



Ramsar Information Sheet

Published on 22 December 2023

Update version, previously published on : 11 May 1999

United Kingdom of Great Britain and Northern Ireland (Overseas territories)

Pembroke Marsh East



Designation date	11 May 1999
Site number	988
Coordinates	32°18'03"N 64°46'55"W
Area	7,65 ha

<https://rsis.ramsar.org/ris/988>

Created by RSIS V.1.6 on - 22 December 2023

Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a 'full' Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

1 - Summary

Summary

Pembroke Marsh East occupies a peat-filled basin on the north-east edge of the City of Hamilton. It is the largest freshwater ecosystem and supports the largest surviving Cattail *Typha angustifolia* marsh on Bermuda. It also contains a brackish open-water pond and parts of the Pembroke Canal, which drains into an estuarine system.

The site supports the largest population of eels on Bermuda, likely including both the Critically Endangered European eel *Anguilla Anguilla* and Endangered North American eel *Anguilla rostrata*. It may also support two endemic species of freshwater molluscs (Pea clam *Pisidium volutabundum* and Freshwater limpet *Ferrissia bermudensis*), although these have not been recorded since 1950 and may be extinct. The site is noted an important habitat for a wide variety of breeding, passage and wintering bird species.

It has suffered greatly from leachate and runoff from an adjacent former landfill site and surrounding urban areas. Sporadic small-scale dumping and infilling remains as an issue. The site overlies Bermuda's central freshwater lens, an important groundwater source for the surrounding community, and plays a notable role in buffering floodwater, trapping sediment and filtering pollutants.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Responsible compiler

Institution/agency	Bermuda Government
Postal address	DENR Headquarters, the Botanical Gardens, 169 South Road, Paget, DV04, Bermuda

National Ramsar Administrative Authority

Institution/agency	Department for Environment, Food and Rural Affairs
Postal address	2 Marsham Street, London SW1P 4DF

2.1.2 - Period of collection of data and information used to compile the RIS

From year	1999
To year	2023

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Pembroke Marsh East
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2.1.4 - Changes to the boundaries and area of the Site since its designation or earlier update

(Update) A. Changes to Site boundary	Yes <input checked="" type="radio"/> No <input type="radio"/>
(Update) The boundary has been delineated more accurately	<input checked="" type="checkbox"/>
(Update) The boundary has been extended	<input type="checkbox"/>
(Update) The boundary has been restricted	<input type="checkbox"/>
(Update) B. Changes to Site area	the area has decreased
(Update) The Site area has been calculated more accurately	<input checked="" type="checkbox"/>
(Update) The Site has been delineated more accurately	<input type="checkbox"/>
(Update) The Site area has increased because of a boundary extension	<input type="checkbox"/>
(Update) The Site area has decreased because of a boundary restriction	<input type="checkbox"/>
(Update) For secretariat only. This update is an extension	<input type="checkbox"/>

2.1.5 - Changes to the ecological character of the Site

(Update) 6b i. Has the ecological character of the Ramsar Site (including applicable Criteria) changed since the previous RIS?	Not evaluated
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2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image
<2 file(s) uploaded>

Former maps	0
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Boundaries description

The geographical coordinates for the site are 32°18'3"N, 64°46'56"W. It is located on the Main Island of Bermuda, on the north-east edge of the City of Hamilton in Pembroke Parish. The site boundary follows the boundary of the Bermuda Government nature reserve. It is bounded to the west by Dutton Avenue, to the north and east by the Marsh Folly composting facility, and to the south by the Transport Control Department.

2.2.2 - General location

a) In which large administrative region does the site lie?	Bermuda
b) What is the nearest town or population centre?	City of Hamilton

2.2.3 - For wetlands on national boundaries only

a) Does the wetland extend onto the territory of one or more other countries? Yes No

b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party? Yes No

2.2.4 - Area of the Site

Official area, in hectares (ha):

Area, in hectares (ha) as calculated from GIS boundaries

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
WWF Terrestrial Ecoregions	Neotropic
Marine Ecoregions of the World (MEOW)	Tropical Atlantic, Tropical Northwestern Atlantic

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

- Criterion 1: Representative, rare or unique natural or near-natural wetland types

Hydrological services provided	See section 4.5.
Other ecosystem services provided	See section 4.5.
Other reasons	Pembroke Marsh East is the largest freshwater ecosystem. It supports the largest surviving Cattail <i>Typha angustifolia</i> marsh on Bermuda, a brackish open-water pond, and parts of the Pembroke Canal.

- Criterion 2 : Rare species and threatened ecological communities

Optional text box to provide further information	<p>Pembroke Marsh East supports the largest population of eels on Bermuda, which gain access to the pond via the Pembroke Canal, a drainage ditch connecting to the sea at Mill Creek 1.6 km to the west. It is uncertain if this includes both the North American eel <i>Anguilla rostrata</i> and European eel <i>Anguilla Anguilla</i>; both breed in the Sargasso Sea and could be present. The European eel is listed as Critically Endangered and the American eel as Endangered on the IUCN Red List; both are listed under the Bermuda Protected Species Order (2012).</p> <p>Several species of endemic freshwater snails, clams and a limpet were recorded at Pembroke Marsh in 1910, including two species of freshwater molluscs that are endemic to Bermuda; the Pea clam <i>Pisidium volutabundum</i> and the Freshwater limpet <i>Ferrissia bermudensis</i> (synonym <i>Ancylus bermudensis</i>). However, these have not been recorded since 1950 despite targeted surveys and may be extinct (see Outerbridge 2020).</p>
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- Criterion 3 : Biological diversity

Justification	<p>The site is an important location for biodiversity. It supports an important freshwater marsh with areas of Cattail <i>Typha angustifolia</i> and Saw-grass <i>Cladium jamaicense</i>, a brackish open-water pond and parts of the Pembroke Canal, and supports the largest population of eels on Bermuda (see Criterion 2). It is also an important habitat for birds. As of March 2022, 85 checklists have been submitted to ebird.org listing 151 bird species for the site. It is an important breeding area for Common gallinule <i>Gallinula galeata</i>, American coot <i>Fulica americana</i>, Yellow-crowned night heron <i>Nyctanassa violacea</i> and Green heron <i>Butorides virescens</i>. A wide variety of waterfowl have been recorded on passage and in winter, including American bittern <i>Botaurus lentiginosus</i>, Black-crowned night heron <i>Nycticorax nycticorax</i>, Blue-winged teal <i>Anas discors</i>, Common teal <i>Anas crecca</i>, Great blue heron <i>Ardea herodias</i>, Least bittern <i>Ixobrychus exilis</i>, Lesser scaup <i>Aythya affinis</i>, Pied-billed grebe <i>Podilymbus podiceps</i>, Purple gallinule <i>Porphyrola martinica</i>, Ring-necked duck <i>Aythya collaris</i>, and Sora rail <i>Porzana carolina</i>.</p>
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3.2 - Plant species whose presence relates to the international importance of the site

<no data available>

3.3 - Animal species whose presence relates to the international importance of the site

Phylum	Scientific name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
		2	4	6	9	3	5	7	8								
Fish, Mollusc and Crustacea																	
CHORDATA/ ACTINOPTERYGII	<i>Anguilla anguilla</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				CR	<input type="checkbox"/>	<input type="checkbox"/>	Bermuda Protected Species Order 2012: Critically Endangered – Level 2 protected species	Listed as Critically Endangered on the IUCN Red List and the same under the Bermuda Protected Species Order (2012)
CHORDATA/ ACTINOPTERYGII	<i>Anguilla rostrata</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				EN	<input type="checkbox"/>	<input type="checkbox"/>	Bermuda Protected Species Order 2012: Vulnerable – Level 2 protected species	Listed as Endangered on the IUCN Red List and Vulnerable under the Bermuda Protected Species Order (2012)
MOLLUSCA/ BIVALVIA	<i>Pisidium volutabundum</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	Bermuda Protected Species Order 2012: Critically Endangered - Level 1 protected species	Endemic Bermudian species, Critically Endangered/ Possibly Extinct; the site is its only known location
Birds																	
CHORDATA	<i>Aves</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>		

1) Percentage of the total biogeographic population at the site

In addition the above species, *Ferrissia bermudensis* should be included in the table above (it could not be entered via the RSIS website as it is not recognised as an extant species) – it qualifies under Criterion 2 and 3 as an endemic Bermudian species known only from Pembroke Marsh East, and is classified as Critically Endangered or Possibly Extinct (listed under the Bermuda Protected Species Order 2012 as Critically Endangered - Level 1 protected species)

3.4 - Ecological communities whose presence relates to the international importance of the site

<no data available>

4 - What is the Site like? (Ecological character description)

4.1 - Ecological character

Pembroke Marsh East occupies a peat-filled basin that is connected to the sea by a 2 km drainage channel – the Pembroke Canal. It includes an area of freshwater marsh with Cattail *Typha angustifolia* and Saw-grass *Cladium jamaicense*, a brackish open-water pond, and parts of the Pembroke Canal which drain into an estuarine system at Mills Creek.

The eastern two-thirds of the marsh basin was completely destroyed and buried under the main landfill site for Bermuda, which closed in 1992. The western third of the basin, where the present nature reserve is located, was never used for large-scale garbage dumping, but was the subject of an unsuccessful land-claim project in the 1920s and 1930s. In addition, there has been continued sporadic small-scale, incremental dumping and infilling. The site has suffered greatly from toxic leachate and runoff from the landfill site, which seems to have killed off the resident killifish population. Although household garbage is no longer dumped at Pembroke Marsh, the horticultural waste composting facilities remain active.

The area around Pembroke Marsh East is heavily populated and developed, with high density residential and industrial buildings, in addition to the former landfill site. Accordingly, the quality of the water is adversely affected by leachate, as well as pollutants, such as oils and fuels, being transported during heavy rainfall from surrounding roads, car parks and industrial areas. Pollution sampling carried out in the late 1990s confirmed that there was very little life in the pond at that time.

4.2 - What wetland type(s) are in the site?

Inland wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
Fresh water > Lakes and pools >> Tp: Permanent freshwater marshes/pools	Open pond	0	0.66	Representative
Fresh water > Marshes on peat soils >> U: Permanent Non-forested peatlands	Marsh vegetation	0	4.98	Representative

Human-made wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type
9: Canals and drainage channels or ditches	Pembroke Canal	0	0.22

Other non-wetland habitat

Other non-wetland habitats within the site	Area (ha) if known
Encroachment from developments	0.28
Mixed woodland	1.51

4.3 - Biological components

4.3.1 - Plant species

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTALILIOPSIDA	<i>Arundo donax</i>	Actual (major impacts)	No change
TRACHEOPHYTALILIOPSIDA	<i>Cyperus alternifolius</i>	Actual (minor impacts)	No change
TRACHEOPHYTALILIOPSIDA	<i>Eichhornia crassipes</i>	Actual (major impacts)	No change

4.3.2 - Animal species

Invasive alien animal species

Phylum	Scientific name	Impacts	Changes at RIS update
CHORDATA/ACTINOPTERYGII	<i>Gambusia holbrooki</i>	Potential	No change
CHORDATA/AMPHIBIA	<i>Rhinella horribilis</i>	Actual (minor impacts)	No change
CHORDATA/REPTILIA	<i>Trachemys scripta elegans</i>	Actual (major impacts)	No change

Optional text box to provide further information

The Red-eared slider terrapin *Trachemys scripta elegans* is extremely numerous; it likely preys on indigenous aquatic life and has been observed basking on birds' nests. The Cane toad *Rhinella horribilis* is also found at the site. As there are no indigenous amphibians on Bermuda, the toads likely do not cause much disruption. Bermuda killifish *Fundulus bermudae* were previously found in Pembroke Marsh, but are no longer extant due to pollution. The introduced Eastern mosquitofish *Gambusia holbrooki*, was introduced to Pembroke Marsh East for mosquito control; as a predator of killifish eggs it poses a potential threat if they were ever reintroduced.

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
C: Moist Mid-Latitude climate with mild winters	Cfa: Humid subtropical (Mild with no dry season, hot summer)

Bermuda has a sub-tropical climate, which is hot and humid in summer, mild from autumn to spring, and with gales and strong winds common during the winter.

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres)

a) Maximum elevation above sea level (in metres)

- Entire river basin
- Upper part of river basin
- Middle part of river basin
- Lower part of river basin
- More than one river basin
- Not in river basin
- Coastal

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean.

Bermuda has no rivers or surface drainage because of the porous nature of the underlying limestone. Pembroke Marsh sits above Bermuda's central freshwater lens, where the water table meets the surface and a layer of peat accumulated. Historically, the Pembroke Marsh basin was connected to the sea via tidal creeks, which were destroyed by development in the early 20th century. The site is now drained via the Pembroke Canal, which is man-made and follows the former path of the natural drainage to the sea at Mills Creek, 1.6 km west of the site.

4.4.3 - Soil

Organic

(Update) Changes at RIS update No change Increase Decrease Unknown

No available information

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)? Yes No

Please provide further information on the soil (optional)

The soils are mainly organic peat.

4.4.4 - Water regime

Water permanence

Presence?	Changes at RIS update
Usually permanent water present	

Source of water that maintains character of the site

Presence?	Predominant water source	Changes at RIS update
Water inputs from precipitation	<input type="checkbox"/>	No change
Water inputs from groundwater	<input checked="" type="checkbox"/>	No change

Water destination

Presence?	Changes at RIS update
Marine	No change
Feeds groundwater	No change

Stability of water regime

Presence?	Changes at RIS update
Water levels largely stable	No change

4.4.5 - Sediment regime

Significant accretion or deposition of sediments occurs on the site

(Update) Changes at RIS update No change Increase Decrease Unknown

Sediment regime unknown

Please provide further information on sediment (optional):

The site is located in a basin which acts as a sediment trap. Sediments are washed into the marsh from surrounding developed areas and roadways, while organic material from marsh plants contributes to peat formation.

4.4.6 - Water pH

Circumneutral (pH: 5.5-7.4)

(Update) Changes at RIS update No change Increase Decrease Unknown

Unknown

Please provide further information on pH (optional):

The mean pH is 6.5 for Pembroke Canal that feeds the marsh (Doughty 2011).

4.4.7 - Water salinity

Fresh (<0.5 g/l)

(Update) Changes at RIS update No change Increase Decrease Unknown

Unknown

4.4.8 - Dissolved or suspended nutrients in water

Mesotrophic

(Update) Changes at RIS update No change Increase Decrease Unknown

Unknown

4.4.9 - Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself: i) broadly similar ii) significantly different

Surrounding area has greater urbanisation or development

Surrounding area has higher human population density

Surrounding area has more intensive agricultural use

Surrounding area has significantly different land cover or habitat types

Please describe other ways in which the surrounding area is different:

The surrounding area is heavily populated and developed with high density residential and industrial buildings, in addition to a former landfill site.

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Erosion protection	Soil, sediment and nutrient retention	Medium
Pollution control and detoxification	Water purification/waste treatment or dilution	Medium
Hazard reduction	Flood control, flood storage	Medium

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Nature observation and nature-based tourism	Low
Scientific and educational	Educational activities and opportunities	Low

Supporting Services

Ecosystem service	Examples	Importance/Extent/Significance
Biodiversity	Supports a variety of all life forms including plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part	Medium

Optional text box to provide further information

The site provides benefits through the rich diversity of lifeforms and ecosystems that it supports. It also helps maintain water quality standards, including buffering floodwater, trapping sediment and filtering pollutants in runoff that arises from surrounding urban areas (particularly during heavy rains) and leachate from an adjacent former landfill site. Pembroke Marsh overlies Bermuda's central freshwater lens, which is an important groundwater source for the surrounding community. The site is not accessible to the public, so recreational activities are limited to some birdwatching that takes place around the edge of the site. It is occasionally visited for educational field trips.

Outside the site: 1000s

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site? Yes No Unknown

4.5.2 - Social and cultural values

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

<no data available>

4.6 - Ecological processes

<no data available>

5 - How is the Site managed? (Conservation and management)

5.1 - Land tenure and responsibilities (Managers)

5.1.1 - Land tenure/ownership

Public ownership

Category	Within the Ramsar Site	In the surrounding area
National/Federal government	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Other types of private/individual owner(s)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Provide further information on the land tenure / ownership regime (optional):

The Pembroke Marsh Nature Reserve, which covers all of the site, is owned by the Government of Bermuda. The land adjacent to the west is also owned by the Government of Bermuda and contains recreational facilities, including the tennis stadium, softball fields, football pitches and netball courts at Bernard Park. The Marsh Folly composting facility operated by the Bermuda Government lies along the eastern boundary.

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:

Department of Environment and Natural Resources, Government of Bermuda

Provide the name and/or title of the person or people with responsibility for the wetland:

Senior Terrestrial Conservation Officer, Terrestrial Conservation Section, Department of Environment and Natural Resources

Postal address:

Department of Environment and Natural Resources Headquarters, Botanical Gardens, 169 South Shore Rd, Paget DV04, Bermuda

E-mail address:

environment@gov.bm

5.2 - Ecological character threats and responses (Management)

5.2.1 - Factors (actual or likely) adversely affecting the Site's ecological character

Human settlements (non agricultural)

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Housing and urban areas	Medium impact		<input type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change
Commercial and industrial areas	High impact		<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Drainage	Medium impact		<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change
Canalisation and river regulation	Low impact		<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Invasive and other problematic species and genes

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Invasive non-native/ alien species	High impact	High impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Pollution

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Household sewage, urban waste water	Medium impact		<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change
Industrial and military effluents	High impact		<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Please describe any other threats (optional):

The site has suffered greatly from toxic leachate and runoff from the adjacent former landfill site (see section 4.1), which, along with pollutants transported during heavy rainfall from surrounding roads, car parks and industrial areas, remains a significant threat. Although the landfill site was closed in 1992, thousands of tons of waste already present on site remain entombed beneath rubble and continue to release leachate pollution, though the extent of pollution still occurring in the pond and marsh is unknown. Sporadic small-scale dumping and infilling also remains as an issue, and although restoration of the site as parkland was proposed, this has yet to be undertaken.

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Nature Reserve, Bermuda National Parks Act (1986)	Pembroke Marsh Nature Reserve	https://environment.bm/pembroke-marsh	whole

5.2.3 - IUCN protected areas categories (2008)

- Ia Strict Nature Reserve
- Ib Wilderness Area: protected area managed mainly for wilderness protection
- II National Park: protected area managed mainly for ecosystem protection and recreation
- III Natural Monument: protected area managed mainly for conservation of specific natural features
- IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
- V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation
- VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

Habitat

Measures	Status
Improvement of water quality	Proposed

Species

Measures	Status
Control of invasive alien animals	Partially implemented

Human Activities

Measures	Status
Communication, education, and participation and awareness activities	Partially implemented

Other:

The site is designated as a Nature Reserve under the Bermuda National Parks Act (1986) and is managed primarily for nature conservation.

5.2.5 - Management planning

Is there a site-specific management plan for the site? No

Has a management effectiveness assessment been undertaken for the site? Yes No

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party? Yes No

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? No, but restoration is needed

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Birds	Implemented

As of March 2022, at total of 85 checklists covering 151 bird species have been submitted to ebird.org by volunteers.

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Boëtius, I. and Boëtius, J. (1967) Eels, *Anguilla rostrata*, LeSueur, in Bermuda. *Videnskabelige Meddelelser Fra Dansk Naturhistorisk Forening*, 130, 63-84.

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

Cooke, J.E. (1995) Report on Pembroke Marsh and Canal sediment and water monitoring, June 1995. Produced by Clayton Consultants Ltd (Birmingham, UK) for the Ministry of Works and Engineering, Bermuda Government.

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

Doughty, L.A. (2011) Report on water quality in Pembroke Canal and the inner part of Mill Creek, Bermuda. BSc dissertation. Cardiff University.

IUCN (2022) The IUCN Red List of Threatened Species. <https://www.iucnredlist.org/>

Outerbridge, M. (2020) Recovery Plan for the endemic freshwater molluscs of Bermuda; the limpet *Ancylus bermudensis* and the pea clam *Pisidium volutabundum*. Department of Environment and Natural Resources, Government of Bermuda Ministry of Home Affairs.

Outerbridge, M.E. (2022) Management Plan for the American Eel *Anguilla rostrata* on Bermuda. Department of Environment and Natural Resources, Government of Bermuda.

Thomas, M.L.H. (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.

Thomson, J.A.M. and Foster, S.S.D. (1986) Effects of urbanisation on ground water of limestone islands: an analysis of the Bermuda case. *Journal of the Institution of Water Engineers and Scientists* 40, 527-540.

Ward, J.L. (1992) Sustaining Pembroke Marsh: a case study of a dump. Unpublished MA dissertation, University of Georgia.

Wingate, D.B. (1986). The history of drainage and land fill operations in the Pembroke marsh Basin and its implications for future management and use of the area. *Department of Agriculture and Fisheries Monthly Bulletin*. 57(7):53-56

Previous RIS
 Pembroke Marsh East Ramsar Information Sheet UK41005. Version 3.0, 13/06/2008, produced by JNCC.
 Pembroke Marsh East Ramsar Information Sheet GB988RIS. Dated 10 February 1999.

Related webpages
 Pembroke Marsh ebird sightings <https://ebird.org/hotspot/L2716850>
 Bermuda Government webpage <https://environment.bm/pembroke-marsh>
 Aerial video of the marsh <https://www.youtube.com/watch?v=BPry9B42wR4>

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)

<no file available>

ii. a detailed Ecological Character Description (ECD) (in a national format)

<no file available>

iii. a description of the site in a national or regional wetland inventory

<no file available>

iv. relevant Article 3.2 reports

<no file available>

v. site management plan

<no file available>

vi. other published literature

<1 file(s) uploaded>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:



Looking to the southeast across Pembroke Marsh (Alison Copeland, 02-02-2011)



Pembroke Marsh east view (Alison Copeland, 02-02-2011)

6.1.4 - Designation letter and related data

Designation letter

<1 file(s) uploaded>

Date of Designation

1999-05-11