



Ramsar Information Sheet

Published on 10 January 2024

Update version, previously published on : 11 May 1999

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

Paget Marsh



Designation date	11 May 1999
Site number	990
Coordinates	32°17'04"N 64°46'34"W
Area	11,65 ha

<https://rsis.ramsar.org/ris/990>

Created by RSIS V.1.6 on - 10 January 2024

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

Paget Marsh is located in a peat-filled basin, most of which is less than 0.5 m above sea-level. It is the least disturbed of Bermuda's peat marshes and last remaining large example of the original forest cover of Bermuda. It includes relict mangrove swamp in a nearly non-tidal freshwater peat basin growing at the northerly limit for mangroves in the Atlantic; a significant area of endemic Bermuda palmetto *Sabal bermudana* 'hammock' forest; and a diverse and notable representation of wetland habitats ranging from open water ditches to Saw-grass *Cladium mariscus* subsp. *jamaicense* savanna, Wax-myrtle *Morella cerifera* thickets, and land-locked stands of Red mangrove *Rhizophora mangle*.

The site is rich in plant life. The swamp forest supports several Bermudian endemic and globally threatened plant species, including the Bermuda cedar *Juniperus bermudiana*, Bermuda palmetto *Sabal bermudana*, Bermuda maidenhair fern *Adiantum bellum*, Bermuda sedge *Carex bermudiana*, and Wild Bermuda pepper *Peperomia septentrionalis*. It also contains several rare native species, including St. Andrew's cross *Hypericum hypericoides* and Bermuda campylopus moss *Campylopus trachyblepharon*. A large number of mosses, ferns, aquatic plants, reeds, grasses, vines, herbs, shrubs, trees and palms occur. The diversity of moss species is particularly notable. In addition, 111 bird species have been observed.

The site contains a short boardwalk, which makes it the only easily accessible marsh habitat in Bermuda. It is a valuable educational site for school children and adult special interest groups, and it is also a favourite site for passive pursuits, such as bird watching, nature photography and nature walks. Large collections of herbarium sheets from the early 20th century exist for Paget Marsh, and it remains an important research site for water quality, vegetation succession, rare species introductions and invasive plant management. The main threats are invasive non-native plant and animal species, pollution, and salination of groundwater and saturation of soils.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Responsible compiler

Institution/agency

Postal address

National Ramsar Administrative Authority

Institution/agency

Postal address

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

From year

To year

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)

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 No

(Update) The boundary has been delineated more accurately

(Update) The boundary has been extended

(Update) The boundary has been restricted

(Update) B. Changes to Site area the area has increased

(Update) The Site area has been calculated more accurately

(Update) The Site has been delineated more accurately

(Update) The Site area has increased because of a boundary extension

(Update) The Site area has decreased because of a boundary restriction

(Update) For secretariat only. This update is an extension

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?

2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image

<2 file(s) uploaded>

Former maps

Boundaries description

The geographical coordinates for the site are 32°17'5"N, 64°46'34"W. It is located on the Main Island of Bermuda, almost 1 km SSE of Hamilton, in Paget Parish at the junction of Middle Road and South Road. The site is bounded by Middle Road to the south and east, the private houses of Lover's Lane and Highwood Lane to the north, the SPCA property and Valley Road to the northwest, and the wall of the churchyard of St. Paul's to the southwest.

2.2.2 - General location

a) In which large administrative region does the site lie?

b) What is the nearest town or population centre?

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
Marine Ecoregions of the World (MEOW)	Tropical Northwestern Atlantic
WWF Terrestrial Ecoregions	Neotropics

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 Paget Marsh is of international importance as the least disturbed of Bermuda's peat marshes and last remaining large example of the original forest cover of Bermuda. It includes relict mangrove swamp in a nearly non-tidal freshwater peat basin growing at the northerly limit for mangroves in the Atlantic; a significant area of endemic Bermuda palmetto *Sabal bermudana* 'hammock' forest; and a diverse and notable representation of wetland habitats ranging from open water ditches to Saw-grass savanna *Cladium mariscus* subsp. *jamaicense*, Wax-myrtle *Morella cerifera* thickets, and land-locked stands of Red mangrove *Rhizophora mangle*.

- Criterion 2 : Rare species and threatened ecological communities

Optional text box to provide further information

The swamp forest at Paget Marsh supports several Bermudian endemic and globally threatened plant species, including the Bermuda cedar *Juniperus bermudiana*, which is listed as Critically Endangered on the IUCN Red List, and the Bermuda palmetto *Sabal bermudana*, Bermuda sedge *Carex bermudiana*, and Wild Bermuda pepper *Peperomia septentrionalis*, which are all listed as Endangered on the IUCN Red List.

Paget Marsh also contains several rare native species, that are listed on the Bermuda Protected Species Order 2012, including St. Andrew's cross *Hypericum hypericoides* and Bermuda campylopus moss *Campylopus trachyblepharon*.

Bermuda palmetto-dominated forests, with their associated diversity of epiphytes and understory plants, would have been common on pre-colonial Bermuda. Only 3.6 ha of this habitat remains, 2.8 ha of which are located within Paget Marsh.

- Criterion 3 : Biological diversity

Justification

The site is an important location for biodiversity as one of least disturbed peat marshes and last remaining large example of indigenous species-dominated forest cover on Bermuda. A variety of wetland habitat types are present, including mangrove swamp, endemic Bermuda cedar-palmetto 'hammock' forest with an understory of ferns and mosses, open water ditches and saw-grass savanna. The site is rich in plant life, including several endemic and globally threatened plants (see Criterion 2). Paget Marsh is the finest remaining example of peat marsh habitat on Bermuda, a habitat that contains a higher diversity of plant growth forms than any other Bermudian habitat, including mosses, ferns, aquatic plants, reeds, grasses, vines, herbs, shrubs, trees and palms. The understory supports the highest diversity of moss species on Bermuda.

A total of 111 bird species have been observed at Paget Marsh. Although it is of limited importance for waterfowl, the Blue-winged teal *Anas discors*, and Sora rail *Porzana carolina* occur on passage and in winter. Yellow-rumped (Myrtle) warbler *Setophaga coronata* also overwinter in the wax-myrtle thickets. It is home to many local woodland birds, such as Cardinals, Catbirds and the endemic sub-species of the White-eyed vireos *Vireo griseus bermudianus*. The marsh is used as a breeding site for resident bird species such as the Common moorhen *Gallinula chloropus*, Green heron *Butorides virescens* and Yellow-crowned night heron *Nyctanassa violacea*.

3.2 - Plant species whose presence relates to the international importance of the site

Phylum	Scientific name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
Plantae								
BRYOPHYTA/ BRYOPSIDA	<i>Campylopus trachylepharon</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Listed on the Bermuda Protected Species Order 2012	Globally rare and listed as Critically Endangered on Bermuda; subject of a protected species recovery plan
TRACHEOPHYTA/ LILIOPSIDA	<i>Carex bermudiana</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	EN	<input type="checkbox"/>	Listed on the Bermuda Protected Species Order 2012	Endemic to Bermuda; listed as Endangered on IUCN Red List
TRACHEOPHYTA/ MAGNOLIOPSIDA	<i>Hypericum hypericoides</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LC	<input type="checkbox"/>		Scarce native Bermudian species (formerly thought to be endemic) covered by a protected species recovery plan, which lists Paget Marsh as an important habitat for the species
TRACHEOPHYTA/ PINOPSIDA	<i>Juniperus bermudiana</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CR	<input type="checkbox"/>	Listed on the Bermuda Protected Species Order 2012	Endemic to Bermuda; listed as Critically Endangered on IUCN Red List
TRACHEOPHYTA/ MAGNOLIOPSIDA	<i>Peperomia septentrionalis</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	EN	<input type="checkbox"/>	Listed on the Bermuda Protected Species Order 2012	Endemic to Bermuda; listed as Endangered on IUCN Red List
TRACHEOPHYTA/ LILIOPSIDA	<i>Sabal bermudana</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	EN	<input type="checkbox"/>		Endemic to Bermuda; listed as Endangered on IUCN Red List

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

1) Percentage of the total biogeographic population at the site

<no data available>

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

RIS for Site no. 990, Paget Marsh, United Kingdom of Great Britain and Northern Ireland (Overseas territories)

Name of ecological community	Community qualifies under Criterion 2?	Description	Justification
Bermuda palmetto hammock forest	<input checked="" type="checkbox"/>	The canopy of this habitat is mostly composed of <i>Sabal bermudana</i> , with some <i>Juniperus bermudiana</i> . There is a species-rich understory, including <i>Osmundastrum cinnamomeum</i> , <i>Osmunda spectabilis</i> , <i>Carex bermudiana</i> , and <i>Eleocharis bermudiana</i> .	As an endemic species-dominated ecological community, this type of forest is unique to Bermuda; about 80% of the remaining extent occurs within Paget Marsh.

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

4.1 - Ecological character

Paget Marsh is located in a peat-filled basin, in a valley bottom that is surrounded by high dune hills formed from Aeolian limestone. Most of the site is less than 0.5 m above sea-level. It was originally connected by underwater caves to the tidal waters of Hamilton Harbour, but these have become blocked by accumulated peat and the marsh is nearly non-tidal. Although water-levels are somewhat seasonal and fluctuate irregularly with ocean eddies, they generally remain stable and relatively high.

The site supports the last remaining large example of the original forest cover of Bermuda. It is particularly interesting as it contains a diverse variety and progression of wetland habitats, ranging from open water ditches and ponds to Saw-grass *Cladium mariscus* subsp. *jamaicense* savanna, to Wax-myrtle *Morella cerifera* thickets, endemic Bermuda cedar-palmetto *Juniperus bermudiana*-*Sabal bermudiana* 'hammock' forest (which covers much of the ground surface), and stands of relict (i.e. now land-locked) Red mangrove *Rhizophora mangle* growing at the northerly limit for mangrove in the Atlantic. A variety of native and endemic sedges, shrubs and ferns are associated with the shady and humid conditions found in the forest, including the Bermuda sedge *Carex bermudiana*, Cinnamon fern *Osmundastrum cinnamomeum* and Royal fern *Osmunda spectabilis*. Also present in the understorey are the shrub St. Andrew's cross *Hypericum hypericoides* and Bermuda spike rush *Eleocharis bermudiana* which are now almost confined to Paget Marsh. The 100 year-old stone wall in the centre of the marsh supports the endemic Bermuda maidenhair fern *Adiantum bellum*. Marshland plants include Saw-grass *Cladium mariscus* subsp. *jamaicense*, Lesser bulrush *Typha augustifolia*, Great bulrush *Schoenoplectus tabernaemontani* and the Giant fern *Acrostichum danaeifolium*. The understory is noted as having the highest diversity of moss species on Bermuda.

Although Paget Marsh is one of the least disturbed peat marshes on Bermuda, it has been impacted by the digging of drainage ditches around the periphery of the marsh in the 1940s, and the introduction of aggressive acid soil plant species, including Guava *Psidium guajava*, Marlberr *Ardisia elliptica*, Chinese fan palm *Livistona chinensis* and the Queensland umbrella tree *Schefflera actinophylla*. In addition, the local catchment for east central Paget Parish drains into the site, including runoff from heavily-used roads, agricultural fields and residential areas.

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 > Marshes on peat soils >> U: Permanent Non-forested peatlands	Sawgrass savanna	0	0.54	Representative
Fresh water > Marshes on peat soils >> Xp: Permanent Forested peatlands	Mangrove forest = 1.15 ha; Palmetto hammock forest = 6.13 ha	0	7.28	Representative

Human-made wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type
2: Ponds	Open water pond/bird scrape	0	0.08
9: Canals and drainage channels or ditches		0	0.3

Other non-wetland habitat

Other non-wetland habitats within the site	Area (ha) if known
Mixed woodland	2.91
Agricultural field	0.54

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTA/POLYPODIOPSIDA	<i>Adiantum bellum</i>	Endemic to Bermuda
TRACHEOPHYTA/LILIOPSIDA	<i>Eleocharis albida</i>	Endemic to Bermuda; rarely seen and possibly only occurring in Paget Marsh
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Rhizophora mangle</i>	At the northern limit of its range in the Atlantic on Bermuda

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Ardisia elliptica</i>	Actual (major impacts)	increase
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Ficus microcarpa</i>	Actual (major impacts)	No change
TRACHEOPHYTA/LILIOPSIDA	<i>Livistona chinensis</i>	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Psidium guajava</i>	Actual (minor impacts)	decrease
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Schefflera actinophylla</i>	Actual (major impacts)	increase
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Schinus terebinthifolia</i>	Actual (major impacts)	No change

Optional text box to provide further information

Invasive plants are an increasingly serious threat to Paget Marsh’s unique plant community. The ornamental shrub Marlberry *Ardisia elliptica* has become rampantly invasive in Paget Marsh at densities that threatened to crowd out most indigenous understory species. The Queensland umbrella tree *Schefflera actinophylla* and Indian laurel *Ficus microcarpa* are increasingly common in all parts of the marsh, where they grow as epiphytes smothering other trees, as well as from the drier substrates within the forest. The Guava tree *Psidium guajava* historically monopolized parts of the forest, requiring labour intensive removal. A number of the invasive trees that are common in most Bermudian habitats also inhabit the drier parts of Paget Marsh, in particular the Chinese fan palm *Livistonia chinensis* and Brazil pepper tree *Schinus terebinthifolia*. *Eleocharis bermudiana* (Bermuda spike rush) is an endemic plant to Bermuda. It is rarely seen and possibly only occurring in Paget Marsh.

4.3.2 - Animal species

Invasive alien animal species

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

Optional text box to provide further information

Cane toads *Rhinella horribilis* breed in the freshwater ditches and ponds of Paget Marsh. Their effects on the ecosystem are unknown, but are not thought to be significant as Bermuda has no wildlife that prey on toads, and no indigenous amphibians for them to compete with. The Red-eared slider terrapin *Trachemys scripta elegans* can be found in ponds, ditches and the wetter parts of the marsh forest. It is likely these are impacting other wildlife, particularly in the more predatory early life stages. The Eastern mosquitofish *Gambusia holbrooki* have been introduced to the ponds and ditches to control mosquitoes. These likely played a role in the failed attempt to re-introduce Bermuda killifish *Fundulus bermudae*. Black rats *Rattus rattus* are common in the marsh and destroy the seeds of endemic plants, particularly *Carex bermudiana* and *Sabal bermudana*, impacting the recruitment of seedlings. This is one of the driving causes of the decline of *Carex bermudiana*.

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

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 site is underlain by acidic peat soils and a predominately freshwater ecosystem. However, it was originally connected by subterranean caves to the tidal waters of Hamilton Harbour, which progressively became blocked by accumulating peat.

Increased salination and saturation of soils is a particular concern – see section 5.2 for further details.

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
Feeds groundwater	No change

Stability of water regime

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

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology:

See section 4.4.3.

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.

4.4.6 - Water pH

Acid (pH<5.5)

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

Unknown

4.4.7 - Water salinity

Fresh (<0.5 g/l)

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

Mixohaline (brackish)/Mixosaline (0.5-30 g/l)

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

Unknown

Please provide further information on salinity (optional):

See section 4.4.3.

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 site is located in a mainly residential area, with some agricultural fields, and is partly bounded by heavily-used roads.

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	High
Recreation and tourism	Picnics, outings, touring	Medium
Spiritual and inspirational	Aesthetic and sense of place values	Medium
Scientific and educational	Important knowledge systems, importance for research (scientific reference area or site)	High
Scientific and educational	Educational activities and opportunities	High

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	High

Optional text box to provide further information

The site provides benefits through the rich diversity of lifeforms and ecosystems that it supports. It also provides hydrological services which are primarily related to water quality standards, including trapping floodwater and sediment and filtering pollutants in runoff that arises from surrounding areas particularly roadways during heavy rains.

The site is an important location for recreation and education. There is a boardwalk with an interpretive trail which makes it an easily accessible reserve for visitors and a good place to see waterfowl and woodland birds. The boardwalk makes Paget Marsh the only easily accessible marsh habitat in Bermuda, making it an incredibly valuable educational site for both school children and adult special interest groups. It is used regularly for educational guided tours and for informal recreational use by locals and tourists. Paget Marsh is a favourite site for passive pursuits such as bird watching, nature photography, and nature walks.

Paget Marsh was historically well visited by botanists for scientific exploration. Large collections of herbarium sheets from the early 20th century exist for Paget Marsh. It remains an important research site for water quality, vegetation succession, rare species introductions and invasive plant management, and could be an important site to investigate climate change impacts.

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

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Foundation/non-governmental organization/trust	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Religious body/organization	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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 site is co-owned by the Bermuda National Trust and the Bermuda Audubon Society, two Bermudian environmental NGOs. The land around the boundaries of the site are owned by private home owners. On the western boundary of the site is St. Paul's Church, owned by the Anglican Church of Bermuda. The property of the Bermuda Society for the Prevention of Cruelty to Animals (SPCA) lies on the north-western boundary.

5.1.2 - Management authority

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

Bermuda National Trust; Bermuda Audubon Society

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

Head of Natural Heritage, Bermuda National Trust

Postal address:

Bermuda National Trust, 'Waterville', 2 Pomander Road, Paget, PG 05, Bermuda
Bermuda Audubon Society, PO Box HM 1328, Hamilton HM FX, Bermuda

E-mail address:

palmetto@bnt.bm

5.2 - Ecological character threats and responses (Management)

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

Transportation and service corridors

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Roads and railroads	Medium impact		<input 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		<input checked="" type="checkbox"/>	increase	<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	High impact		<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change
Agricultural and forestry effluents	Low impact	Medium impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change
Air-borne pollutants	Medium impact		<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Climate change and severe weather

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

Please describe any other threats (optional):

Several invasive non-native plant species have been introduced to Paget Marsh, including Guava *Psidium guajava*, Marberry *Ardisia elliptica*, Indian laurel *Ficus microcarpa*, Chinese fan palm *Livistona chinensis* and the Queensland umbrella tree *Shefflera actinophylla*. Black rats *Rattus rattus* are also incredibly abundant in Paget Marsh, where they eat the seeds of Bermuda palmettos and the endangered Bermuda sedge. Red-eared slider terrapins have also invaded the interior of the marsh, drainage ditches and ponds where they eat aquatic plants and invertebrates. The impact of rats and terrapins on nesting birds is unknown. It is likely the terrapins are eating the *Gambusia holbrooki* introduced to the ponds to control mosquitos. Due to the ease of access afforded by the boardwalk, dumping of unwanted aquarium fish, plants and invertebrates into the ponds of Paget Marsh is a regular occurrence. For example, during a killifish monitoring visit in 2012, several species or ornamental fish were trapped in the pond at Paget Marsh, but only one individual Bermuda killifish was found.

There is evidence of road and possibly agricultural runoff introducing pollutants into the open water within the site, particularly David's Pond. This may be responsible for high mortality and mutation rates among tadpoles and juvenile Cane toads *Rhinella horribilis* (see <https://www.audubon.bm/conservation/research/22-bermuda-amphibian-project>).

Salination of groundwater and saturation of soils is a major threat. During 2002, high tides combined with the effects of a strong ocean current circulation produced unusually high sea levels in the western Atlantic, centred on the Bermuda area. Water levels in the marsh remained 30 cm or more above normal for over four months, coupled with an influx of brackish water into the marsh. Within six months, over 90% of the Bermuda cedars in the hammock forest died, many of them mature trees 200 or more years of age. Cedar death from inundation was also recorded in Devonshire Marsh and Shelly Bay Marsh. This was the longest duration and highest sea level event on record. Similar warm water eddy-induced high-sea level events occurred in 2011 and 2017, with the 2017 event lasting four months from September to December. This points to the potential for future sea-level rise to have detrimental effects on such wetland habitats, especially if sea-level rises faster than peat formation resulting in mainly fresh-water wetlands being more frequently inundated by saline tidal waters. If the ground becomes permanently covered with standing water, this will certainly prevent recruitment of seedlings and will probably drown the few remaining Bermuda cedars. If the peat becomes saturated and soft, it may also make it harder for trees to remain standing in hurricanes.

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Nature Reserve	Paget Marsh	http://www.audubon.bm/conservation/nature-reserves/145-8-paget-marsh	partly
Nature Reserve	Paget Marsh Nature Reserve	https://bnt.bm/environment/protected_open_space/central_wetlands/	partly
Protected farmland and historic house	Paget Marsh Farmland and Lemon Moor Cottage	https://bnt.bm/environment/protected_open_space/farmlands/	partly

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	Partially implemented

Species

Measures	Status
Control of invasive alien plants	Partially implemented
Reintroductions	Partially implemented

Human Activities

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

Other:

Invasive non-native plant species were historically controlled by selective regular cutting, which has largely been effective for some species. Red-eared slider terrapins are periodically culled from the ponds in the site.

An attempt was made to introduce the endemic Bermuda killifish *Fundulus bermudae* to the pond at Paget Marsh, but the population failed to establish. Also, a group of captive bred endemic Greater Bermuda land snail *Poecilozonites bermudensis* (which are Critically Endangered on IUCN Red List) was introduced to the site in 2020; it is not known if they have successfully established

Settling reservoirs have been installed under the main drainage pipes that flow into the marsh, to reduce direct flow and help control water-borne pollution.

Education on the wildlife value and importance of the site is provided during guided tours, school field trips, summer camps and via an interpretive signs located along the boardwalk. Also a comprehensive resource guide for teachers has been created by the Bermuda National Trust https://secureservercdn.net/192.169.220.85/ob4.376.myftpupload.com/wp-content/uploads/2020/11/paget_marsh.pdf

Research activities take place at Paget Marsh often. Recent examples include ecotoxicology studies of amphibians, collecting plant material for genetic analysis, surveys for Protected Species Act listed animals and plants.

5.2.5 - Management planning

Is there a site-specific management plan for the site? In preparation

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

Please indicate if a Ramsar centre, other educational or visitor facility, or an educational or visitor programme is associated with the site:

The Bermuda National Trust's educational programme uses the site for field visits and several interpretive signs have been installed along the boardwalk.

URL of site-related webpage (if relevant):

5.2.6 - Planning for restoration

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

Further information

Proposed restoration works cover the removal of invasive species, particularly invasive Marberry, Guava, Queensland Umbrella Tree, Chinese Fan Palm and Ficus, and repair of the boardwalk.

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Birds	Implemented

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Bacon, D. & Fort, J. (2004) The Bermuda Amphibian Project: A comprehensive approach to assessing ecotoxicological impacts on Bermuda's amphibians. In: Society of Environmental Toxicology and Chemistry, 25th Annual Meeting, 14-18 November 2004, Portland, Oregon.
 Bermuda National Trust (2014) Paget Marsh Nature Reserve Teachers Resource Guide. 64 pages.
https://secureservercdn.net/192.169.220.85/ob4.376.myftpupload.com/wp-content/uploads/2020/11/paget_marsh.pdf
 Copeland, A.I. (2020) Management Plan for the Bermuda Campylopus Moss *Campylopus bermudianus* syn. *Campylopus trachylepharon*. Department of Environment and Natural Resources, Government of Bermuda. https://environment.bm/s/Campylopus-Moss-Plan-200708_final.pdf
 Copeland, A. I. (2020) IUCN Red List assessment of Bermuda's endemic plants 2013-2016. Technical Report of the Biodiversity Section, Department of Environment and Natural Resources, Government of Bermuda, Flatts, Bermuda. <http://dx.doi.org/10.13140/RG.2.2.17442.35523>
 IUCN (2022) The IUCN Red List of Threatened Species. <https://www.iucnredlist.org/>
 Outerbridge, M.E. (2020) Recovery Plan for the killifishes of Bermuda (*Fundulus bermudae* & *Fundulus relictus*). Department of Environment and Natural Resources, Government of Bermuda. 52 pages. <https://environment.bm/s/Killifishes-Recovery-Plan-FINAL-July-2020.pdf>
 Thomas, M.L.H. (1993) Mangrove swamps in Bermuda. Atoll Research Bulletin, 386, 1-17.
 Wingate, D.B. (1984) Taking stock of Bermuda's wetland heritage. Department of Agriculture and Fisheries, Hamilton.

Previous versions of RIS

Paget Marsh Ramsar Information Sheet UK41004. Version 3.0, 13/06/2008, produced by JNCC.
 Paget Marsh Ramsar Information Sheet GB990RIS. Dated 10 February 1999.

Related websites

Audubon Society webpage www.audubon.bm/conservation/nature-reserves/145-8-paget-marsh
 Bermuda National Trust webpages https://bnt.bm/environment/protected_open_space/central_wetlands/;
https://bnt.bm/environment/protected_open_space/farmlands/; <https://bnt.bm/learning/field-trip-information/>
 Bermuda Government webpage <https://whhttps://environment.bm/ramsar-sites>
 Paget Marsh ebird sightings <https://ebird.org/hotspot/L2279530>

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:



The Paget Marsh boardwalk entering the mangroves (*Alison Copeland, 13-03-2011*)



Spike rushes, ferns and Bermuda Palmettos in the interior of Paget Marsh (*Alison Copeland, 05-08-2014*)



Endemic Bermuda Palmettos, ferns and invasive Marberry, Paget Marsh (*Alison Copeland, 20-08-2014*)

6.1.4 - Designation letter and related data

Designation letter

<1 file(s) uploaded>

Date of Designation