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)

Spittal Pond

Designation date	11 May 1999
Site number	984
Coordinates	32°18'41"N 64°43'30"W
Area	9,88 ha

https://rsis.ramsar.org/ris/984
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

Spittal Pond is the only Bermudian example of a non-tidal, permanent, shallow brackish lagoon with fringing mudflats, saltmarshes and stands of Black mangrove Avicennia germinans. Adjacent to this are transitional areas of grass-dominated marsh and drier habitats on less saline soils, including dense invasive tree-dominated woodland, areas of limestone pavement (locally known as 'Checkerboard'), and an impressive and geologically important stretch of rugged coastline with low-lying rocky shore and limestone cliffs.

The ecological conditions in the pond can be very changeable. During spring tides and cyclonic storms, ocean waves break through two low-lying overwash areas allowing seawater to flood into the pond. Hurricanes can also sweep in huge inputs of seawater, large boulders, sediment, vegetation and organic matter, leading to prolonged nutrient enrichment and anaerobic conditions. This greatly effects and limits the biotic diversity.

The coastal habitat supports the largest remaining mainland population of the Bermuda skink Plestiodon longirostris and the pond potentially supports both the American eel Anguilla rostrata and European eel Anguilla anguilla; all of which are listed as either Critically Endangered or Endangered on the IUCN Red List. The site is noted for its bird life and is considered to be the most important wetland for wintering waterfowl and transient shorebirds in Bermuda. Other notable species include the threatened endemic daisy-like Darrell's fleabane Erigeron darrellianus; the Bermuda buckeye butterfly Junonia coenia subsp. bergi which is the only endemic butterfly to Bermuda and occurs in high numbers; and the West Indian top shell Cittarium pica which occurs along the rocky shore in significant numbers.

Spittal Pond is one of the most popular and heavily visited natural attractions on Bermuda. It has also has been the subject of several detailed scientific studies and contains sites of cultural significance. The main threats are nutrient enrichment, invasive non-native plants, and damage from recreational use.

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)	Spittal Pond

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?	Not evaluated

2.2 - Site location

2.2.1 - Defining the Site boundaries

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

Former maps	0

Boundaries description

The geographical coordinates for the site are 32°18'41"N 64°43'30"W. It is located on the south coast of the Main Island of Bermuda, in Smith's Parish, 6 km ENE of Hamilton. The site boundary follows the outline of the Bermuda National Trust nature reserve on the west, north and east sides. The southern boundary of the site follows the 2012 Mean High Water shoreline.

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): 9.88

Area, in hectares (ha) as calculated from GIS boundaries: 9.881

2.2.5 - Biogeography

Biogeographic regions

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

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	Spittal Pond represents the only permanent, near-natural, non-tidal, shallow brackish lagoon found on Bermuda. It is fringed by transitional areas of mudflat and saltmarsh, scattered stands of Black mangrove Avicennia germinans, and transitional areas of grass-dominated marsh and drier habitats on less saline soils. In the woodland adjacent to Spittal Pond, two small artificial ponds have been excavated for birds. These small ponds are not flooded by the sea and the waters are significantly less saline than the main pond. The northern boundary of the site is an invasive tree-dominated upland woodland, while the southern boundary is near-pristine sea cliffs and rocky shore habitat. This juxtaposition of ponds, rocky shore, saltmarshes and woodland is rare in Bermuda.

☑ Criterion 2 : Rare species and threatened ecological communities

Optional text box to provide further information	The coastal habitat of the Spittal Pond site contains the largest remaining mainland population of the Bermuda skink Plestiodon longirostris, which is listed as Critically Endangered on the IUCN Red List. The site potentially also supports both the American Eel Anguilla rostrata and European eel Anguilla anguilla; although the identity of the specific eel species using Spittal Pond is uncertain (they are not seen very often but appear usually when the pond turns anoxic and fatalities float to the surface), both of these eel species breed in the Sargasso Sea around Bermuda and can easily access the pond given the close proximity of the ocean. European eel is listed as Critically Endangered on both the IUCN Red List and under the Bermuda Protected Species Order (2012), whilst the American Eel Anguilla rostrata is listed as Endangered on the IUCN Red List and Vulnerable on the Bermuda Protected Species Order (2012).

☑ Criterion 3 : Biological diversity

Justification	The site is rich in biodiversity. It contains a number of habitat types, including a brackish standing waterbody with fringing areas of mudflats, saltmarsh and mangroves, a section of coastal rocky shore, and areas of limestone pavement (locally known as 'The Checkerboard') and dense woodland on the surrounding hills. This concentration and ecological transitioning of habitats within a small area increases its value. The site is important for bird life. It has a total of 255 recorded species and is considered to be the most important wetland for wintering waterfowl and transient shorebirds in Bermuda. It provides a major refuge for passage shorebirds, notably Lesser yellow legs Tringa flavipes (which is very common every year), Killdeer Charadrius vociferus and Semipalmated sandpiper Calidris pusilla, and is of principal importance as a wintering area for many species of North American heron, egrets, ducks, coot and moorhen, including Pied-billed grebe Podilymbus podiceps, Little blue heron Egretta caerulea, Louisiana (Tri-colored) heron, Egretta tricolor, Snowy egret Egretta thula, Great egret Casmerodius albus, American black duck Anas rubripes, Common teal Anas crecca, American widgeon Anas americana, Blue-winged teal Anas discors, Ring-necked duck Aythya collaris, Lesser scaup Anas affinis, and American coot Fulica americana. The coastal cliffs support a nesting population of White-tailed tropicbirds Phaethon lepturus catesbyi (listed as Vulnerable on the Bermuda Protected Species Order 2012). Woodland areas are home to Grey catbird Dumetella carolinensis, the endemic subspecies of the White-eyed vireo Vireo griseus bermudianus and Northern cardinals Cardinalis cardinalis. The site is also potentially important for internationally threated species, including the Bermuda skink Plestiodon longirostris and both the American eel Anguilla rostrata and European eel Anguilla anguilla (see Criterion 2). Other notable species include the endemic daisy-like Darrell's fleabane Erigeron darrellianus which is listed as Near Threatened by the IUCN; Bermuda buckeye butterfly Junonia coenia subsp. bergi which is the only endemic butterfly to Bermuda and occurs in high numbers at Spittal Pond; and the West Indian top shell Cittarium pica which occurs along the rocky shore in significant numbers and is protected under the Fisheries (Protected Species) Order (1978). Spittal Pond also supports dense concentrations of Widgeon grass Ruppia maritima which provides food for migrant birds, and the Top-minnow/Eastern mosquitofish Gambusia holbrooki is abundant and serves both as mosquito control and food for herons.

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								
TRACHEOPHYTA / MAGNOLIOPSIDA	*Erigeron darrellianus*	☐	☑	☐	NT	☐	Bermuda Protected Species Order 2012: Vulnerable – Level 3 protected species	Listed as Near Threatened on the IUCN Red List and as Vulnerable (Level 3 protected species) under the Bermuda Protected Species Order (2012); Spittal Pond supports about 4% of the global population of this endemic Bermudian plant (Copeland, 2020)

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								
Others																	
ARTHROPODA / INSECTA	*Junonia coenia*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐		Endemic sub-species to Bermuda
CHORDATA / REPTILIA	*Plestiodon longirostris*	☑	☐	☐	☐	☑	☐	☐	☐				CR	☐	☐	Bermuda Protected Species Order (2012): Critically Endangered – Level 1 protected species	Listed as Critically Endangered on the IUCN Red List and the same under the Bermuda Protected Species Order (2012)
Fish, Mollusc and Crustacea																	
CHORDATA / ACTINOPTERYGII	*Anguilla anguilla*	☑	☐	☐	☐	☑	☐	☐	☐				CR	☐	☐	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	*Anguilla rostrata*	☑	☐	☐	☐	☑	☐	☐	☐				EN	☐	☐	Bermuda Protected Species Order 2012: Vulnerable – Level 2 protected species	Listed as Endangered on the IUCN Red List and Vulnerable the same under the Bermuda Protected Species Order (2012)
MOLLUSCA / GASTROPODA	*Cittarium pica*	☐	☐	☐	☐	☑	☐	☐	☐					☐	☐	Bermuda Fisheries (Protected Species) Order (1978)	Listed as a protected species under the Bermuda Fisheries (Protected Species) Order (1978); occurs in significant numbers at Spittal Pond
Birds																	
CHORDATA / AVES	*Vireo griseus bermudianus*	☐	☐	☐	☐	☑	☐	☐	☐					☐	☐	Bermuda Protected Species Order (2012) Vulnerable – Level 1 protected species	Endemic sub-species to Bermuda; listed as Vulnerable under the Bermuda Protected Species Order (2012)

1) Percentage of the total biogeographic population at the site

For Plestiodon longirostris, Raine (1998) captured 54 skinks between The Checkerboard and freshwater pond; and Turner (2018) reported that researchers caught recorded 84 skinks at Spittal Pond between 1997 and 2017 (but no population estimate is given).

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

Spittal Pond is a permanent, non-tidal, brackish lagoon, set in a natural coastal valley adjacent to a rugged coastline. The main pond covers nearly 3 ha and ranges from about 35-75 cm depth. It is fed by ground-water from a freshwater lens and is lined with layers of unconsolidated organic matter and peat overlying clay. Although the lagoon does not have an underground connection to the sea, it is located very close to the ocean, and waves break during spring tides and storms break through two low-lying overwash areas allowing seawater to flood into the pond. As a result of the periodic influx of saline waters, and depending on freshwater inflows and evaporation, water levels in the main pond typically fluctuate by about 75 cm and salinity from <10% to 40%. This greatly effects and limits the biotic diversity. The waters are extremely nutrient-rich with very high productivity and low species diversity, which tends to result in boom-and-bust cycles.

Hurricanes are the greatest natural factor affecting the ecological character of the pond. The waves breaking into the pond during Hurricane Fabian in 2003 reached over 12 m in height and swept large boulders, tons of sand, soil and sediment, and huge amounts of vegetation and organic matter into the pond. The resulting nutrient enrichment and anaerobic conditions lasted for months and the huge input of seawater raised pond levels by 4-5 m. Many marine species, survived for several months before the conditions returned to brackish. Ongoing coastal erosion has also reshaped the land between the pond and ocean. At the eastern end of Spittal Pond, the areas of low-lying overwash land is now regularly flooded during spring tides and the breach will likely turn into a permanent connection to the sea.

Spittal Pond is fringed by areas of saltmarsh and mudflats, which become increasingly exposed when water levels drop. These are surrounded by transitional areas of grass-dominated marsh and drier habitats on less saline soils. The saltmarsh lies mainly at the eastern end and includes distinct stands dominated by Sea rush Juncus maritimus or Sheathed paspalum Paspalum vaginatum. Other saltmarsh species include Saltmarsh oxeye Borrichia frutescens, Seaside purslane Sesuvium portulacastrum, Woody glasswort Sarcocornia perennis and Seaside heliotrope Heliotropium curassavicum. Submerged beds of Widgeon grass Ruppia maritima occur in places within Spittal Pond. Since about 2012, seedlings of Black mangrove Avicennia germinans have become increasingly established along the shoreline of the pond and are likely to develop into mangrove stands in the future. Two additional small freshwater ponds were excavated in 1966. One covers 0.06 ha in the coastal woodland south of Spittal Pond; the other covers 0.11 ha on the southern edge of Spittal Pond separated by a grassy bank. These contain isolated small islets that are important bird nesting habitat. The pond is separated from the sea by a line of undulating limestone hills up to 22m in height. These are covered by dense invasive tree-dominated woodland with a canopy composed primarily of Australian whistling pine Casuarina equisetifolia, with scattered Chinese fan palm Livistona chinensis (invasive), Brazil pepper Schinus terebinthifolia (invasive) and Bay grape Coccoloba uvifera (native). There is a dense understory of indigenous and invasive herbaceous plants, and limestone outcrops.

The southern boundary of the site forms an impressive stretch of rugged coastline, with low-lying rocky shore and limestone cliffs reaching up to 18m high at Portuguese Rock. At the western end of the site, ‘The Checkerboard’ limestone pavement and fossilized palmetto stumps can be seen, adjacent to an eroded sea cliff with a wave cut platform at its base. The site features the best representation of these geological formations in Bermuda.

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

Marine or coastal wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
D: Rocky marine shores		0	1.34	Representative
G: Intertidal mud, sand or salt flats		0	0.27	Representative
H: Intertidal marshes		0	0.75	Representative

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
Saline, brackish or alkaline water > Marshes & pools >> Sp: Permanent saline/ brackish/ alkaline marshes/ pools		0	2.9	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	Heron Pond = 0.10 ha; Woodland Pond = 0.06 ha	0	0.16

Other non-wetland habitat

Other non-wetland habitats within the site	Area (ha) if known
Mixed coastal vegetation; Invasive woodland	4.46

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTA/MAGNOLIOPSIDA	*Avicennia germinans*	Bermuda is the northern limit of the range in the Atlantic for this species
TRACHEOPHYTA/LILIOPSIDA	*Ruppia maritima*	Contributes significantly to the importance of the site for migrant birds

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTA/MAGNOLIOPSIDA	*Ageratina riparia*	Actual (major impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Casuarina equisetifolia*	Actual (major impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Schinus terebinthifolia*	Actual (major impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Volkameria glabra*	Actual (minor impacts)	No change

Optional text box to provide further information

The coastal woodland on the southern side of the site is dominated by the invasive Australian whistling pine Casuarina equisetifolia, which has displaced much of the indigenous flora. The herbaceous perennial Ageratina riparia is displacing native plants in the understory of the woodland. The hillside on the northern side of Spittal Pond is covered by invasive tree dominated woodland comprised of Brazilian pepper-tree Schinus terebinthifolia and other species. Although this northern woodland lies outside the Ramsar site, it provides bird-transported seeds into the site.

4.3.2 - Animal species

Invasive alien animal species

Phylum	Scientific name	Impacts	Changes at RIS update
CHORDATA/AVES	*Columba livia*	Actual (major impacts)	No change
CHORDATA/AVES	*Pitangus sulphuratus*	Actual (major impacts)	No change

Optional text box to provide further information

The dairy farm just outside the northern boundary of the site attracts flocks of feral pigeons due to available water and animal feed. These pigeons nest year-round in coastal cliff holes. By doing so they deprive the seasonally absent White-tailed tropicbirds Phaethon lepturus catesbyi of nesting sites. The invasive Great kiskadee Pitangus sulphuratus is known to predate Bermuda skinks Plestiodon longirostris within the site.

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): 0

a) Maximum elevation above sea level (in metres): 22

- 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.

Western North Atlantic Ocean

4.4.3 - Soil

Mineral ☑

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

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)

See section 4.1.

4.4.4 - Water regime

Water permanence

Presence?	Changes at RIS update
Usually permanent water present	No change

Source of water that maintains character of the site

Presence?	Predominant water source	Changes at RIS update
Water inputs from precipitation	☑	No change
Marine water	☑	No change
Water inputs from groundwater	☑	No change

Water destination

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

Stability of water regime

Presence?	Changes at RIS update
Water levels fluctuating (including tidal)	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 4.1.

4.4.5 - Sediment regime

Sediment regime is highly variable, either seasonally or inter-annually ☑

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

Sediment regime unknown ☐

Please provide further information on sediment (optional):

The lagoon acts as a sediment trap, gradually accumulating silt and organic matter, together with marine sand and eroded limestone periodically swept in from the adjacent coast during hurricanes (see section 4.1). The rocky coastal section of the site is subject significant erosion during hurricane events.

4.4.6 - Water pH

Circumneutral (pH: 5.5-7.4) ☑

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

Alkaline (pH>7.4) ☑

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

Unknown ☐

Please provide further information on pH (optional):

A range of 6.5-9.0 pH has been recorded.

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 ○

Euhaline/Eusaline (30-40 g/l) ☑

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

Unknown ☐

Please provide further information on salinity (optional):

See section 4.1.

4.4.8 - Dissolved or suspended nutrients in water

Eutrophic ☑

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

Unknown ☐

Please provide further information on dissolved or suspended nutrients (optional):

See section 4.1. The adjacent dairy farm contributes significant nutrients.

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 surrounded by areas of woodland, permanent pasture and sub-urban housing; the southern boundary of the Ramsar Site forms part of the coastline of the Main Island of Bermuda

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
Hazard reduction	Flood control, flood storage	Medium
Hazard reduction	Coastal shoreline and river bank stabilization and storm protection	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	High
Spiritual and inspirational	Aesthetic and sense of place values	High
Spiritual and inspirational	Cultural heritage (historical and archaeological)	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 microorganizms, 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 diversity of lifeforms and ecosystems that it supports. The lagoon also acts as a sediment trap, gradually accumulating silt and organic matter, together with material periodically swept in during hurricanes. It also provides a natural defence against coastal erosion and ameliorates potential flooding during severe storms. It catches incoming seawater during storm surge events, reducing flooding and storm damage from salt water further up the valley. This function will become increasingly important with climate change.

Spittal Pond is one of the most popular and heavily visited natural attractions on Bermuda. It is set in an attractive location and includes part of the southern rocky coastline of Bermuda with views out across the ocean. It also attracts high levels of recreational use, with locals and tourists using it for birdwatching, photography, walking, jogging, dog walking, seasonal whale watching and other forms of quiet recreation.

Regular educational field trips are made by conservation groups and schools, including the Bermuda National Trust's annual interpretive Children's Walk. In addition, migrating and wintering birds have also been recorded since 1950; studies of tropicbird population/breeding success were carried out in 2001-2003; and detailed scientific studies have been made of: (i) the geochemical composition of the surface and sediment pore waters (Shosa et al., 2004); and (ii) the sedimentological record which encompasses the past 4,500 years (Tackaberry et al., 2004). A survey of the endangered Bermuda Skink population of the site was conducted between 2015 and 2017 (Turner, 2018). The endemic plantlife within the site was inventoried in 2013 (Copeland, 2020).

The Spittal Pond site also contains sites of cultural significance. Jeffrey's Hole cave is part of the African diaspora heritage trail. Portuguese Rock (formerly known as 'Spanish Rock') contains a rock carving with the date 1543, which is believed to mark an early visit by Portuguese sailors before Bermuda was settled.

Outside the site: 1000s visitors

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	☐	☑

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Foundation/non-governmental organization/trust	☑	☐

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

The Spittal Pond Ramsar Site completely overlaps the Bermuda National Trust's nature reserve at Spittal Pond. The site has been owned by the Bermuda National Trust since 1954. It is surrounded by land owned by the Bermuda Government, which is designated as a nature reserve under the Bermuda National Parks Act (1986). The Government land surrounds the National Trust land on the east, north and west sides. The southern boundary is the ocean. The Ramsar boundary follows the National Trust property boundary and the mean high water shoreline.

5.1.2 - Management authority

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

Provide the name and/or title of the person or people with responsibility for the wetland: Natural Heritage Officer of the Bermuda National Trust; Terrestrial Conservation Section, Dept. of Environment and Natural Resources.

Postal address: Bermuda National Trust, 'Waterville', 2 Pomander Road, Paget, PG 05, Bermuda
Department of Environment and Natural Resources, Botanical Gardens, 169 South Shore Rd, Paget DV04, 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

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Livestock farming and ranching	High impact		☑	No change	☑	No change

Human intrusions and disturbance

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Recreational and tourism activities	Medium impact		☑	No change	☑	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		☑	No change	☑	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		☑	No change	☑	No change
Agricultural and forestry effluents	High impact		☑	No change	☑	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	High impact		☑	No change	☑	No change

Please describe any other threats (optional):

Spittal Pond has been adversely affected by nutrient enrichment in the past, due to the presence of a dairy cattle farm just uphill of the north and north-west edges of the site. Poor husbandry practices and overgrazing led to the loss of vegetation cover, soil erosion and cattle manure directly entering the pond. Cattle were poorly enclosed and often were allowed to graze and manure around the lagoon edge. Severe nutrient enrichment resulted in eutrophication, algal blooms, anaerobic conditions, loss of most biota and numerous complaints about strong smells emanating from the area. This was addressed by reducing the number of cattle kept on the farm (reducing the amount of manure produced and the amount of erosion and rain run-off) and improved fencing. This reduced the nutrient load and improved the health of the pond compared to the 1960-80s, with blooms of the more toxic blue-green and red algae, once common and long-lasting, now being rare and brief, dependent on major weather events (see section 4.1).The new tenants of the farm have in recent years allowed the cows to graze the pond edge again, and wade into the water in the heat of summer. Ongoing collaboration between the farmers and conservation bodies should improve the situation and restore the fencing.

In 1955, following the Bermuda-wide loss of the dense cedar forest due to the scale-insect epidemic of the late 1940s, the government reforested the land south of Spittal Pond with non-native Australian whistling-pine trees Casuarina equisetifolia. These grow rapidly to a much greater height than the original native forest and also drop a dense carpet of highly acidic needles, reducing plant species-richness on the forest floor and possibly affecting the pond itself through acidic run-off. The monoculture of Casuarina trees also provide relatively poor habitat for birds, and they have self-seeded along the coast, blocking scenic views, shading out and inhibiting regrowth of the native coastal flora. Non-native trees block scenic views elsewhere in the reserve.

Invasive plants and animals are prevalent within the site. Bermuda skinks are predated by the invasive Great kiskadee Pitangus sulphuratus, and Black rats Rattus rattus damage the berries of the endangered Bermuda palmettos Sabal bermudana.

The site is heavily used for recreation. This has led to erosion along the footpaths in many places. Several hurricanes have damaged the fencing along the pond edge. Despite signs prohibiting entry, people now walk along the pond edge, startling nesting birds, or flushing the birds that are on the pond. The fencing needs to be restored and reserve users educated to fix this problem.

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Nature Reserve, designated under Bermuda National Parks Act (1986)	Spittal Pond Nature Reserve	https://environment.bm/spittal-p ond	partly
Nature Reserve, designated under the Bermuda National Trust Act (1969)	Spittal Pond Nature Reserve	https://bnt.bm/environment/prote cted_open_space/central_wetlands /	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
Habitat manipulation/enhancement	Partially implemented
Re-vegetation	Partially implemented

Species

Measures	Status
Control of invasive alien plants	Partially implemented

Human Activities

Measures	Status
Livestock management/exclusion (excluding fisheries)	Partially implemented
Regulation/management of recreational activities	Implemented
Communication, education, and participation and awareness activities	Implemented

Other:

The site has been notified for its nature conservation interest under several pieces of national legislation. The entire site is held as a nature reserve under the Bermuda National Trust Act (1969). The surrounding areas were scheduled as a nature reserve under the Bermuda National Parks Act (1986).

Measures have been put in place to address historical loss of vegetation cover, erosion of soil and cattle manure directly entering the lagoon (see section 5.2.1). Some of the areas afforested with non-native Australian whistling-pine trees Casuarina equisetifolia have been cleared and reforested with endemic and native tree and shrub species (see section 5.2.1).

The Department of Environment and Natural Resources undertakes regular culling of pigeons at the dairy farm next to Spittal Pond. These feral pigeons arrive in flocks to eat the cattle feed, then return to roost in the coastal cliff holes of the nature reserve. These cliff holes are critical nesting habitat for the White-tailed tropicbirds, which are at sea during the winter months, and return to find pigeons in their nests.

Measures to manage recreational use include improved signage and fencing and the installation of dog waste bins. The Bermuda National Trust installed a series of interpretive signs in various habitats within the reserve in 2017 to show visitors the historic and natural features of the site, including a Ramsar Site designation sign near the parking area. Educational field trips for school children and special interest groups are regularly conducted at the site by a number of Bermudian NGOs. The Bermuda National Trust hosts a Children's Walk, where guides take groups of students around the reserve to stations manned by local experts. Each year this event is attended by hundreds of participants. Other events include the Audubon Society's World Shorebirds Day count in the autumn and the Christmas Bird Count.

5.2.5 - Management planning

Is there a site-specific management plan for the site? Yes

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:

Interpretive signs are in place, and regular educational tours are given. The 'Nature Reserve' land zoning of the site prohibits the construction of buildings or other structures.

URL of site-related webpage (if relevant):

Bermuda National Trust self-guided tour of Spittal Pond: https://secureservercdn.net/192.169.220.85/ob4.376.myftpupload.com/wp-content/uploads/2021/12/Childr ens-Nature-Walk-PPT-Website-Version.pptx BNT teacher resources for field trips: https://bnt.bm/

5.2.6 - Planning for restoration

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

Further information

In the past, endemic and native tree planting activities have been undertaken within the site by both the Government and Bermuda National Trust.

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Birds	Implemented

Records of breeding/migratory waterfowl using the pond have been kept since 1950. Species present at the site in December each year are recorded during the Bermuda Audubon Society's Christmas Bird count. Throughout the year, checklists of birds seen at the site are submitted to the Audubon Society and uploaded to ebird.org. As of April 2022, there are 2019 checklists recording 255 species for Spittal Pond.

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Bermuda National Trust. (2014) Spittal Pond Nature Reserve Teachers Resource Guide. Bermuda National Trust, Paget.
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.
Hayward, S.J., Gomez, F.H. and Sterrer, W. (eds.) (1981) Bermuda's delicate balance: people and environment. Bermuda National Trust, Paget.
IUCN (2022) The IUCN Red List of Threatened Species. https://www.iucnredlist.org/
Raine, A. (1998). A study of the morphological differentiation, fluctuating asymmetry and the threats facing isolated populations of the critically endangered Bermuda Skink (Eumeces longirostris). Unpublished M.Sc. dissertation, University College London.
Shosa, J.D., Becker, C.J. and Rueger, B.F. (2004) A geochemical comparison of the surface and sediment pore waters of Spittal Pond and Warwick Pond, Bermuda. Proceedings of the 11th Symposium on the Geology of the Bahamas and Other Carbonate Regions, p. 205-214. https://geraceresearchcentre.com/pdfs/11thGeology/205_ShosaBeckerRueger_11thGeology.pdf
Tackaber ry, W.J., Rueger, B.F. and Gastaldo, R.A. (2004) Holocene history of Spittal Pond, Bermuda: Implications for sea-level change. Proceedings of the 11th Symposium on the Geology of the Bahamas and Other Carbonate Regions, p.187-203.
Thomas, M.L.H. (2005) Bermuda's Wetlands. Project Nature Field Study Guide, Fourth Edition, Bermuda Zoological Society.
Turner, HS (2018) Population Status and Conservation of the Critically Endangered Bermuda Skink. PhD thesis, University of Kent, UK.
Wingate, DB (1984) Taking stock of Bermuda's wetland heritage. Department of Agriculture and Fisheries, Hamilton.

Previous versions of RIS
Spittal Pond Ramsar Information Sheet UK41007. Version 3.0, 13/06/2008, produced by JNCC.

Related webpages
Bermuda Audubon Society Newsletters. http://www.audubon.bm/news/newsletters
Bermuda Audubon Society webpage http://www.audubon.bm/conservation/nature-reserves/152-1-somerset-long-bay-west
Bermuda Government webpages https://environment.bm/spittal-pond; https://environment.bm/buckeye-butterfly
Spittal Pond Nature Reserve ebird sightings https://ebird.org/hotspot/L952649

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 west over Spittal Pond (*Alison Copeland, 26-09-2021*)

Looking south across Spittal Pond to the sea (*Alison Copeland, 11-01-2012*)

6.1.4 - Designation letter and related data

Designation letter
<1 file(s) uploaded>

Date of Designation: 1999-05-11