from the dairy farm nest in the coastal cliffs compete with the nesting White-tailed Tropicbirds *Phaethon lepturus*.

25. 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
Land owned by a NGO for nature conservation	+	
Site management statement/plan implemented	+	
Ramsar site (classified 10 May 1999) The site has been notified for its nature conservation interest under several pieces of National Legislation. Part of the site was declared as a nature reserve under the Bermudan National Trust Act. It was designated as a nature reserve under the Protection of Birds Act 1975 along with the surrounding areas and scheduled as a nature reserve by the Bermudan National Parks Act, 1986. Part of a larger National Park Nature reserve = 36.4 ha; Ramsar site = 9.53 ha	+	+
There is some eutrophication as a result of runoff from adjacent dairy farm. Measures have been taken to reduce eutrophication by redirecting runoff from the farm, and introducing a valved pipe to the sea to control salinity.	+	+
In 1954 a protective fence was erected around the perimeter of the pond. In 1955, following the loss of the dense cedar forest due to scale insect epidemic of the late 1940s, the government reforested the land south of the pond with non-native <i>Casuarina</i> .	+	+
The Bermuda National Trust has improved the sanctuary by erecting two additional small ponds for waterbirds between the main pond and the sea in 1966 and 1986, and by installing a flushing pipe and valve at the east end of the pond to control water levels.	+	

<p>The monoculture of <i>Casuarina</i> planted between the pond and the sea in 1955 has attained a dominance and height which is uncharacteristic of Bermuda and is relatively sterile for birds and floral diversity. In particular, the forest is self-seeding and has colonised the coastal zone, blocking scenic views and shading out the native coast flora. The condition has inhibited the recovery or re-establishment of native flora. Elsewhere in the reserve non-native weed trees are blocking scenic views and trails. Following extensive damage to <i>Casuarina</i> forest during hurricane 'Emily' in 1987, some clearing of invasive, introduced plants undertaken and reforestation with endemic and native tree and shrub species.</p>	+	+
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26. Conservation measures proposed but not yet implemented:

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

Feature of importance/issue	Approach to solving problems	Measurable conservation objective
<p>Improvement/restoration of water quality in ponds, and promotion of better environmental management of zones around the site</p>	<p>A catchment management approach is essential to the long-term conservation of this wetland.</p> <p>Adjacent to, and upslope of, the site is a farm stocked at high density with dairy cattle. This has resulted in widescale erosion of pastures (little grass was apparent in the fields at the time of the visit – with much trampled bare soil). The Ponds have been impacted by sediment inputs consequent upon this soil erosion, and probably more significantly, by direct nutrient inputs from the large quantities of cattle manure produced by the farm. These wastes leach into the wetland resulting in significant eutrophication — with associated ecological consequences. Possibly consider options such as management agreement with farm and demonstration-farm for agri-environmental farming practices.</p> <p>Immediate needs are to:</p> <ul style="list-style-type: none"> • explore means of reducing the herd size to a level that is appropriate to the location and sustainable without causing degradation of the farmland or surrounding impacts; and • explore means of reducing and re-directing run-off from the farm away from the Ponds. Ideally these wastes should be physically contained on site (perhaps used to generate methane in a biogas plant). Alternatively, piping these to the sea might be feasible as long as wastes were discharged into an area of high water dispersal, and did not result in pollution of the inshore or beach environments. 	<p>Reduced levels of nutrient loading in the ponds to those more normally experienced in pond systems of this sort.</p> <p>Reduced incidence/elimination of indicators of abnormally high nutrient loading (such as algal blooms and high biological oxygen demand).</p>
<p>Alien plants</p>	<p>There are significant numbers of alien plants in and around the site. A detailed plan should be prepared listing these, their impacts and assessing the degree to which it is possible to manage, contain or eliminate these species, with monitoring needs included.</p> <p>[Already carried out]</p>	<p>Reduced impacts/extent of alien plant species on site</p>
<p>Alien birds (pigeons)</p>	<p>A significant flock of feral pigeons is associated with the cattle farm, presumably taking advantage of cattle food. These</p>	<p>Elimination of feral pigeon flock within three years of</p>

Feature of importance/issue	Approach to solving problems	Measurable conservation objective
	<p>apparently compete for nest sites with White-tailed Tropicbirds and other species. There is a need for proactive management (with monitoring) to reduce or eliminate these pigeons. This might be undertaken by:</p> <ul style="list-style-type: none"> • trapping and culling of pigeons near the farm; [Underway, flock of pigeons reduced by 30% in 2003/2004] • reducing attractiveness of the farm buildings to pigeons; or • reducing food supplies for pigeons through modifying cattle feeding regimes so that spilt food is not readily available for the birds to exploit. 	commencement of control measures.
Exploitation of the sites significant education potential, and raise awareness of the value of the site	<p>Spittal Ponds receives extremely high levels of recreation use, both for birdwatching but also for walking, jogging and other forms of quiet recreation. Accordingly, the site has a very significant potential for environmental education and public awareness. Whilst there is some signage near footpaths, this is limited and, for example, makes no reference to the status of the sites as a designated wetland of international importance.</p> <p>It would be appropriate to present information to the public on other conservation management being undertaken on or near the site, for example measures to improve water quality (above).</p> <p>Other possibilities include targeting decision-makers and improved nature-trails, as well as ranger work to undertake and oversee work suggested.</p>	Progressive development in the use of the site for environmental education and to develop public awareness.

27. Current scientific research and facilities:

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

No facilities. There has been a limnological study of the pond. Migrating and wintering birds have been monitored and recorded since 1950.

Studies of tropicbird population/breeding success in 2001-2003

28. Current conservation education:

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

There are regular field trips by conservation groups and schools.

29. Current recreation and tourism:

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

The site is used for bird watching and walking by locals and tourists.

30. 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,
Hamilton, Bermuda

31. 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.

Dept. of Conservation Services, P. O. Box FL588, Flatts FLBX, Bermuda
 Dept. of Parks, Botanical Gardens, 169 South Shore Rd, Paget DV04, Bermuda
 Bermuda National Trust, 'Waterville', Paget, PG 05, Bermuda

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

- Hayward, SJ, Gomez, FH & Sterrer, W (eds.) (1981) *Bermuda's delicate balance: people and environment*. Bermuda National Trust, Paget
- Hepburn, I, Oldfield, S & Thompson, K (1992) *UK Dependent Territories Ramsar study: Stage 1*. Unpublished report to Department of the Environment, European and International Habitat Protection Branch, Bristol, from International Waterfowl and Wetlands Research Bureau/ NGO Forum for Nature Conservation in UK Dependent Territories, Slimbridge/ Sandy (Research contract, No. 7/2/126)
- Sanders, S., Dobson, A. & Stroud, D. 2003. Spittal Pond. pp 217-222 in *A Sense of Direction: a conference on conservation in UK Overseas Territories and other small island communities* (ed. M. Pienkowski). UK Overseas Territories Conservation Forum, www.ukotcf.org
- Scott, DA & Carbonell, M (eds.) (1986) *A directory of neotropical wetlands*. IUCN/IWRB, Cambridge/Slimbridge
- Wingate, DB (1984) *Taking stock of Bermuda's wetland heritage*. Department of Agriculture and Fisheries, Hamilton

Please return to: **Ramsar Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1DG
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

DD MM YY		
Designation date		

Site Reference Number							

(updated with the help of Bermuda Dept of Conservation Services from an earlier version compiled by the Joint Nature Conservation Committee)

2. Date this sheet was completed/updated:

11 November 2004 (updated from 10 May 1999)

3. Country:

UK (Bermuda)

4. Name of the Ramsar site:

Warwick Pond

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional):

6. Geographical coordinates (latitude/longitude):

32 16 00 N 64 48 00 W

7. 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 adjacent to Middle Road, Warwick Parish, 3 km south-west of Hamilton, bordered by arable land and woodland to the north, east and south.

Administrative region: Bermuda

8. **Elevation** (average and/or max. & min.) (metres): 9. **Area** (hectares): 2.3

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

10. Overview:

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

Bermuda's largest freshwater pond with mudflats at the north end and a broad fringing marsh. Important for the only freshwater adapted population of endemic killifish. The most important mudflat for passage of transient shorebirds on Bermuda. Pond also important for resident and migratory waterfowl, e.g. herons, egrets, ducks and rails.

11. 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, 3, 7

12. Justification for the application of each Criterion listed in 11. 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).

- 1 This is the largest freshwater pond in Bermuda and is a good representative example of a natural small island wetland.
- 3 The seasonal mudflats regularly support 16 species of passage shorebirds. It also supports the only freshwater-adapted population of the endemic killifish *Fundulus bermudae*.
- 7 It supports the only freshwater-adapted population of the endemic killifish *Fundulus bermudae*.

13. 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):

14. 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	mud, nutrient-rich
Geomorphology and landscape	coastal, lowland
Nutrient status	eutrophic
pH	6.5 – 7.0
Salinity	Usually very low (except in droughts)
Soil	Deep, fertile valley bottom soil
Water permanence	usually permanent
Summary of main climatic features	No information available.

15. 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).

A shallow freshwater pond up to 20 cm deep with mudflats at the north end and a broad fringing marsh. There are slight fluctuations in water level associated with the tides.

16. Hydrological values:

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

No special values known

17. Wetland types

Code	Name	% Area
Tp	Freshwater marshes / pools: permanent	40

4	Wet grassland	10
U	Non-forested peatlands	50

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Open water, some mudflats and *Paspalum/Fimbristylis* marsh. The largest shallow freshwater pond in Bermuda.

19. 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.*

Mainly *Paspalum vaginatum* with some *Scirpus americanus* and *Fimbristylis castanea*.

20. 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.*

Species Information

The endemic killifish *Fundulus bermudae* occurs. This is the only freshwater location where it does so, and it is likely that the form occurring here is unique to the pond. The mudflats at the north end of the pond are an important feeding area for passage shorebirds, notably: semipalmated plover *Charadrius semipalmatus*, greater yellowlegs *Tringa melanoleuca*, lesser yellowlegs *T. flavipes*, semipalmated sandpiper *Calidris pusilla*, least sandpiper *C. minutilla*, white-rumped sandpiper *C. fuscicollis*, pectoral sandpiper *C. melanotos* and stilt sandpiper *C. himantopus*. Wintering birds include pied-billed grebe *Podilymbus podiceps*, various herons (Ardeidae), blue-winged teal *Anas discors*, sora rail *Porzana carolina* and American coot *Fulica americana*. The common moorhen *Gallinula chloropus* breeds on the pond.

21. Social and 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.

22. Land tenure/ownership:

Ownership category	On-site	Off-site
Local authority, municipality etc.	+	+
Private		+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Transport route		+	Large-scale
Urban development		+	Large-scale
Agricultural fields	+		Small-scale

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

Activity	On-site	Off-site	Scale
Pollution - unspecified	+	+	Large-scale

Vegetation succession	+	+	Large-scale
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Possibly the most detrimental factor affecting the water quality at Warwick Pond is extensive run-off of rain water from the closely adjacent Middle Road into the pond. Middle Road is one of the most heavily used roads on Bermuda and is located approximately 17-20 m from the edge of the pond. As other ponds subject to rain run-off have been found to have high levels of hydrocarbon pollutants (especially of the heavy, diesel-family hydrocarbons from vehicular fuel spillage, sump drippings, etc.), it can be assumed that Warwick Pond is no different. The heavy hydrocarbons have been directly implicated in high mortality and deformity rates among toads of Marine toads *Bufo marinus*.

In addition there are agricultural and arable fields located just north and east of the pond which are used for growing bananas and crops such as potatoes and carrots. There is some potential for fertilizer or pesticides applied on these fields to wash or seep into the pond.

There has been some encroachment by the cattail *Typha angustifolia* upon the rich mudflats surrounding the pond, especially at the north end. This increased growth has started to reduce the size of the mudflats (an important feeding ground for the passage of migrants, in particular waders or shorebirds). Area covered by *Typha* increased 300% in 15 years. It is unknown whether this increased growth is due to natural selection, increased nutrient intake and/or a rising water table caused by increasing sea levels.

25. 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
Land owned by a NGO for nature conservation	+	
Management plan in preparation	+	
Some culling of invasive plant species (e.g. <i>Livistonia chinensis</i> and <i>Schinus terebinthifolius</i>) has taken place, with some replanting of endemic trees.	+	
Eutrophication has been tackled to some extent but site is still suffering seasonal eutrophication.	+	+

26. Conservation measures proposed but not yet implemented:

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

No further conservation measures are currently proposed.

27. Current scientific research and facilities:

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

A detailed limnological study of the pond was conducted by Dr Martin Thomas.

Migrant bird usage has been monitored and recorded since 1950.

28. Current conservation education:

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

Some field trips by local schools.

29. Current recreation and tourism:

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

The Bermuda National Trust maintains a nature trail around the pond. An observation hide is proposed.

30. 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,
Hamilton, Bermuda

31. 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
Also: Conservation (Terrestrial Officer, Dept. of Conservation Services, P. O. Box FL588, Flatts
FLBX, Bermuda

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

- Hayward, SJ, Gomez, FH & Sterrer, W (eds.) (1981) *Bermuda's delicate balance: people and environment*. Bermuda National Trust, Paget
- Hepburn, I, Oldfield, S & Thompson, K (1992) *UK Dependent Territories Ramsar study: Stage 1*. Unpublished report to Department of the Environment, European and International Habitat Protection Branch, Bristol, from International Waterfowl and Wetlands Research Bureau/ NGO Forum for Nature Conservation in UK Dependent Territories, Slimbridge/ Sandy (Research contract, No. 7/2/126)
- Scott, DA & Carbonell, M (eds.) (1986) *A directory of neotropical wetlands*. IUCN/IWRB, Cambridge/Slimbridge
- Wingate, DB (1984) *Taking stock of Bermuda's wetland heritage*. Department of Agriculture and Fisheries, Hamilton
-

Please return to: **Ramsar Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**

Telephone: +41 22 999 0170 • Fax: +41 22 999 0169 • email: ramsar@ramsar.org

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

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

Updated by:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 4DG
UK
Email: pienkowski@cix.co.uk

With assistance from Cayman Islands Dept. Environment.

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DD MM YY

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

21 September 1994 / 11 November 2004

3. Country:

UK (Cayman Islands)

4. Name of the Ramsar site:

Booby Pond and Rookery, Little Cayman

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional): Yes

6. Geographical coordinates (latitude/longitude):

19 39 51.4 N 80 04 33.0 W

7. 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: South Town (Blossom Village), Little Cayman

Administrative region: Grand Cayman, Cayman Islands

- 8. Elevation** (average and/or max. & min.) (metres): **9. Area** (hectares): 82
- | | |
|------|---|
| Min. | 0 |
| Max. | 3 |
| Mean | 1 |

10. Overview:

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

The Booby Pond and Rookery was designated a Ramsar Wetland of International Importance in 1994. It comprises a mangrove fringed saline lagoon, which supports a major colony of Red-footed Boobies *Sula sula*, and provides a seasonally important habitat for resident and migratory waders and other waterfowl. It is 1800 m long and varies around 250 m wide, separated from the sea to the south by a narrow barrier of land 100-225 m wide. Pond water is derived from rainfall and groundwater seepage and is brackish to hypersaline, depending on the season, occasionally drying out completely in the spring.

11. 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, 4, 6

12. Justification for the application of each Criterion listed in 11. 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).

1	Representative of a coastal, land-locked, mangrove-fringed lagoon system of a kind that is widespread among low-lying islands in the region.
2	The <i>endangered</i> endemic Lesser Cayman Islands Iguana <i>Cyclura nubila caymanensis</i> is found on site, also <i>vulnerable</i> West Indian Whistling duck <i>Dendrocygna arborea</i> .
3	<i>Floristic diversity:</i> Lagoon fringe vegetation, transition through to diverse dry evergreen thicket on rock pavement, including several species endemic to Cayman. <i>Faunal diversity:</i> Supports significant populations of breeding water birds, and endemic birds and reptiles.
4	An important feeding area for resident and migratory herons, and passage and wintering Nearctic shorebirds.
6	This site contains a breeding colony of Red-footed Boobies <i>Sula sula</i> , ca.10-15,000 individuals, probably accounting for at least 30% of the total Caribbean population (est. 35,000 ind.)

13. 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:

Caribbean

b) biogeographic regionalisation scheme (include reference citation):

14. 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	Ironshore Formation, typically friable, poorly consolidated reef limestones, calcarenites and oolitic limestones cemented by calcite. (Pleistocene)
Geomorphology and landscape	Coastal, enclosed coast (including embayment), lagoon
Nutrient status	Eutrophic
pH	Circumneutral
Salinity	Brackish, mixosaline, hypersaline and hyperhaline
Soil	Mainly organic
Water permanence	Seasonal / intermittent
Summary of main climatic features	Average annual rainfall: 1174 mm Mean annual temperature: 23–30° C

15. 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).

A low-use asphalt-topped road runs along southern border, separated from the site by a narrow fringe of vegetation, with moderate, mostly residential, development on the land to the south of the road. Dry evergreen thicket and agricultural land border to the north.

Climate type: sub-humid tropical, with distinct seasonal variation (wet season May-Nov). During summer months, easterly-bound low-pressure systems may develop into tropical storms and hurricanes. Restricted air temperature range (max 36.5°C, min 11.2°C), strongly moderated by sea temperature.

16. Hydrological values:

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

Sediment trapping.

17. Wetland types

Code	Name	% Area
I	Intertidal forested wetlands	23
Q	Saline / brackish lakes: permanent	57
W	Shrub-dominated wetlands	20

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

A shallow, eutrophic, brackish-hypersaline mangrove-fringed lagoon system. Anecdotal evidence suggests some alteration of drainage at the eastern extent, possibly as a result of hurricane action land-locking the lagoon. Nutrient rich run-off from the expanding bird colony may contribute to the nutrient loading of the water.

Fringing vegetation is predominately mangrove swamp, with evergreen thicket / mixed woodland along the northern boundary.

Dominant terrestrial features are the breeding colonies of Red-footed Boobies and Magnificent Frigatebird *Fregata magnificens* – the only such aggregations in the Cayman Islands. Significant reptiles include the endemic Lesser Cayman Islands Rock Iguana *Cyclura nubila caymanensis* and Green Anole *Anolis maynardi*.

19. 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.*

The lagoon fringe vegetation is dominated by Black mangrove *Avicennia germinans* and White mangrove *Laguncularia racemosa* with some Red mangrove *Rhizophora mangle*, with a transition through Buttonwood *Conocarpus erectus* and Plopnut *Thespesia populnea* to dry evergreen thicket on rock pavement at the northern margin of the site. The thicket is floristically diverse. Major components include the Cayman Islands endemics *Cordia sebestena caymanensis* and *Coccothrinax protorii*. Also prominent are *Bursera simaruba*, , *Guapira discolor*, *Ficus aurea*, *Myrcianthes fragrans*, *Pilosacerens* sp., *Plumeria obtusa*, *Canella winterana*, *Guapira discolor* and *Cephalocereus swartzii*.

20. 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.*

Breeding bird assemblages include (numbers of individuals):

Sula sula (10-15,000) *E.tricolor* (85) *E.thula* (500) *Sterna antillarum*(83)
Fregata magnificens (400) *Bubulcus ibis* (28) *Egretta caerulea* (16)
Dendrocygna arborea *Nyctanassa violacea*

Breeding endemic birds include Caribbean Elaenia *Elaenia martinica caymanensis* and Greater Antillean Grackle *Quiscalus niger bangsi*. This site is also an important feeding area for resident and migratory herons, and passage and wintering Nearctic shorebirds

The Lesser Cayman Islands Iguana *Cyclura nubila caymanensis* is found on site and is endemic to Little Cayman and Cayman Brac. The Little Cayman population appears to be stable (est. 200 ind.), in comparison with Brac counterparts (est. 60 ind.), the latter declining due to predation by feral cats and dogs, and expansion of the Brac road system.

The Little Cayman Green Anole *Anolis maynardi* is endemic to Little Cayman and is to be found on site. This arboreal lizard's most distinguishing feature is its long pincer-shaped snout (which accounts for approximately 40% of SVL).

21. Social and 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.

This is a visually impressive site with good access, and high-quality visitors centre run by National Trust volunteers, making the Booby Ponds Little Cayman's primary terrestrial nature tourism attraction. However, in recent years, complains have arisen regarding noxious odours emanating from seasonally forming scum and exposed sediments.

Burgeoning residential and commercial development has resulted in conflicts involving land parcels along the southern border of the site. This has regrettably resulted in the development of one of these parcels.

22. Land tenure/ownership:

Ownership category	On-site	Off-site
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National Trust	+	
Private		+
Crown		+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature tourism	+	+	Moderate
Fishing: recreational/sport		+	Moderate
Hunting: recreational/sport		+	Small
Airport (forthcoming)		+	Large
Residential development		+	Increasing
Commercial development	+	+	Increasing

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

Activity	On-site	Off-site	Scale	
Airport construction (PR, PO)		+	Large	Disturbance of breeding birds through disruption of flight path may result in conflict situation of bird-strike. 1998 study indicates that risk may be reduced by adoption of sympathetic flight schedule.
Residential / commercial development (PA, PO)		+	Small	Pressure for development of southern margins. Increased potential for inputs into water system.
Pond odour (PR, PO)	+		Large	Pressure from residents for control measures (e.g. dredging / booming / drainage modification of site).

25. 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.

The Reserve covers 80 hectares of which 55 are held in perpetuity for conservation by the National Trust for the Cayman Islands. The remainder, including the southern margins of the site, are in private ownership, but are protected under the Cayman Islands' Animals Law of 1976. This prohibits the disturbance of any form of plant or animal life within the Reserve's boundaries.

The entire site is protected under local legislation, through the Animals Law, and the Animal (Sanctuaries) Regulation 1982 as amended by Gazette No. 24 of 1993. However, the modest penalties and effectiveness of enforcement enacted under this legislation has long been regarded as inadequate and have failed to adequately protect sites in the past. The Animals Law is due to undergo significant upgrading as part of the National Conservation Law (*pending 2004*).

Other relevant legislation includes:

Animals Law No. 8 (1976): this protected iguanas and all non-domestic birds, except those listed as game birds, from hunting, collection and egg taking

Animals (Protection) Regulations (1989): this legislation significantly amended the above, reducing the list of game (unprotected) birds to three species.

National Trust for the Cayman Islands Law (1987): established the National Trust.

National Conservation Law (pending 2004)

1998 – National Trust study of Booby flight patterns and feeding range with respect to implications for the development of the new airport.
 1996 - Hydrological study. National Trust, Cayman Islands Water Authority. FCO funded.
 1996 - Management plan was developed and adopted by the National Trust Council.
 National Conservation Law (*pending* 2004).

26. Conservation measures proposed but not yet implemented:

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

Proposed - Updating of Management Plan.

Proposed - Conservation of remaining privately owned land within the Ramsar site.

Proposed – Research into site management toward reducing seasonally offensive odours.

2004 - Site features in Cayman Islands Important Bird Areas (*in press*).

27. Current scientific research and facilities:

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

Proposed – Study of pond sediments as indicators of climate change. Woods Hole

Oceanographic Institution. 2004

Ongoing monitoring of breeding Booby colony.

28. Current conservation education:

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

A visitor centre was built by the National Trust (1997), which carries interpretation of the site.

The Trust has also published a poster of the Red-footed Boobies with a conservation message.

Supporting information is available through the National Trust website:

www.nationaltrust.org.ky

29. Current recreation and tourism:

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

This is a visually impressive site with good access, making the Booby Ponds Little Cayman's primary terrestrial nature tourism attraction. The high-quality visitors centre run by National Trust volunteers, provides fixed telescopes and site interpretation.

30. Jurisdiction:

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

Cayman Islands Government

Ministry of Tourism, Environment, Development and Commerce

(Administration Building - TEL: (345) 244-2401. FAX: (345) 945-4131)

The Department of the Environment

(Marco Giglioli Building - TEL: (345) 949-8469. FAX: (345) 949-4020)

31. 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.

National Trust for the Cayman Islands

PO BOX 31116 SMB, Grand Cayman, Cayman Islands

TEL: (345) 949-8469 FAX: (345) 949-7020 WEB: www.nationaltrust.org.ky

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

- Bradley, PE (1986): The Cayman Islands. In: *A directory of Neotropical wetlands*, ed. by DA Scott & M Carbone, 469-482. IUCN, Gland & Cambridge
- Bradley, PE, Cottam, M, Ebanks-Petrie, G & Soloman, J (2004) Cayman Islands. *Important Bird Areas in the UK Overseas Territories*. RSPB, Sandy (in press)
- Burton FJ (1998) *Survey of flight lines and foraging range of red-footed boobies Sula sula, from Little Cayman*. Unpublished report to the American Bird Conservancy (Project P-DEC02196)
- Burton FJ, Bradley PE, Schreiber EA & Burton RW (1999): Status of red-footed boobies *Sula sula* on Little Cayman, British West Indies. *Bird Conservation International*, **9**, 227-233
- Cayman Islands Government (1993) The Animals (Sanctuaries) (Amendment) Regulations, 1993. *Cayman Gazette* No. **24** of 1993.
- Clapp, RB (1987) Status of the red-footed booby colony on Little Cayman Island. *Atoll Research Bulletin*, **304**, 1-15
- Clench, WJ (1964) Land and freshwater Mollusca of the Cayman Islands, West Indies. *Occasional Papers on Mollusks*, **2**, 345-380
- Diamond, AW (1980) The red-footed booby colony on Little Cayman. *Atoll Research Bulletin* **241**, 165-170
- Hepburn, I, Oldfield, S & Thompson, K (1992) *UK Dependent Territories Ramsar study: Stage 1*. Unpublished report to Department of the Environment, European and International Habitat Protection Branch, Bristol, from International Waterfowl and Wetlands Research Bureau/ NGO Forum for Nature Conservation in UK Dependent Territories, Slimbridge/ Sandy (Research contract, No. 7/2/126)

Please return to: **Ramsar Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough
Cambridgeshire PE1 4DG
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

10 July 2002 /11 November 2004

3. Country:

UK (Turks and Caicos)

4. Name of the Ramsar site:

North, Middle and East Caicos Islands

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional): Yes

6. Geographical coordinates (latitude/longitude):

21 45 00 N 71 45 00 W

7. 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: Kew, North Caicos Island.

The settlements of Whitby, Bottle Creek (North Caicos), Conch Bar, Bambarra and Lorimers (Middle Caicos) are all situated close to the site.

Administrative region: Turks and Caicos

8. Elevation (average and/or max. & min.) (metres): 9. Area (hectares): 58617

Min. 0

Max. 30

Mean No information available

10. Overview:

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

A wetland site of international importance containing a variety of marine and coastal habitat types, and complex natural transitions. There are also shallow inland ponds of various sizes linked to the sea in times of storm and/or via subterranean channels. Noteworthy are

mangrove swamps, diverse bird life, numerous Arawak sites and several inlets and cays. The whole area is a particularly good example of coastal wetland habitat in the Caribbean, providing shelter and nursery locations for various species of waterfowl, turtles and commercial fish species.

11. 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, 4, 6

12. Justification for the application of each Criterion listed in 11. 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).

- 1 The North, Middle and East Caicos wetlands comprise interrelated ecosystems complete with submerged mangroves, algal flats and seagrass beds. It is a wetland site of international importance containing a variety of marine and coastal habitat types, and complex natural transitions. Noteworthy are mangrove swamps, diverse bird life, numerous Arawak sites and several inlet cays. The whole area is a particularly good example of coastal wetland habitat in the Caribbean, providing shelter and nursery locations for various species of waterfowl, turtles and commercial fish species.

- 2 Internationally important species occurring on the site (and in some cases more importantly on the adjacent woodland area which is ecologically linked and for which measures of conservation are being explored):
 the following Turks & Caicos Islands endemic species of lizard:
 the gecko *Aristelliger hechti* (CR), curly tail *Leiocephalus psammmodromus*, Caicos Islands reef gecko *Sphaerodactylus caicosensis*;
 and the one endemic species of snake: the Caicos Islands trope boa *Tropidophis greenwayi*.
 In addition there are three further lizards that are endemic at the subspecific level:
 Turks & Caicos bark anole *Anolis scriptus scriptus*, Turks & Caicos rock iguana *Cyclura carinata carinata* (CR; the only subspecies of *Cyclura carinata* found outside the Turks & Caicos Islands is confined to the small island of Booby Cay off nearby Mayaguana);
 Mabyua Skink (or slippery back or snake-doctor) *Mabyua mabyouya sloanei*;
 and one snake: Bahaman rainbow boa *Epicrates chrysogaster chrysogaster*.
 The waters of the Ramsar site are important for turtles:
 Green *Chelonia midas*, Hawksbill *Eretmochelys imbricata*, [? Loggerhead *Caretta caretta*], but most nesting beaches have not been included.
 Cuban crow *Corvus nasicus* - occurs only in Cuba and in the Caicos Islands;
 Thick-billed Vireo *Vireo crassirostris stalagmium* - endemic subspecies restricted to the Caicos Islands;
 Greater Antillean bullfinch *Loxigilla violacea ofella* - endemic subspecies restricted to Middle and East Caicos;
 Kirtland's warbler *Dendroica kirtlandii* (VU) - non-breeding grounds for one of the most threatened bird species of the region, the world population consisting of only about 3000 individuals, which breed only in a restricted habitat in one part of Michigan, USA and spend the non-breeding season in largely unknown locations in the Bahamas and TCI.

- 3 Additionally, submerged mangroves and algal flats are important in contributing suspended material to nearby sand banks and by virtue of circulation to and from the cuts and creeks, the

mangroves also contribute materials to the coral reefs.

- 4 The wetlands are thought to play a major role in providing a nursery and feeding grounds for numerous fauna. They act also as land-protection against hurricane damage. The shallow flats where the seagrasses grow serve as major nursery areas of the inshore marine environment. They are the immediate recipients of nutrients produced from the mangrove areas themselves. The areas often do not contain many species, but some exist in high numbers. Thus the economic value of these areas, particularly with regard to edible species such as mullets and shrimp and sport species such as bonefish, is high.

- 6 The site (in some cases in combination with adjacent ecologically linked areas) regularly supports internationally important populations of West Indian whistling duck *Dendrocyhna arborea* (VU), the Caribbean population of brown pelicans *Pelecanus occidentalis*, the nominate subspecies of the reddish egret *Egretta rufescens*, the 'Cuban/Bahaman' population of the West Indian flamingo *Phoenicopterus ruber*, white-cheeked (or Bahama) pintail *Anas bahamensis*, possibly non-breeding black-bellied plover *Pluvialis squatarola cynosurae*, possibly non-breeding lesser yellowlegs *Tringa flavipes*, Caribbean subspecies of gull-billed tern *Sterna nilotica aranea*.

- 8 The area and the flushing of the wetlands to the banks provide food, shelter and nursery locations for various commercial fish species, including fish, conch and lobster fisheries.

13. 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:

Caribbean

b) biogeographic regionalisation scheme (include reference citation):

14. 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	basic, biogenic reef, limestone, mud, nutrient-poor, sand
Geomorphology and landscape	Coastal, enclosed coast (including embayment), intertidal sediments (including sandflat/mudflat), islands, lagoon, lowland, open coast (including bay), pools, subtidal rock (including rocky reefs), subtidal sediments (including sandbank/mudbank)
Nutrient status	mesotrophic, oligotrophic
pH	Alkaline
Salinity	brackish / mixosaline, fresh, hypersaline / hyperhaline, saline / euhaline
Soil	mainly mineral
Water permanence	usually permanent, usually seasonal / intermittent

Summary of main climatic features	Rainfall averages 700 mm per year but is very variable. Potential evapotranspiration exceeds rainfall. Temperatures vary between 20°C and 35°C. Highest temperatures and rainfall occur in the summer.
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15. 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).

The Turks and Caicos Islands lie between the Bahamas, Cuba and Hispaniola. Together with southern Florida, the Bahamas and northern Cuba, they are part of a platform of rocks formed as limestone depositing in shallow seas as the crust slowly subsided. Virtually all these rocks of the area, to a depth of several thousand metres, are directly of marine origin, except some fossil soils and sand-dune rock (aeolian limestone). The region has always had a marine environment from the time of its formation until the present.

The Turks and Caicos Islands are on two shallow banks (Turks Bank and the larger Caicos Bank), with deep ocean between them. The maximum altitude is about 50 m asl. There are further shallow banks (Mouchoir, Silver and Navidad) to the south-east but without islands; some of these banks are within TCI territory. They are important for whales and probably for feeding seabirds. The Bahamas lie on separate banks to the northeast, and share some aspects of the geography.

The sculpting of these rocks depended largely on actions in the Pleistocene Ice Ages, which began approximately two million years ago, when the level of the oceans dropped. In the third glacial, sea-level in the region fell by well over 120 metres (400 feet), and, in the last one, by just under 120 metres. As sea-level fell, the oolite was blown up from the beach to form dunes. The dunes harden as rock ridges. Of great importance to the later development of the ridge is the cave and its related features. Blue holes and underground caves are features of great importance to some birds, and which can be formed only above sea-level. During the periods of glaciation, the entire areas of both Caicos Bank and Turks Bank were dry land, and would have been subject to erosion and solution. Blue holes would have formed in many areas, but most of them would have been filled in by marine sediments once the rising sea covered them up. In some areas they have stayed open.

16. Hydrological values:

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

Shoreline stabilisation and dissipation of erosive forces, Sediment trapping, Hurricane protection

17. Wetland types

Code	Name	% Area
C	Coral reefs	0.9
D	Rocky shores	0.1
E	Sand / shingle shores (including dune systems)	0.1
Q	Saline / brackish lakes: permanent	0.8
R	Saline / brackish lakes: seasonal / intermittent	0.2
Sp	Saline / brackish marshes: permanent	2.6
Ss	Saline / brackish marshes: seasonal / intermittent	7.5
Ts	Freshwater marshes / pools: seasonal / intermittent	0.1
W	Shrub-dominated wetlands	4.6
Xf	Freshwater, tree-dominated wetlands	9.9

Other	Other	2.8
B	Marine beds (e.g. sea grass beds)	50.3
G	Tidal flats	4.6
H	Salt marshes	7.3
I	Mangrove / tidal forest	8.2

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Some of the first products of the study of this area (Pienkowski 2002, see below) were the maps which accompany this data form (see also section 8). These are amplified below by notes on the main vegetation and habitat classes compiled by Frederic J. Burton. Each Ramsar category is followed by a paragraph on the map categories (where appropriate) which fall within it.

Ramsar class A: Shallow marine waters

Water

Open seawater over sand banks south of the Caicos Islands, and in channels between them. Bottom vegetation not described or mapped. (Nothing is attributed to this category in section 8 because category B describes better.)

Ramsar class B: Marine beds

Water

Open seawater over sand banks south of the Caicos Islands, and in channels between them. Bottom vegetation not described or mapped but aerial and boat checks indicate extensive areas of sea grass.

Ramsar class C: Coral reefs

Water

Typical Caribbean barrier reef communities, including a reef crest and a back-reef lagoon off the north shore of east Caicos.

Ramsar class D: Rocky shores

Occurring along parts of the north-eastern shores of the Caicos Islands and small islets off these. Within the site, this is primarily on East Caicos and Iguana Cay.

Ramsar class E: Sand / shingle shores (including dune systems)

Occurring along parts of the north-eastern shores of the Caicos Islands and small islets off these. Within the site, this is primarily on East Caicos.

Ramsar class G: Tidal flats

Water

Low tidal flats which were flooded at the time of satellite image acquisition, showing as shallow water on the map, are unvegetated sand and silt substrates.

Exposed intertidal mud

Unvegetated sand and silt substrates exposed at the time of satellite image acquisition.

Ramsar class H: Salt marshes

Salicornia-Batis-Portulaca saltmarsh

A succulent herbaceous salt marsh community, on a flat calcareous silt substrate. Dominated by *Salicornia virginica*, *Salicornia bigelovii*, *Batis maritima*, and *Portulaca rubricaulis*. *Lycium tweedianum*, *Chamaesyce vaginulatum*, *Sporobolus virginicus*, and scattered *Avicennia germinans* shrubs may be present.

Distichlis / Sporobolus saltmarsh

A grass-dominated salt marsh community, on a flat calcareous silt substrate. Dominated by *Sporobolus virginicus* and *Distichlis spicata* in varying proportions. *Borrchia frutescens*, *Salicornia virginica*, *Salicornia bigelovii*, *Lycium tweedianum*, *Portulaca rubricaulis*, with *Conocarpus erectus* as isolated shrubs or trees, may be present.

Mixed saltmarsh with sparse silver Conocarpus

Scattered *Conocarpus erectus* var. *seriacea* shrubs and trees forming up to 20% cover on a calcareous silt substrate with emergent limestone bedrock. *Sporobolus virginicus*, *Salicornia virginica*, *Rhachicallis americana*, *Borrchia frutescens*, *Portulaca rubricaulis*, *Salicornia bigelovii*, *Fimbristylis ferruginea*, and *Batis maritima* form a partial ground cover in varying combinations. *Avicennia germinans* may be present as a rare emergent shrub or tree.

Ramsar class I: Mangrove / tidal forest

Rhizophora & Avicennia mangrove shrublands

Mangrove shrubland communities 1 metre tall, forming 40% - 60% cover on soft calcareous mud covered with a thick algal turf, and a network of tidal creeks. Ranging from monospecific *Avicennia germinans* at the landward extreme of the community, through mixed *Avicennia germinans* - *Rhizophora mangle*, to monospecific *Rhizophora mangle* towards the seaward edge.

Rhizophora, *Avicennia* and *Laguncularia racemosa* shrublands also occur in more inland sites, associated with *Conocarpus erectus* and succulent halophytes on pond fringes and in seasonal floodwater channels.

Ramsar class J: Coastal brackish / saline lagoons

The waterways between the islands (i.e. not in the open sea N or S) might fall into this category, but they fall also into other categories (e.g. B) and have been included there.

Ramsar class Q: Saline / brackish lakes - permanent

Ponds

Shallow brackish to hypersaline ponds, usually narrowly fringed by mangroves and succulent halophytes and otherwise unvegetated. Water levels fluctuate seasonally and many ponds may dry out periodically or seasonally, grading to class R below.

Ramsar class R: Saline / brackish lakes - seasonal / intermittent

Ponds

See Q above.

Ramsar class Ss: Saline / brackish marshes - seasonal / intermittent

Unvegetated rock & mud flats

Rock pavements and dark calcareous silt flooded by seasonal/intermittent expansion of natural brine pans. Virtually devoid of higher plants due to extremely high salinity. Slightly raised rock areas may rarely support a few prostrate *Conocarpus erectus*, severely stunted *Avicennia germinans*, *Salicornia virginica* or *Rhachicallis americana*.

Sparsely vegetated saline sand flats

Approximately 75% unvegetated sand with a thin algal crust, supporting local aggregations of *Avicennia germinans* shrubs, and the succulent halophytes *Portulaca rubricaulis*, *Salicornia virginica* and *Suaeda conferta*. Intermittently flooded by rain and/or tide. Old flamingo nests were observed in this habitat, as well as in some ponds.

Ramsar class Sp: Saline / brackish marshes - permanent

Natural brine pans

Depressed rock pavement areas, intermittently filled by high tides, becoming extremely hypersaline due to evaporation, forming crystalline salt at the margins. No vegetation.

Ramsar class Ts: Freshwater marshes / ponds: seasonal / intermittent

Pine woodland sinkholes

Ramsar class W: Shrub-dominated wetlands

Conocarpus shrubland on saltmarsh grasses

Conocarpus erectus, usually var. *seriacea*, forming a 1-3 metre seasonally flooded shrubland over a herbaceous community dominated by *Sporobolus virginicus* or occasionally *Distichlis spicata*. *Conocarpus erectus* var. *erectus* is often present as a prostrate shrub, with *Salicornia virginica*, *Portulaca rubricaulis*, *Borrchia frutescens*, *Rhachicallis americana*, *Jacquinia keyensis*, *Rhynchospora colorata*, *Fimbristylis ferruginea*, *Agalinis maritima*, and occasionally *Rhizophora mangle* and/or *Avicennia germinans* as shrubs.

Conocarpus-*Rhachicallis* dwarf shrubland

A seasonally flooded, shrubland with most woody vegetation dwarfed, on calcareous silt with emergent limestone bedrock. Dominated by prostrate *Conocarpus erectus*, with *Rhachicallis americana*, *Rhizophora mangle*, *Jacquinia keyensis*, *Manilkara bahamensis*, *Thrinax morrisii*, *Borrchia frutescens*, *Coccoloba uvifera*, *Cladium jamaicense*, *Swietenia mahagoni*,

Gundlachia corymbosa, *Strumpfia maritima*, *Crossopetalum rhacoma*, *Sophora tomentosa*, *Fimbristylis ferruginea*, and *Distichlis spicata*.

Ramsar class Xf: Freshwater tree-dominated wetlands

Seasonally-flooded woodlands (various)

1). *Conocarpus erectus*, including var. *seriacea*, forms seasonally / intermittently flooded woodland communities on very slightly raised sand banks amid tidal flats. The tree layer may be monospecific, or may variously include *Pithecellobium keyense*, *Dodonea viscosa*, *Guapira discolor*, *Swietenia mahagoni*, *Maytenus phyllanthoides* and *Metopium toxiferum*. The shrub layer may include the endemic *Eupatorium lucayanum*, *Crossopetalum rhacoma*, *Borrchia frutescens*, *Thrinax morrisii*, *Coccoloba uvifera*, and *Erithalis fruticosa*, while the herbaceous layer typically includes *Sporobolus virginicus*, *Chamaesyce vaginulatum* and *Lycium tweedianum*.

2). *Sabal palmetto* palms form seasonally flooded woodlands in association with *Gundlachia corymbosa* where fresh to brackish floodwater accumulates during the rainy season. The two species are strongly co-dominant, with *Distichlis spicata* often also abundant.

Seasonally flooded Pinus woodland

Pinus caribaea woodland occurs in extensive stands intermingled with other seasonally flooded habitats. The limestone bedrock has very thin soils, and many seasonally flooded sinkholes: the entire habitat floods with fresh water during periods of intense rain. *Sabal palmetto* and *Cladium jamaicense* grow in the sinkholes. The shrub layer is usually sparse, with *Coccoloba uvifera*, *Thrinax morrisii*, *Randia aculeata*, *Tabebuia bahamensis*, *Cassia inaguensis*, *Byrsinomia lucida*, *Lysiloma latisiliquum*, *Savia erythroxyloides*, *Conocarpus erectus*, *Metopium toxiferum*, *Acacia choriophylla*, *Swietenia mahagoni*, *Ernodea serratifolia* and *Erithalis fruticosa*. Herbaceous species include *Rhynchospora colorata*, *Jacquemontia havanensis*, *Cassytha filiformis*, and the ground orchid *Spiranthes vernalis*.

Ramsar class Other

Dry shrublands

Diverse xerophytic mixed evergreen-deciduous shrublands and woodlands, on limestone bedrock and thin soils. Species composition varies with elevation above ground water, and exposure to salt spray. Abundant tree species include *Lysiloma latisiliquum*, *Coccoloba diversifolia*, *Tabebuia bahamensis*, *Coccothrinax argentata*, *Thouinia discolor*, *Metopium toxiferum*, *Acacia choriophylla*, *Cephalocereus millspaughii*, *Guaicum sanctum* and *Thrinax morrisii*. Several orchid species in the genus *Encyclia* are also widespread and conspicuous in these habitats.

The notes in this section and, more particularly in sections 17 and 18, will be amplified when further results of current studies coordinated by UK Overseas Territories Conservation Forum and the Turks & Caicos National Trust become fully available.

19. 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.*

Internationally important species occurring on the site

Habitat:

The mangroves of the TCI are typical of the region. Three species of mangrove, *Rhizophora mangle*, *Laguncularia racemosa* and *Avicennia germinans* grow with *Conocarpus erectus* (Combretaceae) in mixed stands along the inland margin of the islands fringing the Caicos Bank.

Nationally important species occurring on the site

Habitats:

Pine forests are particularly noteworthy on North Caicos which has the highest rainfall of all the islands, as well as on Middle Caicos.

The dry shrubwoods of coastal areas and rocky plains, with species such as the prickly pears, *Opuntia millspaughii*, *O. bahamana* and *O. lucayana*, have been identified as regional priorities for the conservation of cacti and succulents.

Matured forest stands are rare in many places, probably because of clearance for plantations, hurricane action, and possibly the high demands for fuelwood and for charcoal production (CDB 1983).

Higher plants:

Batophora sp., *Penicillus* sp., *Halimeda* sp., *Acetabularia* sp., *Caulerpa* sp., *Thalassia testudinum*, *Cymodocea filiforme*, *Rhizophora mangle*, *Avicennia germinans*, *Salicornia virginica*, *S. bigloveii*, *Borrchia arborescens*, *Sporolobus virginicus*.

Predominant tree species of the forest/scrub biome of the Turks and Caicos include *Pithecellobium keyense* (Leguminosae), *Conocarpus erectus* (Combretaceae), *Bursera simaruba* (Burseraceae), a species of lignum-vitae *Guaiacum santum* (Zygophyllaceae) (EN), Caribbean mahogany *Swietenia mahagoni* (Meliaceae) (EN), *Manilkara bahamensis* (Sapotaceae) and Caribbean pine *Pinus caribaea* (Pinaceae).

The following tree and shrub species, all scarce and local in Turks and Caicos and restricted regionally in this distribution, were evaluated against IUCN red list criteria but are not considered to be globally threatened.

Caesalpinia reticulata, *Euphorbia gymnonata*, *Hibiscus brittonianus*, *Mimosa bahamensis*, *Pavonia bahamensis*, *Pinus caribaea* var. *bahamensis*, *Tabebuia bahamensis*, *Thouinia discolor*, *Ziziphus taylori*, *Encyclia caicensis*, *Argythamnia argentea*, *Opuntia x lucayana*, *Limonium bahamense*, *Cynanchum stiptatum*, *Borreria brittonii*, *B. capillaris*.

20. 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.*

Internationally important species occurring on the site:

Reptiles and amphibians:

the following Turks & Caicos Islands endemic species of lizard:

the gecko *Aristelliger hechti* (CR),

Curly Tail *Leiocephalus psammiodromus*,

Caicos Islands Reef Gecko *Sphaerodactylus caicosensis*;

and the one endemic species of snake: the Caicos Islands Trope Boa *Tropidophis greenwayi*.

In addition there are three further lizards that are endemic at the subspecific level:

Turks & Caicos Bark Anole *Anolis scriptus scriptus*,

Turks & Caicos Rock Iguana *Cyclura carinata carinata* (CR; the only subspecies of *Cyclura carinata* found outside the Turks & Caicos Islands is confined to the small island of Booby Cay off nearby Mayaguana);

Mabuya Skink (or slippery back or snake-doctor) *Mabuya mabouya sloanei*;

and one snake: Bahaman Rainbow Boa *Epicrates chrysogaster chrysogaster*

Marine turtles are common, nesting on many of the cays, *Chelonia midas*, *Eretmochelys imbricata*, *Caretta caretta*.

Birds:

Dendroica kirtlandi, *Dendrocygna arborea*, *Phaethon lepturus catesbyi*, *Pelecanus occidentalis occidentalis*, *Fregata magnificens*, *Ardea herodias*, *Casmerodius albus egretta*, *Egretta thula thula*, *Egretta caerulea*, *Egretta tricolor ruficollis*, *Egretta rufescens colorata*, *Bubulcus ibis ibis*, *Butorides striatus bahamensis*, *Nycticorax nycticorax*, *Nycticorax violaceus violaceus*, *Phoenicopterus ruber ruber*, *Dendrocygna arborea*, *Anas crecca*, *Anas bahamensis bahamensis*, *Anas discors*, *Oxyura jamaicensis*, *Pandion halioetus ridgwayi*, *Rallus longirostris*, *Pluvialis squatarola*, *Charadrius alexandrinus nivosus*, *Charadrius wilsonia*, *Charadrius seimpalmatus*, *Charadrius melodus*, *Charadrius vociferus*, *Haematopus palliatus prattii*, *Himantopus mexicanus*, *Tringa melanoleuca*, *Tringa flavipes*, *Tringa solitaria*, *Catoptrophorus semipalmatus*, *Actitis macularia*, *Bartramia longicauda*, *Numenius phaeopus*, *Arenaria interpres*, *Calidris alba*, *Calidris pusilla*, *Calidris mauri*, *Calidris minutilla*, *Calidris melanotos*, *Calidris himantopus*, *Limnodromus griseus*, *Gallinago gallinago*, *Larus atricilla*, *Sterna nilotica aranea*, *Sterna maxima maxima*, *Sterna sandvicensis acuflavida*, *Sterna dougallii dougallii*, *Sterna hirundo*, *Sterna antillarum antillarum*, *Sterna anaethetus recognita*, *Sterna fuscata fuscata*, *Anous stolidus stolidus*, *Ceryle alcyon*.

21. Social and 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 includes the most important Arawak site found in the area.

Aesthetic

Aquatic vegetation (e.g. reeds, willows, seaweed)

Archaeological/historical site

Conservation education

Current scientific research

Fisheries production

Non-consumptive recreation

Sport fishing

Subsistence fishing

Tourism

Traditional cultural

22. Land tenure/ownership:

Ownership category	On-site	Off-site
National/Crown estate	+	+
Private	+	+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+	+	Small-scale
Tourism	+	+	Small-scale
Recreation	+	+	Small-scale
Research	+	+	Small-scale
Collection of non-timber natural products: subsistence	+	+	Small-scale
Cutting of vegetation (small scale/subsistence)	+	+	Small-scale
Fishing: (unspecified)	+	+	Small-scale
Fishing: recreational/sport	+	+	Small-scale
Arable agriculture (unspecified)		+	Small-scale
Grazing (unspecified)		+	Small-scale
Urban development		+	Small-scale
Other		+	Small-scale

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

Activity	On-site	Off-site	Scale
No factors reported			

There are suggestions of the potential development of a causeway between North and Middle Caicos, and a road to the south coast of Middle Caicos, as well as a hotel development and boat or ship harbour at East Caicos, with a possible causeway to Middle Caicos. Whilst none of these (except the last) would necessarily be within the site, they would be close and, if constructed, could present impacts.

25. 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
NNR	+	+
Management plan in place and being implemented	+	+

The Ramsar site was protected under domestic legislation as a nature reserve around the time of its listing under Ramsar. At the same time, several other nearby sites were protected. Recent and current studies have identified other parts of the adjacent and ecologically linked areas which need protection.

The Ramsar site and adjoining areas which form part of the same system were the subject of a detailed study leading towards a management plan for the area (Pienkowski 2002). The study was conducted by the UK Overseas Territories Conservation Forum, CAB International and the Turks & Caicos National Trust, in conjunction with the local residents and the TCI Government. The study was funded partly by the UK Department for Environment, Agriculture and Rural Affairs Darwin Initiative.

Following continued involvement of local people at all stages, the general approach of the draft management plan was enthusiastically supported at a community meeting in Middle Caicos in February 2002. The Plan was subsequently adopted by the TCI Government in 2003, who asked TC National Trust, with support from UKOTCF, to lead on management of the site.

Work to implement the plan is in progress by the Turks & Caicos National Trust and the UK Overseas Territories Conservation Forum, with support initially from UK Foreign & Commonwealth Office as well as sources in Turks & Caicos. (Contact point: UK Overseas Territories Conservation Forum (Attn: Dr Mike Pienkowski), 102 Broadway, Peterborough PE1 4DG, UK; E-mail : pienkowski@cix.co.uk; web: www.ukotcf.org).

The further necessary support being pursued. Some aspects of the plan are indicated in sections 27 & 28 below.

26. Conservation measures proposed but not yet implemented:

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

See Pienkowski (2002), available at www.ukotcf.org

27. Current scientific research and facilities:

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

The Darwin Initiative project brought together a group of scientific specialists from a range of institutions, many of whom have not previously worked together. The biodiversity surveys conducted have drawn on: conservation management, organisational capacity building and ornithological expertise from the UK Overseas Territories Conservation Forum; entomological expertise from CABI Bioscience and the Natural History Museum in London; botanical expertise from the Fairchild Tropical Gardens (Florida) and the National Trust for the Cayman Islands, with satellite-imagery skills of the latter; knowledge of bats from the joint chairman of the IUCN/SSC Chiroptera Specialist Group and conservation advisor to The Bat Conservation Trust, and the Carnegie Museum of Natural History (Pennsylvania); expertise in herpetiles from the Zoological Society of San Diego. In each case, the work of these recognised international specialists has been complemented by the knowledge of local people. The results of this work were incorporated in the draft management plan as well as being prepared for scientific publication. Needs for further study and for monitoring are being addressed within the context of the working plan.

28. Current conservation education:

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

The training and education elements of the Darwin Initiative project have been varied considerably to fit in with changing local requirements. During the specialists' visits, a wide range of those interested in developing skills have been invited to join in on Middle Caicos. Those to take advantage of this ranged from the local elementary school on Middle Caicos to the British West Indies Collegiate from Providenciales, the High School on North Caicos and staff of the TCI Government. Another extra area of training developed was capacity-building in the Middle Caicos community as a whole to take an increased part in decision-making on the future of their island, based partly on the preliminary results of this project discussed in community meetings. In terms of formal education, the Turks & Caicos National Trust, in consultation with local schools, has developed and implemented an internationally acclaimed environmental education programme for elementary schools *Our Land, Our Sea, Our People*. This fills a gap in either the absence of suitable environmental material or the use of locally inappropriate materials from UK or distant parts of the Caribbean, so as to restore in young people a value in local knowledge of relations with their environment, while it is still possible

to benefit from the first-hand knowledge of their grandparents, who had to live off the land. This will be extended using results from the study of the Ramsar site and adjacent area.

The ecotourism-related developments noted below will be used also for educational purposes.

29. Current recreation and tourism:

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

A key element of the draft management is the provision and management of trails, other viewing situations, literature and guide training at a range of situations within the Ramsar site and surrounding area. Other initiatives of the Turks & Caicos National Trust and of the TCI Government are providing support to local residents on the development of small businesses compatible with, and complementary to, the conservation and education initiatives.

The Government of the Turks & Caicos has transferred to the Turks & Caicos National Trust a former school building, in Bambarra, Middle Caicos, to provide an environmental centre. The building requires considerable renovation before it can be used effectively, but it is already a major asset. TCNT, with the support of TCI Government, UKOTCF and others, is seeking funding for this from various sources, mainly in-country. This will integrate with the other initiatives noted above.

30. Jurisdiction:

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

Ministry of Natural Resources, Government of the Turks & Caicos Islands, Grand Turk, Turks & Caicos Islands, British West Indies

31. 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.

Turks & Caicos National Trust (PO Box 540, Providenciales, Turks & Caicos Islands, British West Indies; tel +1 649 941 5710; fax +1 649 941 4258; e-mail: tc.nattrust@tciway.tc) leads in management of the site in conjunction with TCI Government's Protected Areas Department and the local community.

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

Joseph Smith Abbott, Director
BVI National Parks Trust
P.O. Box 860
Road Town, Tortola
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Tel / Fax: +1 284-494-3904 / +1 284- 494-6383
E-mail: director@bvinationalparkstrust.org

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DD MM YY

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Designation date

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Site Reference Number

(Updated, with assistance from UKOTCF, from the JNCC earlier version)

2. Date this sheet was completed/updated:

1 May 1999/ Updated: 11 November 2004

3. Country:

UK (British Virgin Islands)

4. Name of the Ramsar site:

Western Salt Ponds of Anegada

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional): yes

6. Geographical coordinates (latitude/longitude):

18 42 07 N, 64 17 01 W

7. 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: The Settlement, Anegada. The site is at the western end of Anegada, at an approximate distance of 2.8 km on a bearing of 282 degrees from the Settlement, the largest village and partial administrative centre on Anegada. Anegada lies approximately 19 km north of Virgin Gorda, separated by a shallow passage. It is the northernmost of the British Virgin Islands.

Administrative region: British Virgin Islands

8. Elevation (average and/or max. & min.) (metres): **9. Area (hectares):** 1071

Min. 0
Max. 8
Mean No information available

10. Overview:

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

The wetland is comprised of brackish saline lagoons amongst shrub-dominated vegetation. The ponds are partially-filled depressions in the lower part of a limestone ridge and are predominantly isolated from the sea by multiple ridges and dunes. There is one small channel connecting the ponds with the sea. Most of the ponds rise and fall with the highest tides, although many dry out during the dry periods.

Anegada contains four major vegetation habitats: salt ponds, dry woodlands, cactus scrub, and mangroves. The wetland is the largest in the territory and provides a habitat for six endemic and endangered species of flora and fauna.

The shallow lagoons also support a fishery based on mullet fish

11. 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, 8

12. Justification for the application of each Criterion listed in 11. 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).

- 1 The Western Salt ponds of Anegada are a particularly good example of salt pond wetlands within the Greater Antilles.

 - 2 The site supports a number of endangered fauna and flora. The site provides a habitat for six species of global significance; the most notable are the critically endangered endemic Anegada rock iguana *Cyclura pinguis* about 2 m long, and *Cordia rupicola* (Boraginaceae), a Puerto Rican bank endemic that is recorded only for Puerto Rico and Anegada, and its widespread occurrence on Anegada makes this the most globally important site.

 - 3 The site is a very important habitat and nesting site for both sea and shore birds, with many species present that are not found elsewhere in the British Virgin Islands or other islands on the Puerto Rico shelf, and provides an important stopover site for migratory birds from North America.
Five species of flora of global significance exist within the Western Ponds on Anegada, including: *Acacia anegadensis* (Leguminosae) an Anegada endemic, *Metastelma anegadensis* (Ascepiadaceae) a BVI endemic, *Cordia rupicola* (Boraginaceae) a Puerto Rican bank endemic, *Leptocereus quadricostatus* (Cactaceae) a Puerto Rican bank endemic, and *Malpighia woodburyana* (Malpighiaceae) a Puerto Rican bank endemic.

 - 8 The ponds provide a spawning area for the Curry-mole mullet fish *Mugil cephalus*, which enter the ponds each year from November to February through a channel connected to the sea to spawn.
-

13. 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:

Caribbean

b) biogeographic regionalisation scheme (include reference citation):

14. 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	limestone, mud, nutrient-rich, sand
Geomorphology and landscape	coastal, island, lagoon, lowland, pools, subtidal sediments (including sandbank/mudbank)
Nutrient status	highly eutrophic
PH	alkaline
Salinity	brackish / mixosaline, hypersaline / hyperhaline
Soil	mainly organic
Water permanence	usually permanent, usually seasonal / intermittent
Summary of main climatic features	Anegada lies in the hurricane area. Prevailing winds are easterly. Average temperature range 24 – 34° C. Rainfall is 750 – 1000 mm per annum.

15. 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).

Being of (coquina) limestone formation, the island of Anegada is unique in the BVI. Soils are shallow and alkaline, predominantly composed of calcium carbonate and detritus. There are a network of salt ponds throughout the western and eastern sections. The eastern and central parts of the island are eroded with coverage of hole-pocked limestone plains. The western sandy plain consists of edaphic and xeric vegetation. The island is subjected to constant wind driven sea and salt spray, and with little rain, its vegetation is mostly stunted scrub and dry woodland (commonly known as Antillean xerophytic thorn forest or scrub formation. Although Anegada's permanent population is less than 200 individuals, various resources are increasingly strained due to external demands. For example, with fishing as the major economic activity and because of growing tourist demands, the waters around Anegada have become over-exploited, whilst there is increasing pressure for the development of tourism infrastructure throughout the island, with particular reference to the coastal zone. Soil pH, limited rainfall, and constant winds preclude extensive agricultural development. Driving winds increase erosion in exposed areas, and gulying takes place after heavy rainfalls.

16. Hydrological values:

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

Shoreline stabilisation and dissipation of erosive forces, sediment trapping, flood water storage / desynchronisation of flood peaks, maintenance of water quality (removal of nutrients).

17. Wetland types

Code	Name	% Area
H	Salt marshes	9.3
I	Mangrove / tidal forest	4.7

J	Coastal brackish / saline lagoons	11.7
Q	Saline / brackish lakes: permanent	22.1
W	Shrub-dominated wetlands	52.2

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

There are five main habitat types at the Western Salt Ponds. These are:

- 1) Tidal mudflats - areas of silty sand and mud that are periodically covered by tide waters. The often sparse vegetation is typified by *Salicornia perrenis*, *S. bigloveii*, *Distichlis spicata* and stunted mangroves.
- 2) Mangrove/Tidal Forest - areas that are more or less enclosed except for some interplay with lagoon habitats. Conditions are generally brackish. Vegetation is patchy with clumps of red *Rhizophora mangle*, black *Avicennia germinans* and buttonwood *Conocarpus erectus* mangroves, interspersed with ponds and mudflats. Drier areas support *Borrchia arborescens*, *Sesuvium portulacstrum* and *Distichlis spicata*.
- Many organisms aggregate in the mangrove maze of roots where organic matter is abundant. The fish, shellfish and algae depend on mangroves as a source of food and shelter. Various avian species reside in the ponds, mudflats and the canopy of the mangroves. During the winter (October to May), migratory birds stop over in the wetland to rest and feed.
- 3) Coastal brackish/saline lagoons - protected inlets which are tidal and open to the sea at least at very high tides. Typified by a thick border of Red mangrove. The water contains marine elements and supports a productive system with a thick soft mud layer inhabited by a high invertebrate biomass.
- 4) Salina - an inland pond which is generally hypersaline, the shallow open water area often dries out and salt crystallizes along the pond edges. It is the habitat of brine shrimp *Artemia* spp. and is bordered by buttonwood mangrove.
- 5) Salt pond - an area periodically connected to the sea. The pond supports limited submerged vegetation and is bordered by a narrow zone of mangrove species.

19. 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.*

Internationally important species occurring on the site.

Five species of flora of global significance exist within the Western Ponds on Anegada, including: *Acacia anegadensis* (Leguminosae) an Anegada endemic, *Metastelma anegadensis* (Ascepiadaceae) a BVI endemic, *Cordia rupicola* (Boraginaceae) a Puerto Rican bank endemic, *Leptocereus quadricostatus* (Cactaceae) a Puerto Rican bank endemic, and *Malpighia woodburyana* (Malpighiaceae) a Puerto Rican bank endemic.

Higher Plants.

Fishlockia anegadensis, *Cynanchum anegadense*, *Sabal causiarum* and *Thurinax mossisii*

Assemblage.

The site supports a diverse assemblage of plant species including: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*, *Conocarpus erectus*, *Salicornia perrenis*, *S. bigloveii*, *Distichlis spicata*, *Borrchia arborescens* and *Sesuvium portulacstrum*.

20. 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.*

Species occurring at levels of international importance.

Reptiles.

Cyclura pinguis (Iguanidae) a critically endangered Anegada endemic inhabits within the Western Ponds Ramsar site. The total remaining population is estimated at less than 200 individuals. Furthermore, the habitat of *Cyclura pinguis*, comprised of stunted scrub and dry woodland combined with a substrate of sandy-porous limestone, is threatened by human development within and outside the Ramsar site.

Nationally important species occurring on the site.**Birds.**

The avifauna of the Western Ponds, Anegada is comprised of a small core of resident breeding species including the successfully reintroduced *Phoenicopiterus ruber* (Phoenicopteridae), which is augmented by numerous migrants from North America during the winter months, including the *Phalacrocoracidae* family, notably the Double-crested and Olivaceous Cormorants and the *Charadriidae* family, including the Black-bellied and Lesser Golden Plover.

Reptiles.

Anegada Worm Snake (*Typlops richardi catapontus*), Anegada Ground Snake (*Dromicus portoricensis anegadae* / *Alsophis portoricensis anegadae*). White-lipped Frog (*Leptodactylus albilabris*).

Fish.

Mugil cephalus.

21. Social and 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.

Conservation education

Current scientific research - Darwin Initiative Assessment of the Coastal Biodiversity of Anegada, BVI, *Cyclura pinguis* Headstart Facility Project

Fisheries production

Livestock grazing

Subsistence fishing

Tourism

Traditional cultural

22. Land tenure/ownership:

Ownership category	On-site	Off-site
National/Crown estate	+	+
Private		+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+	+	Large-scale
Tourism	+	+	Small-scale
Research	+	+	Small-scale

Cutting of vegetation (small scale/subsistence)	+	+	Small-scale
Fishing: subsistence	+	+	Small-scale
Gathering of shellfish	+	+	Small-scale
Bait collection	+	+	Small-scale
Rough or shifting grazing	+	+	Small-scale
Flood control	+	+	Large-scale
Mining	+	+	Small-scale
Transport route	+	+	Large-scale
Other	+	+	Small-scale

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

Activity	On-site	Off-site	Scale	Status of factor
Land clearance	+	+	Small-scale	Existing
Invasive species	+	+	Small-scale	Existing
Over grazing	+	+	Medium-scale	Existing

Whilst land clearance is a small-scale activity at present there is the potential for medium to large scale clearance if national protected area status is not legally designated to the site.

25. 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
Site management statement/plan implemented	+	
Other	+	

The Conservation and Fisheries Department is the overall management authority for the Anegada Western Ponds Ramsar site, although the BVI National Parks Trust has been identified as the *de facto* managers owing to the area's status as a proposed National Park. However the Trust does not have the legal management authority to implement conservation measures required to ensure habitat protection; therefore current site management is restricted to monitoring and research, and an officially approved management plan does not exist.

26. Conservation measures proposed but not yet implemented:

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

The Anegada Western Ponds Ramsar site is a proposed protected area under the National Parks Ordinance 1961, however legal designation is pending.

27. Current scientific research and facilities:

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

Research has been undertaken by the H. Lavity Stouff Community College, BVI about the salt ponds of Anegada.

A two-year collaborative project, 2003-2005 entitled the 'Darwin Initiative Assessment of the Coastal Biodiversity of Anegada, BVI' is in progress with a main objective to carry out a detailed assessment of the coastal biodiversity of Anegada, including the network of ponds, leading to a Biodiversity Action Plan and the creation of the capacity for its future monitoring. Partners include the BVI

National Parks Trust, the BVI Conservation and Fisheries Department, H. Lavity Stoutt Community College BVI, Royal Botanical Gardens Kew, Royal Society for the Protection of Birds, and the UK Marine Turtle Research Institute.

A Darwin Initiative project entitled 'Integrating National Parks, Education and Community Development (BVI)' was conducted from 1998- 2001 at two sites in the BVI, including the Anegada Western Ponds Ramsar site by the BVI National Parks Trust. The main objectives were capacity building and staff training in monitoring techniques and management planning, whilst adding to the biodiversity inventory for Anegada and Virgin Gorda.

The Anegada Rock Iguana (*Cyclura pinguis*) Rehabilitation Project began in 1997 by the BVI National Parks Trust to protect the rapidly declining population of endemic Anegada Rock Iguanas (*C. pinguis*) on Anegada. A Headstart Facility was constructed with assistance from scientists from the IUCN World Conservation Union - Iguana Specialist Group (ISG) and technical input from members of the Centre for Reproduction of Endangered Species of the San Diego Zoo, the Dallas Zoo and the Fort Worth Zoo. The facility houses approximately 90 captive juvenile iguanas. A number of captive iguanas were outfitted with radio transmitters and released into the wild in 2003 and 2004 within the Anegada Western Ponds Ramsar site.

The BVI National Parks Trust (BVINPT) participated in the Royal Botanic Gardens Kew (RBG Kew) Millennium Seed Bank Project through the provision of seeds from Anegada and the Trust has an ongoing relationship with RBG Kew to collect herbarium samples for storage until the BVI has herbarium facilities.

28. Current conservation education:

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

As part of all of the aforementioned projects listed in Section 27, conservation education has been a priority with school visits and guided tours conducted by project scientists and the BVI NPT. Brochures, posters, newsletters and web pages have also been created for the 'Darwin Initiative Assessment of the Coastal Biodiversity of Anegada, BVI' and the Iguana Recovery Programme. Public lectures pertaining to the flora and fauna of Anegada are presented throughout the year by project scientists at the H. Lavity Stoutt Community College (HLSCC) on Tortola and special lectures have also been presented as part of the HLSCC course 'Environments of the BVI'. Finally, the Conservation & Fisheries Department and the National Park Trust host a summer programme for children every year and information relating to Anegada has been incorporated in the past.

29. Current recreation and tourism:

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

Presently visiting to Anegada is much lower than the other British Virgin Islands due to its remote location. The majority of visitors sail to Anegada and spend one or two nights and then leave. Visitation to the wetland areas is mainly by individuals interested in viewing the Anegada Rock Iguanas, flamingos and other birdlife. Most tourists, however, visit Anegada for its pristine white sandy beaches, which stretch for miles. As part of the proposed park, the National Parks Trust has built a captive breeding facility for the Anegada Rock Iguana. Tourism to this area has not been promoted as protection to the area has been deemed advisable before uncontrolled visiting takes place.

30. Jurisdiction:

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

Ministry of Natural Resources and Labour, British Virgin Islands Government
Central Administration Complex, Road Town, Tortola
British Virgin Islands

31. 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.

The Ministry of Natural Resources and Labour is the overall management authority for the Anegada Western Ponds Ramsar site, although the BVI National Parks Trust has been identified as the *de facto* managers owing to the area's status as a proposed National Park.

Ministry of Natural Resources and Labour, British Virgin Islands Government
Central Administration Complex, Road Town, Tortola
British Virgin Islands

Joseph Smith Abbott, Director
BVI National Parks Trust, P.O. Box 860
Road Town, Tortola
British Virgin Islands

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

Jennison, M (1991) *Inclusion of the British Virgin Islands into the Ramsar Convention*. Unpublished M.Sc. dissertation, Heriot-Watt University, Institute of Offshore Engineering, Edinburgh
National Parks Trust of the British Virgin Islands (1986) *A parks and protected area system plan for the British Virgin Islands*. National Parks Trust of the British Virgin Islands, Tortola

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Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1JY
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

DD MM YY		

Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

01 September 2001, by JNCC / 11 November 2004

3. Country:

UK (Falkland Islands)

4. Name of the Ramsar site:

Bertha`s Beach

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional): Yes

6. Geographical coordinates (latitude/longitude):

58 25 00 W 51 55 00 S

7. General location:

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

On the north shore of Choiseul Sound, East Falkland, 40 km south-west of Stanley (population 1,600) and 8 km south-east of Mount Pleasant Airport and the British Forces Falkland Islands Garrison main complex (personnel approx. 2,000).

Administrative region: Falkland Islands

8. Elevation (average and/or max. & min.) (metres): 9. Area (hectares): 3191+

Min. 0
Max. 10
Mean No information available

10. Overview:

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

Sandy beach on the northern shore of Choiseul Sound, East Falkland, connecting the former islands at Fox Point to the mainland. Above high tide mark includes coastal dunes, dune slacks and pools, and grasslands; offshore, includes kelp beds in shallow seas and two islands with tussac vegetation, Direction Island and Fox Point Islet. Of value as a good representative example of Falkland coastal wetland types, including beach, small lakes, shallow marine ecosystems and tussac islands, supporting

a broad range of Falkland avifauna and flora, including the endemic Falkland steamer duck and other endemic subspecies of waterfowl, and gentoo penguin colonies.

11. 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, 4, 6

12. Justification for the application of each Criterion listed in 11. 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).

- 1 The principal criterion under which Bertha's Beach qualifies is Criterion 1, since it is a good representative example (in a relatively natural state) of several different wetland habitat types found around much of the coast of the Falkland Islands, including:
- Low sand dunes at the top of the beach (Ramsar wetland type E);
 - Shallow waters offshore, with kelp beds (Ramsar wetland type A & B);
 - Freshwater pools above high water mark and associated short turf grassland (coastal 'greens') (Ramsar wetland type K);
 - Fox Point Islet and Direction Island, two offshore rock outcrops with tussac grass (Ramsar wetland type D); and
 - Areas of peaty moorland with whitegrass *Cortaderia pilosa* and diddle-dee *Empetrum rubrum* (Ramsar type U).

- 2 It qualifies under Criterion 2 because it supports appreciable numbers of ruddy-headed goose *Chloephaga rubidiceps*, listed as 'Lower Risk: near-threatened' by IUCN (1996). Cobb's wren *Troglodytes cobbi*, listed by IUCN as 'vulnerable', may occur on Direction Island and/or Fox Point Islet. Several of the six Falkland plant species, listed as 'globally threatened' by IUCN (Walter & Gillett 1998) may occur.

- 3 The site qualifies under Criterion 3 by virtue of the richness of the waterfowl populations which are important value for maintaining the genetic and ecological diversity of the region. The site supports populations of the endemic Falkland steamer duck *Tachyeres brachydactyla* and a number of endemic Falkland subspecies including upland goose *Chloephaga picta leucoptera*, kelp goose *Chloephaga hybrida malvinarum*, white-tufted grebe *Podiceps rolland rolland* and tussacbird *Cinclodes a. antarcticus*. The endemic Cobb's wren may occur on the tussac islands. Two of the twelve Falkland endemic plants (Moore 1973), clubmoss cudweed *Chevreulia lycopodioides* and coastal nassauvia *Nassauvia gaudichaudii* occur.

It qualifies under Criterion 3 because it provides breeding habitat for an unusually diverse assemblage of breeding water birds of the Falklands, in greater variety and numbers than many other apparently similar areas in the islands, including the rare species mentioned under Criterion 2, the endemic species and subspecies indicated under Criterion 3 and other more widespread species noted in section 18. Populations of endemic species and subspecies may be of international importance on this site.

- 4 It qualifies under Criterion 4 because it supports breeding southern sea lion *Otaria flavescens* and breeding colonies of gentoo penguins *Pygoscelis papua* at a critical stage in their biological cycle. Also, the whole coastal area is particularly important for large congregations of migratory species such as white-rumped sandpipers [sci name] and sanderling [sci name], which occur in much higher numbers here than in other parts of the island. The ponds behind the main dune system are excellent for a variety of waterfowl.

- 6 Especially with extension, qualifies also under 5 as holding > 1% white-rumped sandpipers in non-breeding season.

13. 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:

b) biogeographic regionalisation scheme (include reference citation):

14. 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	acidic, clay, sand, overlaying sandstone of the Brenton Loch Formation
Geomorphology and landscape	coastal, pools
Nutrient status	
pH	alkaline
Salinity	no information
Soil	mainly organic peaty gleyed podzol with iron-pan variable
Water permanence	usually permanent Both permanent and temporary pools are present on the site
Summary of main climatic features	Cool temperate oceanic climate, with average temperatures between 2 – 6° C. Rainfall averages 610 mm per annum.

15. 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).

No information available

16. Hydrological values:

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

Shoreline stabilisation and dissipation of erosive forces, Other [??]

17. Wetland types

Code	Name	% Area
A	Shallow marine waters	15
B	Marine beds (e.g. sea grass beds)	10
D	Rocky shores	5
E	Sand / shingle shores (including dune systems)	15
U	Peatlands (including peat bogs swamps, fens)	45
K	Coastal fresh lagoons	10

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Starting from the seaward side, six main wetland types can be distinguished: offshore islands (Ramsar type D); shallow seas (Ramsar type A), with kelp beds (type B); beach and dune systems (type E); coastal grasslands and pools (type K); and eroded sandy outcrops in the oceanic heath (type U), important as the site of the penguin colonies.

Offshore islands. About 1 km offshore lies Direction Island (so called because it presents a magnetic anomaly which affects ships' compasses, including that of the Norwegian iron barque *Bertha* which was wrecked in 1892 and bestowed its name on the beach), a 1 ha rocky outcrop covered with a hectare of tussac grass *Parodichloa flabellata*. Tussac grass is typical of Falkland coastal areas, but has in many areas suffered from overgrazing and is now much more restricted than formerly, so that it mostly survives on ungrazed offshore islands. Direction Island has in the past supported a small population of southern sea lions *Otaria flavescens* and there are indications of breeding shearwaters (Strange *et al.* 1988). Fox Point Islet, the other tussac island, is located immediately off Fox Point and covers about 1 ha.

Shallow seas. Below low tide mark are a number of low-lying reefs and extensive beds of kelp *Macrocystis pyrifera*, which extend beyond the 6 metre mark, as in many offshore sites in the Falklands. Kelp helps to protect coastlines from erosion, and probably provides spawning grounds and shelter for many fish (mullet, smelt), squid, jellyfish, molluscs (including chitons), crabs and other marine life forms. In addition it provides feeding grounds for dolphins, seals, fish and some water birds such as shags, steamer ducks and terns. Several pods of Peale's dolphins are frequently seen between Bertha's Beach and Direction Island feeding in the kelp.

Beach and dune systems. The littoral vegetation is composed of associations of sea cabbage *Senecio candidans*, and non-native marram-lyme grass *Ammophila-Elymus* (the latter introduced to stabilise sand dunes). The beach is used by South American tern *Sterna hirundinacea* and shorebirds, mainly resident Magellanic oystercatcher *Haematopus leucopodus*, together with white-rumped sandpiper *Calidris fuscicollis* and some sanderling *C. alba*, both of which spend the austral summer here. Falkland steamer duck and kelp gull *Larus dominicanus* loaf on the beach.

Coastal grassland ('greens') and pools. Behind Bertha's Beach, above high water mark, at the foot of the higher ground which slopes gradually down from inland, is an area of flat coastal grassland grazed by sheep and some cattle, with occasional pools and marshy ground. The associations in the short-cropped grasslands (greens) are characterised by *Agrostis* and *Festuca* spp. and, on the damper areas, pigvine *Gunnera magellanica* and *Cotula scariosa*. In the ponds spike rush *Eleocharis melanostachys* provides cover, while water-milfoil *Myriophyllum elatinoides* and filamentous algae are important food sources for water birds.

Sandy outcrops. In the higher ground, dominated by the ubiquitous white grass and diddle-dee, some outcrops have been eroded, and support nesting colonies of gentoo penguin.

19. 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.

Species occurring at levels of international importance

Higher Plants

Moonwort Fern *Botrychium dusenii*

Species occurring at levels of national importance
Habitat type
Greens

Higher Plants
Moonwort Fern *Botrychium dusenii*

20. 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.*

The whole coastal area is particularly important for large congregations of migratory species such as white-rumped sandpipers and sanderling, which occur in much higher numbers here than in other parts of the island. The ponds behind the main dune system are excellent for a variety of waterfowl and rare visitors can often be seen here.

Gentoo penguin	Near Threatened	565 pairs 2002/03 FISMP. 884 breeding adults (Clausen 2001).
Magellanic penguin	Near Threatened	Numbers unknown, but widespread and numerous throughout all islands.
White-tufted grebe	(Range-restricted)	Several breeding pairs, numbers unknown.
Upland goose	subsp (Range-restricted)	
	subsp (> 1% pop)	
Kelp goose	subsp (Range-restricted)	
	subsp (> 1% pop)	
Ruddy-headed goose	Data-deficient	Presence confirmed. Numbers unknown.
	Range-restricted	
	> 1% pop	
Falkland steamer duck	Range-restricted	Presence confirmed throughout the area , numbers unknown, but numerous.
Two-banded plover	(Range-restricted)	Present and numerous. Numbers unknown.
	subsp ??	
White-rumped sandpiper	> 1% pop	Up to 2000 birds recorded (FC databases)
Falkland pipit	(Range-restricted)	
	subsp	
Black-throated finch	Data-deficient	Presence confirmed. Numbers unknown.
	Range-restricted	

Long-tailed meadowlark (Range-restricted) subsp

Other Species of Interest

Hudsonian godwit and whimbrel have been recorded here, as non-breeding seasonal visitors during the southern summer, from their breeding grounds in the Arctic. The site is not known to hold any breeding populations of seals or sea lions, although a small colony breeds on Direction Island just off Bertha's Beach and seals can frequently be seen. Peale's dolphins are also often seen from the shore, playing in the surf. The large areas of dunes and ponds behind the beach area are frequently used by breeding black-necked swan and numerous breeding speckled teal, wigeons, crested ducks, flying steamer-duck and visiting silver teal, yellow-billed pintail, as well as the occasional coscoroba swan and red shoveler. Numerous waders patrol the shore, including summer visitors like white-rumped sandpiper, the occasional sanderling, mixed with local two-banded plovers, dotterels and the two species of oystercatchers.

Species occurring at levels of national importance
Southern Sea Lion
Gentoo Penguins

21. Social and 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.

Livestock grazing
No special values known
Non-consumptive recreation
Other
Tourism

22. Land tenure/ownership:

Ownership category	On-site	Off-site
Local authority, municipality etc.	+	
Private		+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Recreation	+	+	Large-scale
Research	+		small-scale
Livestock watering hole/pond	+		Large-scale
Grazing (unspecified)		+	Large-scale
Military activities	+	+	Large-scale

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

Activity	On-site	Off-site	Scale

25. 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

Management plan drafted and agreed – requires implementation and limited funds	+	
National Nature Reserve status pending	+	

26. Conservation measures proposed but not yet implemented:

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

Management plan is drafted and agreed upon, and NNR status is pending.

Military activities are addressed in the draft management scheme.

27. Current scientific research and facilities:

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

Area covered in Breeding Birds Survey of the Falkland Islands (Woods & Woods 1997)

Number of scientific papers on flora and fauna of Falklands

No ongoing research activities or facilities.

Volunteer monitoring scheme to become established at the site, involving developing a database of sightings for use by military personnel.

28. Current conservation education:

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

No activities at present

Area has enormous potential for conservation education for military and civilian visitors

29. Current recreation and tourism:

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

The site is currently exposed to low levels of tourism, although currently there are no facilities. It would be possible to develop visitor facilities, such as signs, a nature trail, and eventually perhaps a visitor centre, with a warden to guide visitors and oversee access to the more sensitive areas.

30. Jurisdiction:

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

Falkland Islands Government,
Government House, Stanley, Falkland Islands

31. 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.

Falkland Land Holdings (FLH) Ltd, John Street, Stanley and in the first instance their representative is Mr Alan Eagle, Fitzroy Farm, East Falkland

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 1JY
UK
Email: pienkowski@cix.co.uk

FOR OFFICE USE ONLY.

DD MM YY		

Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

01 September 2001, by JNCC / 11 November 2004

3. Country:

UK (Falkland Islands)

4. Name of the Ramsar site:

Sea Lion Island

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional): Yes

6. Geographical coordinates (latitude/longitude):

52 26 00 S 59 06 00 W

7. General location:

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

Sea Lion Island is situated 17 km south-east of Bull Point, the most southerly point of Lafonia, East Falkland, and 120 km south-west of Stanley (population 1600).

Administrative region: Falkland Islands

8. Elevation (average and/or max. & min.) (metres): 9. Area (hectares): 1556

Min. 0
Max. 30
Mean No information available

10. Overview:

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

Sea Lion Island is an isolated island, 17 km off the southern tip of East Falkland, noted as an important Falkland breeding site for southern sea lion (Thompson *et al.*, 1995; Thompson 2003) and elephant seal (Galimberti and Boitani 1999). It is made up of two rocky plateaux, well vegetated with oceanic heath and mixed grassland on their higher points, joined by a broad sandy beach, and retains, for an inhabited and farmed island, unusually large stands of fenced tussac grass round the coastline. The former sheep-farming operations have now ceased. The main economic activity is wildlife tourism with a small number of sheep to provide meat for the lodge.

11. 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, 4

12. Justification for the application of each Criterion listed in 11. 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).

- 1 Sea Lion Island qualifies under Criterion 1 because it includes good representative examples of most of the natural wetland types characteristic of the Falklands, both marine/coastal and inland. Among coastal/marine types, it is a rocky offshore island (type D), set in shallow marine waters (type A) with kelp beds (type B), and has extensive sand and pebble beaches (type E) and a sizeable coastal brackish saline lagoon, Beaver Pond, (type J); for an island with a history of sheep ranching, the extent and condition of the stands of tussac grass *Paradiochloa flabellata* are particularly good. Among inland wetland types, the higher parts of the island are made up of peatlands on oceanic heath (type U), with a few permanent freshwater pools (type Tp).
- 2 Sea Lion Island qualifies under Criterion 2 because it supports vulnerable, endangered or critically endangered assemblages of: Cobb's wren *Troglodytes cobbi*, a species which favours tussac grass as a nesting habitat and listed as vulnerable by IUCN (1996); and of ruddy-headed goose *Chloephaga rubidiceps* and striated caracara *Phalacrocorax australis*, both listed as 'Lower Risk: near threatened' by IUCN (1996).
- 3 The site qualifies under Criterion 3 because the island is of special value for maintaining the genetic and ecological diversity of the region. The site has extensive stands of tussac grass, provides an important Falkland breeding site for southern sea lion *Otaria byronia*, holds much the largest numbers of southern elephant seal *Mirounga leonina* breeding in the Falklands, and supports a wide variety of Falkland breeding birds, especially on the beaches, rocky shores and in the tussac grass.

Sea Lion Island also qualifies under Criterion 3, since it supports breeding populations of one endemic species Falkland steamer duck *Tachyeres brachydactyla*, and two endemic subspecies of waterfowl, upland goose *Chloephaga picta leucoptera*, kelp goose *Chloephaga hybrida malvinarum*, imperial shag *Phalacrocorax atriceps albiventor* and black-crowned night heron *Nycticorax n. falklandicus*. In addition it supports breeding populations of other endemic bird species and subspecies for which tussac grass is an important habitat, notably Cobb's wren and tussacbird *Cincoides a. antarcticus*. The island is also free of introduced predators such as rats and cats and therefore represents an important refuge for endemic birds. Populations of endemic species and subspecies may be of international importance on this site. Three of the twelve Falkland endemic plant species (Moore 1973) occur: Falklands lilaopsis *Lilaeopsis macloviana*, Falkland cudweed *Gnaphium affine* and coastal nassauvia *Nassauvia gaudichaudii*.

- 4 Sea Lion Island also qualifies under Criterion 4, since it is of critical importance to a number of birds and animals during the breeding season, a critical stage in their biological cycle. Among birds, this is true of gentoo penguins *Pygoscelis papuan*, rockhopper penguin *Eudyptes chrysocome*, Magellanic penguin *Spheniscus magellanicus* and southern giant petrel *Marconectes giganteus*. Woods & Woods (1997) note that the Falklands hold one of the world's most important populations of gentoo penguins and probably the largest population of rockhopper penguin. For marine mammals, it is of importance, both as a breeding and moulting site, to southern sea lion and southern elephant seal. It has the largest breeding colony of elephant seal within the archipelago, with approximately 500 breeding females (Glalimberti and Biotani 1999).

13. 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:

b) biogeographic regionalisation scheme (include reference citation):

14. 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	acidic, boulder, peat, sand overlaying sandstone of the Brenton Loch formation.
Geomorphology and landscape	cliffs, crags/ledges, islands, lagoon, pools
Nutrient status	
pH	acidic
Salinity	brackish / mixosaline
Soil	mainly organic, typically to a depth of 25 cms, overlaying bleached horizon with iron pan below.
Water permanence	permanent under normal conditions
Summary of main climatic features	Cool temperate oceanic climate, with average temperatures between 2–6° C. Rainfall averages 610 mm per annum.

15. 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).

No information available

16. Hydrological values:

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

17. Wetland types

Code	Name	% Area
A	Shallow marine waters	10
B	Marine beds (e.g. sea grass beds)	10
D	Rocky shores	7.5
E	Sand / shingle shores (including dune systems)	7.5
J	Coastal brackish / saline lagoons	3
Tp	Freshwater marshes / pools: permanent	2
U	Peatlands (including peat bogs swamps, fens)	60

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

The wetland types are as follows, beginning from the sea and moving inland: permanent shallow marine waters

(Ramsar type A); marine sub-tidal aquatic beds (type B); rocky marine shores (type D) or sandy/pebble shores (type E); a coastal brackish lagoon (type J); most of the higher part of the island is covered with peatland (type U), with a few freshwater pools (type Tp).

Permanent shallow marine waters and aquatic beds. The substrate is universally flat along the southern shore, with red algal-encrusted bedrock, and extensive, subtidally well-spaced giant kelp *Macrosystis pyrifera* (Tingley *et al.* 1996). Killer whales *Orcinus orca* regularly feed in this area.

Rocky marine shores, in places backed by cliffs. The rocky shorelines support invertebrates such as mussels, limpets and marine algae. Rockpools trap fish and small marine creatures. These rocky shores provide rich feeding areas for black-crowned night heron, kelp goose, crested duck *Anas specularioides*, Magellanic oystercatcher *Haematopus leucopodus*, and blackish oystercatcher *H. ater*, and nesting areas for species such as kelp goose, Falkland steamer duck and crested duck. The rocky cliffs provide nesting sites for rock shag *Phalacrocorax magellanicus*, with colonies of imperial shag and rockhopper penguin on the cliff tops.

Sandy/pebble shores. Sandy beaches are found round most of the shores of the island and in the sand neck which cuts right across the island, to the east of the settlement; the latter provides the main hauling out and breeding area for Southern Elephant Seal, with about 520 pups born each year from 1995 to 1997 (Galimberti & Boitani, 1999 and Galimberti, pers comm). Dolphin gull *Larus scoresbii*, kelp gull *L. dominicanus* and South American tern *Sterna hirundinacea* breed on the beach. In the centre of this beach is a large pond, extensively used for loafing in winter and spring by waterfowl, waders and seals, though it dries out in most summers. While much of this area is composed of bare sand, the principal vegetation associations are non-native marram-lyme grass *Ammophila-Elymus*, and sea cabbage *Senecio candidans*. The principal gentoo penguin colonies are located on the higher parts of this sandy area. Elsewhere, and in particular along the south coast, the pebble shores at the base of the low cliffs provide the main breeding areas for southern sea lion.

Tussac grass stands. Tussac grass does not fit easily into the Ramsar wetland classification though it is a major wetland habitat type in sub-Antarctic islands. It normally grows around the edge of islands, trapping an open wetter surface in the flatter centre of the island, and possibly plays an important role in conserving water in the soil and maintaining the hydrological and ecological balance of islands. "The similarity between tussock-grass and a small palm tree is due to the curious mode of growth of the former. Each plant forms a hillock of matted roots, rising straight out of the ground, and a few feet or more apart from the roots of the surrounding tussock plants. The hillocks are often six feet high, and four or five feet in diameter, and they throw out from the summit copious grassy foliage, with blades full six feet in length, drooping on all sides, those of the opposite plants meeting, so as to over-arch the spaces between them. Thus a tussock-bog (for so a tract of land covered with this grass is called) becomes a labyrinth" (Hooker 1847). "Tussock thrives where it may be subjected to considerable amounts of sea spray and a moisture-laden atmosphere with a high salt content. Whether the plant benefits nutritionally plays an important part in reducing competition from other plants...Although there are exceptions, tussock stands are generally restricted to coastal belts which rarely exceeds some 300 metres in width" (Strange *et al.* 1988). Tussac grass has in the past been used for grazing of sheep, cattle and horses, and as a result has decreased or disappeared from many of the settled islands. Only 65 ha remain on the two main islands of East and West Falkland (Strange *et al.* 1988). Tussac is an important habitat for birds of the Falklands (Woods 1970) and for seals (Strange 1992). On Sea Lion

Island, the stands of tussac grass, though affected by overgrazing and erosion, are exceptionally good for an island with a history of settlement and sheep-raising. Stands of tussac grass are found around much of the coastline of Sea Lion Island, above the sandy or pebbly shores.

Coastal brackish lagoon. Beaver Pond, a sizeable brackish pool, is at the north-west corner of the island, separated from the sea by a pebble beach. It provides nesting areas for a number of water birds such as Kelp Goose and Falkland Steamer Duck, and supports nesting colonies of Dolphin Gull and Kelp Gull. In the eroded areas around the pool, where tussac grass formerly grew, colonies of Magellanic penguin make their burrows, and upland goose and ruddy-headed goose make their nests and graze.

19. 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.*

Species occurring at levels of international importance:

Higher Plants

Codonorchis lessonii

Species at levels of national importance:

Higher Plants

Tussac Grass

Cinnamon Grass *Hierochloe redolens*

Lilaeopsis macloviana

Gnaphalium affine

Nassauvia gaudichaudii

Feugian violet *Viola magellanica*, only recorded from this site in the entire archipelago and important for the Falklands fritillary as a food plant.

20. 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.*

Species occurring at levels of national importance:

Southern Sea Lion

Gentoo Penguins

Killer Whales

Southern Elephant Seal

Rockhopper Penguins

The introduced-predator-free status of all the five islands in the group make them an important site for small passerines and potentially for burrowing petrels. They are also of importance for striated caracara, which breed on all five islands. Permanent ponds and boggy ground also provide important habitat for waterfowl and wading birds. The four smaller islands are worthy of further survey to ascertain numbers and distribution of qualifying species. The population of gentoo penguins on Sea Lion Island has increased from 3,000 in 1995, whilst the rockhopper population has remained relatively stable.

Gentoo penguin	Near Threatened > 1% global	c. 5,600 breeding adults (Clausen and Huin. In press)
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Rockhopper penguin	Vulnerable	970 breeding adults (Clausen and Huin. In press)
Macaroni penguin	Vulnerable	1 or 2 pairs breed occasionally
Magellanic penguin	Near Threatened	Breeding confirmed on all five islands, numbers unknown.
White-tufted grebe	(Range-restricted) subsp	Need confirmation of presence
Southern giant petrel	Vulnerable	c40 breeding adults on Sea Lion Island.
Sooty shearwater	> 10,000 pairs	Breeding confirmed on Sea Lion Island, numbers unknown. Presence likely on other islands.
Grey-backed storm petrel	> 1% global	Presence probable but unconfirmed.
Common diving petrel	(> 1% global) subsp	Breeding confirmed on Sea Lion Island, Sea Lion easterly and Rum Island. Numbers unknown.
Rock shag	> 1% global	c500 breeding adults, mainly on Whisky Island
King shag	> 1% global	Breeding confirmed, more than a 1000 pairs.
Black-crowned night-heron	(Range-restricted) subsp	
Upland goose	(Range-restricted) subsp (> 1% popl)	
Kelp goose	(Range-restricted) subsp (> 1% popl)	
Ruddy-headed goose	Data-deficient Range-restricted > 1% popl	Breeding confirmed on Sea Lion Island. Small numbers, uncounted.
Falkland steamer duck	Range-restricted > 1% pop	Widespread around all coasts, numbers unknown.
Striated caracara	Near Threatened Range-restricted > 1% global	c20 breeding adults breeding on all islands (Woods 1997).
Two-banded plover	(Range-restricted) subsp ??	
Magellanic snipe	(Range-restricted) subsp ??	Widespread throughout Sealion island
Dolphin gull	> 1% global	

Short-eared owl	(Range-restricted) subsp	
Tussacbird	Range-restricted	Numerous on all five islands
Dark-faced ground-tyrant	(Range-restricted) subsp	
Falkland pipit	(Range-restricted) subsp	
Grass wren	(Range-restricted) subsp	
Cobb's wren	Vulnerable Range-restricted	Numerous on all five islands
Falkland thrush	(Range-restricted) subsp	
Black-throated finch	Data-deficient Range-restricted	Presence confirmed, numbers unknown.

Sea Lion Island is of particular interest for the large colony of breeding elephant seal, which produce around 200 pups per year. These are the subjects of a long-term study by Italian researchers from the University of Rome. Southern sea lion also breed on the coasts, a breeding population producing 40 pups in 2003. The other small islands are used as haul out sites for both sea lion and elephant seals, although no breeding takes place there. Because of the steeply shelving coastline and diverse bird and mammal life, the island is also popular among tourists for being a good site to see killer whales, often feeding on penguins and seals just offshore. One striking feature of the bird community of Sea Lion group is the total absence of breeding or non breeding long-tailed meadowlark, despite them been present at Bull Point only 15 km away.

21. Social and 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.

Livestock grazing

Non-consumptive recreation

Tourism

A memorial located to the south east of the island is dedicated to the memory of servicemen who perished on board the HMS Sheffield, which sunk offshore near the island during the Falklands conflict in 1982. This provides both tourist interest and historical interest.

22. Land tenure/ownership:

Ownership category	On-site	Off-site
Local authority, municipality etc.	+	

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Recreation	+	+	Large-scale
Research	+		Large-scale
Livestock watering hole/pond	+		Small-scale

Grazing (unspecified)		+	Small-scale
Oil/gas exploration		+	None at present – a potential use.
Military activities	+	+	Small-scale

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

Activity	On-site	Off-site	Scale

25. 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

26. Conservation measures proposed but not yet implemented:

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

The site is pending designation as a National Nature Reserve and a management plan was drafted and agreed upon for this purpose. This is not yet implemented.

No further conservation measures are currently proposed although discussions with the landowner are ongoing with regard to an increase in the level and type of tourism at the site, including increasing and evolving tourism activities – including helicopter trips. This may lead to greater conservation steps being taken in the future to protect the site.

27. Current scientific research and facilities:

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

Ongoing research – study of breeding biology and population dynamics of Southern Elephant Seal
Involves marking individuals in entire population (by Galimberti & Boitani, scientists from University of Rome)

Area covered in Breeding Bird Survey of the Falkland Islands (Woods & Woods 1997)

The islands' penguin population is annually monitored as part of the Falklands Conservation Seabird Monitoring Programme.

Mentioned in a number of scientific papers on fauna and flora of the Falklands

28. Current conservation education:

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

There is a hide located to the north of the Lodge, which protects the breeding colony of Southern giant petrel. Literature for tourists is produced by the Lodge owners and copies of the Countryside Code are widely distributed. All military personnel visiting the island receive a full wildlife briefing before they arrive and the site is also featured in 'A Visitors Guide to the Falklands', which seeks to raise awareness of the sensitivity of the site to cruise ship passengers.

29. Current recreation and tourism:

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

This is the island's principal current activity, but it is limited by the number of beds available in the Lodge for visitors (15). A small number of tourists arrive on day visits by boat and helicopter. It is likely that this will increase dramatically in the near future as tour operators are expanding to carry out civilian helicopter trips for Stanley and cruise-ship based tourists. Discussions are underway to ensure that this is carried out in a sustainable fashion.

30. Jurisdiction:

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

Falkland Islands Government,
Government House, Port Stanley, Falkland Islands

31. 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.

Sea Lion Lodge is owned by Strachan-Visik Ltd, 1, Hyde Park Place, London W2 2LH and their representative at the site is Rob McKay, Manager, Sea Lion Lodge, Sea Lion Island. The island itself is owned by the Falkland Island Development Corporation and leased to the above company under contract. The contact for FIDC is Julian Morris, General Manager, FIDC, West Hillside, Stanley, Falkland Islands.

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Site-relevant references

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Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note 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. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

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

FOR OFFICE USE ONLY.

DD MM YY		

Designation date

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Site Reference Number

Updated by:

UK Overseas Territories Conservation Forum

102 Broadway
Peterborough PE1 4DG
UK
Email: pienkowski@cix.co.uk

2. Date this sheet was completed/updated:

04 July 2001 / 11 November 2004

3. Country:

UK (British Indian Ocean Territory)

4. Name of the Ramsar site:

Diego Garcia

5. Map of site included:

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

a) **hard copy** (required for inclusion of site in the Ramsar List): yes -or- no

b) **digital (electronic) format** (optional):

6. Geographical coordinates (latitude/longitude):

07 19 00 S 72 28 00 E

7. General location:

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

Diego Garcia

Nearest Town/City: Diego Garcia.

The Chagos Archipelago is located in the central Indian Ocean

Administrative region: British Indian Ocean Territory

8. Elevation (average and/or max. & min.) (metres): 9. Area (hectares): 35424.05

Min. No information available

Max. No information available

10. Overview:

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

Diego Garcia is the southernmost atoll of the Laccadive–Maldives–Chagos atoll chain. It is an unusual atoll in having a near continuous narrow island around some 90% of its atoll rim. This main island of Diego Garcia is the only inhabited island in the Chagos group, with a military base taking up most of the western half of the island. The archipelago possesses an exceptionally low level of pollution, although there is likely to be low levels of pollution in the Diego Garcia lagoon, which provides an anchorage for varying numbers of large military and civilian vessels. The World Heritage quality of the territory as whole is recognised in the BIOT Conservation Policy Statement (October 1997) which specifies that BIOT will be treated in accordance with the requirements of the Convention subject only to defence requirements.

The Ramsar site incorporates most of the eastern half of the main island, as well as three islets that lie in the only channel from the lagoon to the open ocean. These areas coincide with the Diego Garcia Restricted Area, a broad protective framework that also incorporates a Nature Reserve Area and four Special Conservation Areas.

Terrestrial areas include hardwood and coconut forest, and these form the centre of important nesting colonies for a number of seabirds. The lagoon, although impacted by dredging, anchors and the desalination and possible waste associated with vessels, still maintains important coral and seagrass communities. The outer reefs are little known, but probably contain typical fauna from the region.

11. 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, 3, 4, 6, 7, 8

12. Justification for the application of each Criterion listed in 11. 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).

- 1 The site is a particularly good example of a relatively unpolluted coral reef system in a near-natural state which provides a valuable link in the marine ecology of the Indian Ocean.
- 3 & 4 The site is of special value for maintaining the genetic and ecological diversity of the region, especially its marine life. The site provides a habitat for marine flora and fauna at a critical stage of their biological cycle including the endemic coral *Ctenella chagius* and the threatened Hawksbill and Green Turtles, *Eretymochelys imbricata* and *Chelonia mydas*. The site is also important for breeding seabirds.
- 6 The site contains breeding colonies and other components of several species in internationally important numbers. These include the following, as well as several other species for which data on total population size for comparison is still lacking:

Species	Total	% of population
Greater Crested Tern <i>Sterna bergii thassina</i>	45	3
Black-naped Tern <i>Sterna sumatrana mathewsi</i>	42	?

- 7 & 8 The coral reefs have not received scientific attention, however they are likely to have close

affinities to the sites further north. They support a large number of fish species including the Chagos endemic species. Although not observed it is likely that a site of this size will also include one or more spawning aggregation sites (often located in channel mouths or on reef promontaries (the site includes both)). The lagoon is also likely to provide a valuable nursery for fish stocks.

13. 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:

There are no widely accepted biogeographic classification schemes for the marine environment – the site lies outside the boundaries of the Large Marine Ecosystems, and is often left out of the UNEP Regional Seas. It lies within the very large Indo-Pacific Coral reef province and its location, mid-way between the Indonesian centre of coral reef diversity and the part-isolated Western Indian Ocean may make for its consideration, alongside the Maldives-Laccadives, as a unique region.

b) biogeographic regionalisation scheme (include reference citation):

14. 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	biogenic reef, sand
Geomorphology and landscape	coastal, island, lagoon, subtidal rock (including rocky reefs), subtidal sediments (including sandbank/mudbank)
Nutrient status	oligotrophic
pH	alkaline
Salinity	saline / euhaline
Soil	mainly mineral, mainly organic
Water permanence	usually seasonal / intermittent
Summary of main climatic features	Tropical Maritime

15. 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).

Terrestrial areas are of pure, coralline origin, consisting of coral rock and sand. There is a freshwater lens within the coral rock. Part of an oceanic archipelago.

16. Hydrological values:

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

17. Wetland types

Code	Name	% Area
B	Marine beds (e.g. sea grass beds)	0.5
C	Coral reefs	99
P	Freshwater lakes: seasonal / intermittent	0.5

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Diego Garcia is a mid-ocean coral reef and the southeastern-most atoll of the Chagos Archipelago which contains about 220 zooxanthellate species of 58 genera and is rich in marine life.

19. 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.*

Species at levels of national importance**Sea grass beds**

The only known large area of seagrass in the Archipelago is located on the north-eastern side of the lagoon at Diego Garcia. A number of fish species have been recorded in these seagrasses which have not yet been seen anywhere else in the Archipelago. This seagrass may also provide a critical food resource for green turtles.

20. 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.*

Species occurring at levels of international importance.**Birds**

Red-footed Boobies *Sula sula*

Greater frigate *Fregata minor*

Invertebrates

Coconut crab *Birgus latro*.

There are doubtless other endemic species, including at least one marine alga (Rhyne, 1971), one gastropod mollusc (Taylor, 1971).

The coral *Ctenella chagius* is endemic or near-endemic, and is the only species in this family in the Indo-Pacific region..

Species occurring at levels of national importance**Birds**

Lesser noddy tern *Anous tenuirostris*, Black-naped tern *Sterna sumatrana* and White (fairy) tern *Gygis alba*.

Fish

At least three species of endemic fish (Winterbottom and Anderson, 1999).

Invertebrates**21. Social and 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

Current scientific research

Fisheries production

Non-consumptive recreation

22. Land tenure/ownership:

Ownership category	On-site	Off-site
National/Crown estate	+	+

23. Current land (including water) use:

Activity	On-site	Off-site	Scale
Nature conservation	+	+	Large-scale
Research	+	+	Large-scale
Fishing: recreational/sport	+	+	Large-scale
Harbour/port	+	+	Large-scale
Military activities	+	+	Large-scale

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

Activity	On-site	Off-site	Scale
No factors reported			

25. 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
NNR	+	

26. Conservation measures proposed but not yet implemented:

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

The Chagos Conservation Management Plan (Sheppard and Spalding, 2004) has been accepted in principle by the Foreign and Commonwealth Office, but has yet to be implemented.

27. Current scientific research and facilities:

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

Scientific expeditions and visits were conducted in 1967, 1973, 1975 1978/9, 1996, 1999 and 2001. Surveys of recreational fishing are regularly conducted. The BIOT Conservation Consultant has visited annually for about one month from 1993 onwards and reports to the Commissioner.

28. Current conservation education:

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

The Chagos Conservation Trust is a registered charity whose objectives are to promote conservation, scientific and historical research and to advance education concerning the Chagos Archipelago. The Friends have produced four booklets on *Sea Shores of Chagos*, the *Reef Fishes of Chagos*, the *Plants of Chagos* and the *Birds of Chagos*. They have also produced CDs with several hundred photographs about the nature of the Chagos Archipelago past and present. Most recently, in association with the FCO, they have prepared a leaflet for distribution to personnel and yacht-based visitors to Chagos informing them of the importance of the natural environment and briefing them on key regulations.

There is turtle recording and awareness activity and recording of red-footed boobies. The NRMPDG contains measures to protect wildlife and efforts are made with local television and a locally produced news sheet to make the community interested in nature and aware of the need to protect the environment.

29. Current recreation and tourism:

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

Tourism is not permitted, however the large numbers of military and civilian personnel undertake of recreational activities within the atoll including sailing, fishing and camping (the latter allowed within the southern Nature Reserve portion of the Ramsar Site).

30. Jurisdiction:

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

Foreign and Commonwealth Office,
Overseas Territories Department, King Charles Street, London, SW1A 2AH, UK

31. 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.

BIOT Administrator, Foreign and Commonwealth Office, Overseas Territories Department, King Charles Street, London, SW1A 2AH, UK

32. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

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