Ramsar Information Sheet

Published on 18 December 2024
Update version, previously published on : 1 January 1999

Australia

Bowling Green Bay

Designation date	22 October 1993
Site number	632
Coordinates	19°23'37"S 147°09'26"E
Area	36 652,21 ha

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

The Bowling Green Bay is located on the central coast of Queensland, 52km southeast of Townsville and 21km northeast of Ayr. The wetland complex includes a diverse number of wetland types comprising palustrine, riverine, estuarine and marine wetlands. Complex patterns of saltmarsh and saltwater couch grasslands back onto thin fringes of low Rhizophora mangrove communities in the intertidal zone. The Site contains one of the largest mangrove and saltmarsh habitats along the Great Barrier Reef (GBR) Coast (Goudkamp and Chin 2006). The 'dry tropic' mangrove communities at the Site are uncommon in north-eastern Australia (Kelly and Lee Long, 2011, unpublished). The Site incorporates the mountainous areas of Cape Cleveland, parallel dune systems, low-lying coastal plains and the large pro-grading sandspit of Cape Bowling Green.

The wetlands support a significant diversity and abundance of species including turtles, shorebirds and other waterbirds. Several of these species are listed as threatened at international, national and/or state levels.
The Site is recognised as a network site under the East Asian-Australasian Flyway Partnership and supports at least 3 migratory shorebirds at >1% of the flyway population. The Site is high value for fisheries with important fish and crustacean nurseries. Some species depend on the Site for certain stages of their life-cycle.

The Site meets criteria 1, 2, 3, 4, 6, 7 & 8:
1: The Site includes rare and representative wetland types
2: It supports at least 7 internationally threatened species and 1 threatened ecological community
3: It supports up to 870 species
4: It supports critical habitats for migratory shorebird feeding and roosting; nesting habitat for marine turtles; and diadromous fish migration
6: It supports >1% of the flyway population of sharp-tailed sandpiper, red-necked stint and common tern
7: It supports endemic and diadromous fish species and a wide range of morphologies
8: It is a nursery site for fish and crustaceans.

The Site has cultural, spiritual and provisioning values for the Bindal people and other First Nations People and is important for scientific research, conservation and nature observation activities. The wetlands provide ecosystem services such as regulating hydrology (Ramsar Convention 2018; Kelly and Lee Long, 2011, unpublished) and assimilating nutrients (Department of Environment 2016; Herbert et al. 2015) before run-off enters the GBR lagoon.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Responsible compiler

Institution/agency	Queensland Department of Environment, Science and Innovation
Postal address	GPO Box 2454, Brisbane, QLD 4001 Australia

National Ramsar Administrative Authority

Institution/agency	Department of Climate Change, Energy, the Environment and Water
Postal address	GPO Box 3090 Canberra ACT 2601 Australia

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

From year	1999
To year	2022

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Bowling Green Bay

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	No change to area
(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?	Uncertain

(Update) Optional text box to provide further information

While there has been no notifiable change to ecological character, the Site is subject to a changing climate. Australia has warmed by just over 1°C since 1910, with most warming since 1950. Further increases in temperature are projected, with more extremely hot days and fewer extremely cool days over the coming decades under all emissions scenarios. Warming over Australia is expected to be slightly higher than the global average. Oceans around Australia have warmed by around 1°C since 1910, contributing to longer and more frequent marine heatwaves. Sea levels are rising around Australia, increasing the risk of inundation and the oceans are acidifying (BOM, 2018). These conditions will affect the critical components, processes and services of the Ramsar Site and the resilience and adaptive capacity of the Site will be tested.

Cape Bowling Green Bay sandspit is continuing to erode on it's eastern side. The implications and trajectories are being investigated.

At the date of listing (1993), the site was considered to meet Criterion 5, however, the Site does not and likely never did meet this Criterion. This update removes Criterion 5, but this does not change the ecological character of the Site. This update also gives recognition to the Site meeting Criteria 7 and 8; which were not included in the original nomination.

2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image

<1 file(s) uploaded>

Former maps	0

Boundaries description

See Additional Information Section 6.1.2 for boundary description, under the filename, "AU632_lit220601__boundary_description.docx".

2.2.2 - General location

a) In which large administrative region does the site lie? Burdekin Shire (population 17, 916 in 2014) in Queensland http(www.abs.gov.au)

b) What is the nearest town or population centre? Ayr (population: 9, 178 in 2017) is located 21 km to the southwest; and Townsville (population: 192,988 in 2017) is located 52km northwest of the Ramsar Site.

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): 36652.208

Area, in hectares (ha) as calculated from GIS boundaries: 36652.208

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Marine Ecoregions of the World (MEOW)	Central and Southern Great Barrier Reef (143)
Udvardy's Biogeographical Provinces	6.1.1, Australian Realm, Queensland Coastal (Udvadry, 1975)
Bailey's Ecoregions	Province - Seasonally Humid Mixed (Evergreen and Deciduous) Forests (89) (Bailey)
WWF Terrestrial Ecoregions	Tropical and Subtropical Moist Broadleaf Forest – Queensland Tropical Rainforests (terrestrial) (WWF)
Freshwater Ecoregions of the World (FEOW)	Eastern Coastal Australia (807) (FEOW)

Other biogeographic regionalisation scheme

Australian Hydrological Geospatial Fabric- Topographic Drainage Divisions and River Regions (BOM, 2012): North East Coast - Ross River (http://www.bom.gov.au/water/about/riverBasinAuxNav.shtml)

Interim Biogeographic Regionalisation for Australia version 7 (IBRA7) (Commonwealth of Australia, 2012): Terrestrial: North East Coast (drainage division), Brigalow Belt North (biogeographic region) (https://www.environment.gov.au/system/files/pages/5b3d2d31-2355-4b60-820c-e370572b2520/files/ibra-r egions.pdf)(http://www.environment.gov.au/land/nrs/science/ibra)

Interim Marine and Coastal Regionalisation for Australia (IMCRA version 4, June 2006): Northeast (provincial scale bioregion), Lucinda Mackay Coast (meso scale marine bioregion) (https://www.environment.gov.au/system/files/resources/2660e2d2-7623-459d-bcab-1110265d2c86/files/im cra4.pdf))(http://www.environment.gov.au/system/files/resources/2660e2d2-7623-459d-bcab-1110265d2c86/files/map2-msb.pdf)

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	The extensive wetland complex is low-lying and broad, having a wide zone of mixing between marine, estuarine and freshwater areas (Kelly and Lee Long 2011, unpublished). This type of hydrological mixing contributes to an unusual surface and groundwater flow regime resulting in an uncommon and unpredictable wetland behaviour (Lukacs pers. com. 2009). The tidal range can reach more than 10km inland across a very broad coastal zone, transgressing the Site (Davis et al. 2014). This means that the wetlands in the area are subject to extreme periods of tidal and/or freshwater inundation multiple times a year, creating the dynamic marine-freshwater mosaic (Davis et al. in E. Wolanski (ed), 2014). High inter-annual variability of water input and quality (including salinity) also characterise the Site. Short, medium and long-term flood cycles directly influence the biology and ecology of the wetland biota and are crucial to maintaining the diverse mosaic of coastal wetlands at the Site. The largeness of the Site is likely to play a role in buffering it from impacts associated with large upstream agricultural areas (Kelly and Lee Long, 2011, unpublished) including water extraction, irrigation (Walking the Landscape 2018) and groundwater recharge.
Other ecosystem services provided	The large extent and complexity of wetland types in the coastal zone is regionally important for fisheries species, nutrient assimilation, flood control, cyclone protection and the trapping and stabilisation of sediments along watercourses and in areas adjacent to the Great Barrier Reef lagoon (Bruinsma, 2001). The Site supports an extensive area of blue carbon ecosystems (salt marsh and mangrove) which contribute to mitigation of and adaptation to climate change. Mangroves and tidal marshes have a role in carbon sequestration (Lovelock et al. 2017). Mangroves and saltmarsh stretch across large parts of the Site. The mangrove forests are vital for the region's coastline, particularly during cyclone activity as they help control coastal erosion, protect the land from strong winds, tidal surges and heavy rainfall. (Qld Wetlands Project, Bowling Green Bay – A wetland of international importance)
Other reasons	The Site is generally representative of tropical coastal wetland systems within Australia's Northeast Coast Drainage Division and the Northeast Province of the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) (Kelly and Lee Long, 2011, unpublished). The only other system of similar size and complexity is at Broadsound St Lawrence; however, this system has a markedly different species composition and lacks the freshwater habitats of the Bowling Green Bay (Kelly and Lee Long, 2011, unpublished). The extensive and complex combination of wetland types in the Bowling Green Bay are rare in the Northeast Coast Drainage Division and the Northeast Province bioregion (Davis et al. 2014). The Site is important as it hosts a unique wetland complex (Milton et al. 2014) that is one of the most expansive (Davis et al. in E. Wolanski (ed), 2014) and diverse wetland complexes on the east coast of tropical Australia (Great Barrier Reef Marine Park Authority 2013). The hydrological patterns (freshwater, tidal and oceanographic) prevailing over the Site's geomorphologic and topographic formations drive wetland extent and the diverse, mosaic nature of the coastal wetlands (Kelly and Lee Long, 2011, unpublished). Wetland types include rocky marine shores (D), estuarine waters (F), intertidal mud and sand flats (G) and freshwater tree-dominated wetlands (Xf). The complex and dynamic interplay of freshwater and saline systems over this large wetland system, is uncommon in Australia's Northeast Coast Drainage Division (Kelly and Lee Long 2011, unpublished). The wetlands and associated geomorphological features remain largely intact and in near-natural state (Davis et al. in E. Wolanski (ed), 2014; Davis et al. 2014).

☑ Criterion 2 : Rare species and threatened ecological communities

Optional text box to provide further information

The Site supports a number of nationally and internationally threatened fauna (WildNet 2018). There are at least 4 animal species listed as endangered, 5 vulnerable and 10 near threatened under the international IUCN Red List (Red List) as of the June 2022 update. Amongst the Site's Red Listed species there are a number of species protected at the national level under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) e.g. the vulnerable green turtle (Chelonia mydas), the flatback turtle (Natator depressus) and many shorebird species. As many as 18 species are protected under Queensland's Nature Conservation Act 1992 including the vulnerable dugong (Dugong dugon), Australian snubfin dolphin (Orcaella heinsohni) and the Australian humpback dolphin (Sousa sahulensis).

The seaward boundary of the Site only goes to low water mark, however, it is important to note that the wider Bowling Green Bay itself provides valuable habitat for dugong and is listed as a Dugong Protection Area under Queensland's Fisheries Act 1994. Additionally, Bowling Green Bay has been recently included in the Hinchinbrook to Round Hill Important Marine Mammal Area (IMMA) for it's importance as habitat for dugong and the Australian snubfin and humpback dolphins (Marine Mammal Protected Areas Task Force n.d.).

The Site provides a diversity of wetland habitats supporting the feeding and/or roosting requirements of at least 12 migratory shorebirds species that are either internationally and/ or nationally threatened, including the:

• Great knot (Calidris tenuirostris) - EPBC Act critically endangered and Red List endangered;
• Eastern curlew (Numenius madagascariensis) - EPBC Act critically endangered and Red List endangered;
• Australian painted snipe (Rostratula australis) - EPBC Act endangered and Red List endangered
• Curlew sandpiper (Calidris ferruginea) - EPBC Act critically endangered and Red List near threatened;
• Bar-tailed godwit (Limosa lapponica) - EPBC Act vulnerable and Red List near threatened.

The connected network of low tide foraging areas and high tide roosting areas are necessary for sustaining the shorebird populations (Rogers et al. 2006, Zarikov and Milton 2009, Buelow and Sheaves 2015) listed under the EPBC Act and the Red List.

There are three Red Listed plant species, including Acacia crassicarpa (vulnerable) and two species of lower risk, as at the June 2022 update. However, the IUCN has not assessed most of the plant species at the Site. The Site hosts the EPBC Act endangered Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions.

☑ Criterion 3 : Biological diversity

Justification

The Site is home to a large number of species, up to 870 have been recorded, highlighting the biodiverse nature of the Site (Wildnet 2018). At least 384 plants and 486 animals, representing at least 18 mammals, 39 reptiles, 8 amphibians, 275 birds, 105 fish species and 41 invertebrates. Of the bird species, many are wetland indicator species (WetlandInfo 2018). As many as 200 species of native fauna are wetland dependent species. There are at least 31 species listed under the Queensland Nature Conservation Act 1992 as special least concern (SL). Many SL species are subject to international agreements such as Japanese-Australia Migratory Bird Agreement (JAMBA), Chinese-Australia Migratory Bird Agreement (CAMBA), Republic of Korea and Australia Migratory Bird Agreement (RoKAMBA) and the Convention on Migratory Species (CMS).

The 9 wetland types at the Site form a complex mosaic of estuarine, marine and freshwater wetlands, which support a diverse assemblage of flora and fauna. Studies undertaken by Alsterberg et al. (2017) suggest that ecosystems comprising high habitat diversity also exhibit a high number of ecosystem functions, which together support a greater species richness than ecosystems with less habitat diversity. Buelow et al. (2017) has observed a positive correlation between high habitat and high species diversity in birds within the coastal region of Townsville.

The coastal mosaic that characterises much of the Site has a key role in supporting connectivity i.e. linking habitats across the Site in space and time thereby making a significant contribution to the biological diversity of the Site. Utilisation of connected habitats within coastal ecosystem mosaics is crucial to the life histories of a broad range of fisheries species (Sheaves 2009) and bird species in coastal areas such as the Townsville region (Buelow 2017)

The extensive area and intact nature of the Site and the habitats within also cater well for Site's robustness and biodiversity. For example, the species-area relationship is a well-known ecological concept, i.e. as ecosystem size increases so does species richness (Lomolino 2000).

The Site is regionally significant due to the extent of available nesting and feeding habitat for migratory shorebirds and waterbirds (palustrine and tidal mud/sand flat habitat, mangroves) and the limited choice of suitable alternatives within the bioregion (Kelly and Lee Long, 2011, unpublished).

The wetlands in Bowling Green Bay experience drier conditions than areas to the north and south, and therefore support a composition of flora and fauna species that is significant for the North East Coast Drainage Division and the Northeast IMCRA Province, including an extensive area of dry tropic mangroves, uncommon in the region (Kelly and Lee Long, 2011, unpublished).

☑ Criterion 4 : Support during critical life cycle stage or in adverse conditions

Optional text box to provide further information

The wetland complex provides critical habitat for the roosting and feeding of 94 species of waterbirds including at least 21 species of migratory shorebird that use the East Asian-Australasian Flyway. The Site is listed as a Flyway Network Site (EAAF089). Annual aggregations of shorebirds, waterbirds and seabirds include the black-tailed godwit (Limosa limosa), western Alaskan bar-tailed godwit (Limosa lapponica baueri), red-necked stint (Calidris ruficollis), common tern (Sterna hirundo) and white-winged black tern (Chlidonias leucopterus).

There are approx. EPBC listed 35 migratory species at the Site. These species are also protected under various international agreements such as the Convention on Migratory Species (CMS), Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) and/or Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). Additionally, the Site contains at least 5 species protected from illegal trade under the CITES Agreement. Each summer, migratory shorebirds spend the non-breeding season and part of their northward and southward journey within the Site (approx. Sept-April). In addition, presence of substantial numbers of migratory shorebirds at the site during their breeding season suggests that first-year birds may depend on the Site in that season.

Shorebirds feed on benthic invertebrates at low tide, on exposed intertidal habitats within the Site. At high tide, when foraging areas are submerged, shorebirds will congregate at roosting areas (Rogers et al. 2006a) including the sand spit, freshwater swamps, the bay foreshore and mouths of the Haughton River, Barratta and Barramundi Creeks. Waterbirds including herons, egrets and geese roost at the Site while feeding in adjacent agricultural areas. Little egret and eastern great egret occur either dispersed or in large colonies in mangroves in lower estuaries of coastal creeks/rivers and melaleuca swamps close to marine plain swamps (Kelly and Lee Long, 2011, unpublished).

Extensive seagrass meadows in the adjacent Bowling Green and Cleveland Bays (Sheltinga and Heydon 2005) are feeding/foraging areas for green turtles (Chelonia mydas) and dugongs (Dugong dugon) visiting the Site. The sandspit is nesting habitat for green and flatback (Natator depressus) turtles. The Site is likely foraging area for olive ridley (Lepidochelys olivacea) and loggerhead turtles (Caretta caretta) (Ian Bell pers. com. 2018) and Australian humpback dolphins (Sousa sahulensis) and Australian snubfin dolphins (Orcaella heinsohni) (Justin Meager pers. com. 2021) which are nearshore specialists that forage on wetland dependent nekton (Parra and Jedensjo 2014). At least 13 diadromous fishes migrate between sea and estuarine/freshwater areas for their lifecycles. Other species like the flyspecked hardyhead (Craterocephalus stercusmuscarum) and the spangled perch (Leiopotherapon unicolor) complete their entire lifecycle in freshwater.

☑ Criterion 6 : >1% waterbird population

Optional text box to provide further information

The EAAFP CSR1: Report on the Conservation Status of Migratory Waterbirds of the East Asian – Australasian Flyway. First Edition (Mundkur and Langendoen 2022) has been used for determining which species meet the 1% threshold. Of the many shorebirds frequenting the Site, the following species have been observed as meeting 1% thresholds:
• Sharp-tailed sandpiper (Calidris acuminata) – in November 2011, population counts of 1,448 from 2 roost sites as in Driscoll et al., (2012) exceeded the EAAFP CSR1 1% threshold of 850. More recent counts of 1500 from Queensland Wader Study Group (2021) also meet the EAAFP CSR1 1% threshold.
• Red-necked stint (Calidris ruficollis) – in January 2011, population counts of 6,403 from 2 roost sites as in Driscoll et al. (2012) exceeded the EAAFP CSR1 1% threshold of 4,750.
• Common tern (Sterna hirundo) - In November 2011, population counts of 710 taken by Townsville BirdLife from 5 roost sites (Driscoll et al. 2012) exceeded the 1% threshold from WPE5 of 460.

Lesser sand plover (Charadrius mongolus) count data from 5 roost sites found 330 individuals (Milton et al. 2014). Note the EAAFP CSR1 has divided this species into two populations (subspecies), i.e. mongulus and stegmanii with 1% thresholds of 260 and 130 individuals respectively. The count data from Milton et al. (2014) does not identify which population/subspecies has been counted. Note, more recent counts of 170 were recorded by the Queensland Wader Study Group (2021), however the subspecies was also not determined for this survey. In absence of subspecies data, the counts were checked against the larger mongulus population 1% threshold (260 individuals), which is not currently met.

See Additional material for Expanded RIS with more information.

☑ Criterion 7 : Significant and representative fish

Justification

The Site supports largely intact coastal wetlands with a wide zone of mixing amongst estuarine, marine and freshwater habitats. Habitat diversity and structural complexity combined with the Site's large extent supports many fish species, some of them endemic to Australia including the spangled perch (Leiopotherapon unicolor), flyspecked hardyhead (Craterocephalus stercusmuscarum) and sleepy cod (Oxyeleotris lineolata) as well as the Queensland endemic eastern rainbow fish (Melanotaenia splendida) (WetlandInfo 2018; WildNet 2018). The large extent of estuarine areas including mudflats, saltpans, saltmarshes, estuarine creeks, and mangrove communities provide areas of habitat important for the critical life-cycle stages of aquatic species (Kelly and Lee Long, 2011 unpublished). Adkins et al. (2016) highlights the importance of shallow-coastal habitats for providing multiple ecological functions (e.g. nursery, foraging and refugia) for different life-cycle stages of fish, including the larval and juvenile stages of development.

Fish assemblages at the Site include a range of diadromous species having various life-cycle characteristics. Diadromous species require free passage for migration between the sea and estuarine/freshwater areas during the course of critical life-cycle stages such as spawning and accessing nursery grounds. For example, the economically important barramundi (Lates calcarifer) relies on both fresh and salt water to complete its lifecycle, whilst the bull shark (Carcharhinus leucas) and the blue threadfin (Eleutheronema tetradactylum) (WildNet 2018) are born in freshwater/estuaries and drift into the sea as larvae before migrating back to freshwater to grow into adults and spawn. Other species found at the Site such as the flyspecked hardyhead (Craterocephalus stercusmuscarum) and the spangled perch (Leiopotherapon unicolor) (WetlandInfo 2018; WildNet 2018) are potamodromous and complete their life cycle entirely within freshwater.

The Site supports a range of morphologies, reproductive types and ecological niches, i.e. live-bearing, egg-releasing, hermaphroditic protogyny and protandry, benthic, demersal, pelagic and planktivorous, herbivorous, omnivorous, predatory, scavenging and excavating fish (Kelly and Lee Long, 2011 unpublished). These fish communities support a diverse and complex range of ecosystem components and processes, such as multiple food web interactions, algal grazing, bioturbation, re-cycling and the breakdown of materials (Kelly and Lee Long, 2011, unpublished). The oceanographic and tidal hydrodynamic processes within and surrounding the Site facilitate breeding migrations, larval transport and recruitment of finfish and crustaceans (Kelly and Lee Long, 2011, unpublished). The site partially overlaps with the Cleveland Bay (FHA-071) and Bowling Green Bay (FHA-007) declared fish habitat, which is testament of the Site's value as fisheries habitat.

☑ Criterion 8 : Fish spawning grounds, etc.

Justification

Much of the Site is estuarine, comprising mangroves, mudflats, unconsolidated soft bottoms and salt marshes which are productive fish nurseries. The Site is significant to fisheries in the Northeast Province bioregion for production of large stocks of barramundi, mangrove jack, mud crab and baitfish (Davis et al. in E. Wolanski (ed), 2014). Estuaries function as migratory conduits for species to access marine, estuarine and freshwater habitats. Oceanographic and tidal hydrodynamic processes in and around the Site facilitate breeding migrations, larval transport and recruitment of finfish, turtles and crustaceans into nursery areas (Davis et al. in E. Wolanski (ed), 2014).

Many estuarine waterways, mainly creeks dissect the site. Barramundi Creek and the Haughton River which flow through the Site are of high and moderate fisheries value respectively (Bruinsma 2001). The estuarine conditions support growth of saltmarsh and mangroves. These highly valued communities provide food, shelter, breeding and nursery areas for fisheries species (Bruinsma 2001). Beumer et al. (1997) notes that interactions between soil, water and air within salt marshes can produce optimal conditions for fisheries species to feed, grow and reproduce. Shallow pools within saltmarshes provide transitory feeding habitat for invertebrates, larvae and juvenile fishes (Zeller 1998).

The highly productive mangrove areas support nursery functions for species such as banana prawns (Penaeus merguiensis), mangrove jack (Lutjanus argentimaculatus), estuary cod (Epinephelus spp.), barramundi (Lates calcarifer), tarpon (Megalops spp.) and although rare, the Queensland groper (Epinephelus lanceolatus). The mangroves and associated habitats also provide prey for piscivorous fishes, at least eight species of juvenile sharks (Simpfendorfor and Milward, 1993). Estuarine areas within the tropical estuaries of Northeast Australia provide valuable habitat for Moses perch (Lutjanus russelli) (Sheaves and Moloney 2001) and blue threadfin (Eleutheronema tetradactylum).

Intertidal mudflats provide valuable habitat for benthic invertebrates, which are a key food source for fisheries species and provide a valuable feeding ground for waterbirds and shorebirds (Erftemeijer and Lewis 1999) in Bruinsma (2001). The hard substrate of rocky shores off Cape Cleveland allows for attachment of algae and sessile invertebrates (Zeller 1998) which have a role in the food chain for fisheries species. Zooplankton are also a component of the food chain (Martin 2017). In summer, baitfish feed on zooplankton in the highly productive mangrove estuaries and river mouths within the Site (Kelly and Lee Long, 2011, unpublished). Baitfish aggregations have been recorded off the tip of Cape Bowling Green during Autumn. The baitfish found in and around the Site are considered to be some of the most significant baitfish resources in the Northeast IMCRA bioregion (Davis et al. in E. Wolanaski (ed), 2014).

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	*Acacia crassicarpa*	☑	☑	☐	LC	☐	Nature Conservation Act 1992 - LC	This species was listed as vulnerable on IUCN Red List at the time this RIS update was prepared (June 2022)

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																	

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								
CHORDATA / REPTILIA	*Caretta caretta*	☑	☑	☐	☐	☑	☐	☐	☐				VU	☐	☑	National (EPBC Act)–EN; marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992) – EN	Wetland dependent threatened species. The site provides habitat for feeding and/or nesting, and is a migration pathway for this marine species.
CHORDATA / REPTILIA	*Chelonia mydas*	☑	☑	☐	☐	☑	☐	☐	☐				EN	☑	☑	National (EPBC Act)– VU; marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992) – VU	Wetland dependent endangered species. The site provides habitat for feeding and/or nesting, and is a migration pathway for this marine species.
CHORDATA / REPTILIA	*Crocodylus porosus*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☑	☑	National (EPBC Act)– marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992) - VU	Wetland dependent species
CHORDATA / MAMMALIA	*Dugong dugon*	☑	☑	☐	☐	☑	☐	☐	☐				VU	☑	☐	National (EPBC Act) - marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992) – VU	Wetland dependent species - marine or brackish
CHORDATA / REPTILIA	*Lepidochelys olivacea*	☑	☑	☐	☐	☑	☐	☐	☐				VU	☐	☑	National (EPBC Act)– VU; marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992)- EN	Wetland dependent threatened species. The site provides habitat for feeding and/or nesting, and is a migration pathway for this marine species.
CHORDATA / REPTILIA	*Natator depressus*	☑	☑	☐	☐	☑	☐	☐	☐				DD	☑	☐	National (EPBC Act)– VU; marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992) – VU	Wetland dependent threatened species. The site provides habitat for feeding and/or nesting, and is a migration pathway for this marine species.
CHORDATA / MAMMALIA	*Orcaella heinsohni*	☑	☑	☐	☐	☑	☐	☐	☐				VU	☑	☐	National (EPBC Act) - migratory (CMS) QLD NCA (Nature Conservation Act 1992) – VU	Wetland dependent species - foraging
CHORDATA / MAMMALIA	*Sousa sahulensis*	☑	☑	☐	☐	☑	☐	☐	☐				VU	☑	☐	National (EPBC Act) - migratory (CMS) QLD NCA (Nature Conservation Act 1992) – VU	Wetland dependent species - foraging
Fish, Mollusc and Crustacea																	
CHORDATA / ACTINOPTERYGII	*Acanthopagrus pacificus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; demersal; oceanodromous
CHORDATA / ACTINOPTERYGII	*Acanthurus grammoptilus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; reef associated.
CHORDATA / ACTINOPTERYGII	*Ambassis agassizii*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - Australian endemic; freshwater, demersal, potamodromous
CHORDATA / ACTINOPTERYGII	*Ambassis agrammus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - freshwater, brackish, demersal
CHORDATA / ACTINOPTERYGII	*Ambassis buruensis*	☐	☐	☐	☐	☑	☐	☑	☑				DD	☐	☐		Wetland dependent species - freshwater; brackish; demersal
CHORDATA / ACTINOPTERYGII	*Ambassis gymnocephalus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - amphidromous
CHORDATA / ACTINOPTERYGII	*Ambassis vachellii*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; demersal; oceanodromous
CHORDATA / ACTINOPTERYGII	*Amniataba caudavittata*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine; freshwater; brackish; benthopelagic.
CHORDATA / ACTINOPTERYGII	*Amniataba percoides*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - Australian endemic; freshwater, benthopelagic; potamodromous
CHORDATA / ACTINOPTERYGII	*Anguilla reinhardtii*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine, freshwater, brackish, demersal, catadromous

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								
CHORDATA / ACTINOPTERYGII	*Anodontostoma chacunda*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; pelagic-neritic; anadromous
CHORDATA / ACTINOPTERYGII	*Arothron manilensis*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef associated
CHORDATA / ACTINOPTERYGII	*Arrhamphus sclerolepis*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; pelagic-neritic; amphidromous
CHORDATA / ACTINOPTERYGII	*Atherinomorus endrachtensis*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef-associated
CHORDATA / ELASMOBRANCHII	*Carcharhinus leucas*	☐	☑	☐	☐	☑	☐	☑	☑				VU	☐	☐		Wetland dependent species - marine; freshwater; brackish; reef-associated; amphidromous
CHORDATA / ACTINOPTERYGII	*Chanos chanos*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; benthopelagic; amphidromous
CHORDATA / ACTINOPTERYGII	*Chelmon rostratus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef-associated; non-migratory
CHORDATA / ACTINOPTERYGII	*Chelonodon patoca*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; reef-associated; anadromous
CHORDATA / ACTINOPTERYGII	*Craterocephalus stercusmuscarum*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - Australian endemic, freshwater, pelagic; potamodromous
CHORDATA / ACTINOPTERYGII	*Crenimugil buchanani*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine; freshwater; brackish; pelagic-neritic; catadromous
CHORDATA / ACTINOPTERYGII	*Drombus globiceps*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; demersal; amphidromous
CHORDATA / ACTINOPTERYGII	*Drombus ocyurus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; demersal
CHORDATA / ACTINOPTERYGII	*Eleutheronema tetradactylum*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland indicator species - amphidromous
CHORDATA / ACTINOPTERYGII	*Ellochelon vaigiensis*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; reef-associated; catadromous
CHORDATA / ACTINOPTERYGII	*Encrasicholina devisi*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine; brackish; reef-associated
CHORDATA / ACTINOPTERYGII	*Epinephelus lanceolatus*	☐	☐	☐	☐	☑	☐	☑	☑				DD	☐	☐		Wetland dependent; marine - brackish; reef-associated species; no take species in Queensland
CHORDATA / ACTINOPTERYGII	*Escualosa thoracata*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; pelagic-neritic; amphidromous
CHORDATA / ACTINOPTERYGII	*Eubleekeria jonesi*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - amphidromous
CHORDATA / ACTINOPTERYGII	*Fowleria variegata*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; reef-associated.
CHORDATA / ACTINOPTERYGII	*Gazza minuta*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; demersal
CHORDATA / ACTINOPTERYGII	*Gerres oyena*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef-associated

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								
CHORDATA / ACTINOPTERYGII	*Giuris margaritacea*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine, freshwater, brackish, demersal, amphidromous
CHORDATA / ACTINOPTERYGII	*Glossamia aprion*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - freshwater, benthopelagic
CHORDATA / ACTINOPTERYGII	*Halichoeres nigrescens*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent -foraging; marine; reef-associated.
CHORDATA / ACTINOPTERYGII	*Hephaestus fuliginosus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - Australian endemic; freshwater, benthopelagic
CHORDATA / ACTINOPTERYGII	*Herklotsichthys castelnaui*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; pelagic-neritic
CHORDATA / ACTINOPTERYGII	*Hyporhamphus neglectissimus*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent - marine; pelagic-neritic.
CHORDATA / ACTINOPTERYGII	*Hypseleotris compressa*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - freshwater, demersal, potamodromous
CHORDATA / ACTINOPTERYGII	*Istiblennius meleagris*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef-associated
CHORDATA / ACTINOPTERYGII	*Lates calcarifer*	☐	☑	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - diadromous; distribution Rockhampton and further north; coastal marine; estuarine and freshwater habitats; adults mainly in estuaries (mangroves and river mouths); juveniles extend up rivers into freshwater
CHORDATA / ACTINOPTERYGII	*Leiognathus equulus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; demersal
CHORDATA / ACTINOPTERYGII	*Leiopotherapon unicolor*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - endemic to Australia; freshwater; brackish; demersal; potamodromous
CHORDATA / ACTINOPTERYGII	*Lutjanus argentimaculatus*	☐	☑	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - Marine; brackish; reef-associated; Oceanodromous
CHORDATA / ACTINOPTERYGII	*Lutjanus russellii*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; demersal; catadromous
CHORDATA / ACTINOPTERYGII	*Marilyna pleurosticta*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; demersal; anadromous
CHORDATA / ACTINOPTERYGII	*Megalops cyprinoides*	☐	☐	☐	☐	☑	☐	☑	☑				DD	☐	☐		Wetland dependent species - marine; freshwater; brackish; benthopelagic; amphidromous
CHORDATA / ACTINOPTERYGII	*Melanotaenia splendida*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - Queensland endemic; freshwater, benthopelagic
CHORDATA / ACTINOPTERYGII	*Mugil cephalus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; benthopelagic; catadromous
CHORDATA / ACTINOPTERYGII	*Nematalosa come*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; pelagic-neritic
CHORDATA / ACTINOPTERYGII	*Nematalosa erebi*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species; Australian endemic; freshwater, brackish, pelagic, potamodromous
CHORDATA / ACTINOPTERYGII	*Neoarius graeffei*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine, freshwater, brackish, demersal, anadromous

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								
CHORDATA / ACTINOPTERYGII	*Neosilurus ater*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - freshwater, demersal
CHORDATA / ACTINOPTERYGII	*Nuchequula gerreoides*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine; brackish; demersal; amphidromous
CHORDATA / ACTINOPTERYGII	*Omobranchus rotundiceps*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; benthopelagic
CHORDATA / ACTINOPTERYGII	*Ostorhinchus cookii*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; reef-associated.
CHORDATA / ACTINOPTERYGII	*Oxyeleotris lineolata*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - Australian endemic; freshwater, demersal
CHORDATA / ACTINOPTERYGII	*Parablennius intermedius*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; benthopelagic
CHORDATA / ACTINOPTERYGII	*Paramugil georgii*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Endemic to Australia; wetland dependent species - marine; freshwater; brackish; demersal; catadromous
ARTHROPODA / MALACOSTRACA	*Penaeus merguiensis*	☐	☐	☐	☐	☐	☐	☐	☑					☐	☐		Mangrove areas within the site provide nursery habitat for this species.
CHORDATA / ACTINOPTERYGII	*Periophthalmodon freycineti*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; demersal
CHORDATA / ACTINOPTERYGII	*Pisodonophis cancrivorus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; reef-associated; anadromous
CHORDATA / ACTINOPTERYGII	*Planiliza subviridis*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; demersal; catadromous
CHORDATA / ACTINOPTERYGII	*Poecilia reticulata*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - freshwater; brackish; benthopelagic
CHORDATA / ACTINOPTERYGII	*Pomadasys argenteus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; coastal inshore waters (open bays and estuaries)
CHORDATA / ACTINOPTERYGII	*Pomadasys kaakan*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef-associated
CHORDATA / ACTINOPTERYGII	*Porochilus rendahli*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - Australian endemic; freshwater, demersal
CHORDATA / ACTINOPTERYGII	*Pseudomugil signifer*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - freshwater; brackish; benthopelagic; endemic to Australia
CHORDATA / ACTINOPTERYGII	*Sardinella albella*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; reef-associated
CHORDATA / ACTINOPTERYGII	*Scatophagus argus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; reef-associated; amphidromous
CHORDATA / ACTINOPTERYGII	*Scomberomorus commerson*	☐	☐	☐	☐	☑	☐	☑	☑				NT	☐	☐		Wetland indicator species - oceanodromous; juveniles are highly dependent on estuarine and foreshore nursery and feeding areas (McPherson in L.E. Williams (ed.), 1997)
CHORDATA / ACTINOPTERYGII	*Scomberomorus queenslandicus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; pelagic-neritic; oceanodromous
CHORDATA / ACTINOPTERYGII	*Scomberomorus semifasciatus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; pelagic-neritic; oceanodromous

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		2	4	6	9	3	5	7	8								
CHORDATA / ACTINOPTERYGII	*Secutor ruconius*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine; freshwater; brackish; demersal; amphidromous
CHORDATA / ACTINOPTERYGII	*Selenotoca multifasciata*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; benthopelagic; amphidromous
CHORDATA / ACTINOPTERYGII	*Siganus guttatus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef-associated
CHORDATA / ACTINOPTERYGII	*Siganus lineatus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; reef-associated
CHORDATA / ACTINOPTERYGII	*Sillago analis*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine; brackish; demersal; non-migratory
CHORDATA / ACTINOPTERYGII	*Sillago ciliata*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; demersal; non-migratory
CHORDATA / ACTINOPTERYGII	*Sillago sihama*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef-associated; amphidromous; near the shore. Shallow water along beaches, sandbars, mangrove creeks, estuaries
CHORDATA / ACTINOPTERYGII	*Sphyraena jello*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine; brackish; reef-associated; oceanodromous
CHORDATA / ACTINOPTERYGII	*Stolephorus carpentariae*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; pelagic-neritic
CHORDATA / ACTINOPTERYGII	*Stolephorus indicus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; pelagic-neritic; oceanodromous
CHORDATA / ACTINOPTERYGII	*Stolephorus nelsoni*	☐	☐	☐	☐	☑	☐	☑	☑				DD	☐	☐		Wetland dependent species - marine; pelagic-neritic
CHORDATA / ACTINOPTERYGII	*Strongylura krefftii*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - freshwater; brackish; pelagic
CHORDATA / ACTINOPTERYGII	*Taeniamia fucata*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; reef-associated
CHORDATA / ACTINOPTERYGII	*Taeniamia melasma*	☐	☐	☐	☐	☑	☐	☑	☑					☐	☐		Wetland dependent species - marine; reef-associated
CHORDATA / ACTINOPTERYGII	*Terapon jarbua*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; freshwater; brackish; demersal; catadromous
CHORDATA / ACTINOPTERYGII	*Thryssa hamiltonii*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; pelagic-neritic; amphidromous
CHORDATA / ACTINOPTERYGII	*Toxotes chatareus*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species. Mainly occurs in brackish mangrove estuaries but also penetrates freshwater rivers and small stream
CHORDATA / ACTINOPTERYGII	*Zenarchopterus buffonis*	☐	☐	☐	☐	☑	☐	☑	☑				LC	☐	☐		Wetland dependent species - marine; brackish; reef-associated
Birds																	
CHORDATA / AVES	*Actitis hypoleucos*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act) - marine, migratory (CMS), JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) – SL	Wetland dependent, non-breeding, migratory species.

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								
CHORDATA / AVES	*Arenaria interpres*	☐	☑	☐	☐	☑	☐	☐	☐	4	1996 (Oct)		LC	☐	☐	National (EPBC Act) - marine, migratory (CMS,JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; non-breeding migratory species. Note, the EAAFP CSR 1 interpres, Pacific & SE Asia (non-breeding) population estimate for this species is 30,000 individuals. Although the species occurs at the Site, it does not meet the 1% threshold of 300. Count data from Driscoll et al., 2012 (Table 6) was compared to the 1% threshold. Count was taken from just 1 roost Site so it may be an underestimate.
CHORDATA / AVES	*Calidris acuminata*	☐	☑	☑	☐	☑	☐	☐	☐	1474	2011 -2021	1.7	VU	☐	☐	National (EPBC Act)– marine, migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; Wetland dependent species; Non-breeding migratory species; Roosting and feeding occurs; The C&E Siberia (breeding) population estimate from EAAFP CSR 1 for this species is 85,000 individuals (data from 2005-2016), with a 1% threshold of 850. The site supports 1.73% of this population. Note: although the count data from Driscoll et al., 2012 (Table 6) and Milton et al. 2014 (Table 4.) and Queensland Wader Study Group (2021) exceed the 1% EAAFP CSR 1% threshold of 850; it is not clear whether the Site regularly exceeds this threshold. Counts may be an underestimate. Counts from Queensland Wader Study Group (2021) were across 12 roost sites and Driscoll and Milton 2.
CHORDATA / AVES	*Calidris alba*	☐	☑	☐	☐	☑	☐	☐	☐	10	1998-2021		LC	☐	☐	National (EPBC Act) — marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) – SL	Wetland indicator species; non-breeding migratory species. Note, the EAAFP CSR 1; Rubida, E & SE Asia, Australia, New Zealand (non-breeding) population estimate for this species is 30,000 individuals. Although the species occurs at the Site, it does not meet the 1% threshold. Mean count data from Driscol et al. (2012) and QWSC (2021) were s compared to 1% threshold of 300.
CHORDATA / AVES	*Calidris canutus*	☑	☑	☐	☐	☑	☐	☐	☐	129	2010-2021		NT	☐	☑	National (EPBC Act)– EN; marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - EN	Wetland indicator species; non-breeding migratory species. Note, the EAAFP CSR 1; Piersmai population estimate for this species is 50,500-62,000 individuals and Rogersi population is 48,5000-60,000. Although the species occurs at the Site, it does not meet the 1% threshold. Mean count data from Driscol et al. (2012) and QWSG (2021) was compared to the 1% threshold of Piersmai 560 and Rogersi 540 individual, but counts maybe an underestimate.
CHORDATA / AVES	*Calidris ferruginea*	☑	☑	☐	☐	☑	☐	☐	☐	741	1999-2021		NT	☐	☐	National (EPBC Act)– CE; marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) – EN	Wetland indicator species; Wetland dependent species; Non-breeding migratory species. Note, although the species occurs at the Site, it does not meet the EAAFP CSR 1; E, SE Asia & Australia (non-breeding) 1% threshold (based on a population size of 90,000). Mean count data from Driscoll et la. (2024) and QWSG (2021) were compared to the 1%threshold of 900. Counts maybe an underestimate.
CHORDATA / AVES	*Calidris ruficollis*	☐	☑	☑	☐	☑	☐	☐	☐	5353	2011-2021	1.1	NT	☐	☐	National (EPBC Act) – marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; non-breeding migratory species; Roosting and feeding occurs. The NE Siberia (breeding) population estimate from EAAFP CSR 1 for this species is 475,000 individuals (data from 2005-2016), with a 1% threshold of 4800. The site supports 1.12% of this population. Mean count data was from Driscoll et la. (2024) and QWSG (2021) Counts maybe an underestimate.

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								
CHORDATA / AVES	*Calidris tenuirostris*	☑	☑	☐	☐	☑	☐	☐	☐	1795	2012-2021		EN	☐	☑	National (EPBC Act) – CE; marine; migratory (CMS,JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - CR	Wetland indicator species; Wetland dependent species; Non-breeding migratory species; Roosting and feeding occurs. The EAAFP CSR 1; SE Asia, Australia (non-breeding) population estimate for this species is 425,000 individuals..Note: although the species does occur at the site, it does not regularly exceed the 1% threshold of 4300. Mean count data from Driscoll et al. (2014) and QWSG (2021) was compared to the 1% threshold. Counts may be an underestimate.
CHORDATA / AVES	*Charadrius leschenaultii*	☑	☑	☐	☐	☑	☐	☐	☐	230	2021		LC	☐	☐	National (EPBC Act) – VU; marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) – VU	Wetland indicator and migratory species
CHORDATA / AVES	*Charadrius mongolus*	☑	☑	☐	☐	☑	☐	☐	☐	250	2011-2021		EN	☐	☐	National (EPBC Act)– EN; marine, migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - EN	Wetland indicator species; Wetland dependent species; Non-breeding migratory species. The EAAFP CSR 1; Mongolus population estimates for this species is 25,500 individuals and Stegmanni 13,000 individuals. Mean count data was compared to 1% thresholds Mongolus (260 individuals) and Stegmanni (130 individuals. Mean count data was taken from Driscoll et al. (2012) and QWSG (2012). Counts may be an underestimate.
CHORDATA / AVES	*Chlidonias leucopterus*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)– marine; migratory (JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - LC	Wetland indicator species; non-breeding migratory species; Note: although the species occurs at the Site, it does not meet the 1% threshold. Anecdotal evidence suggests the species visits the Site in large aggregations to feed and roost.
CHORDATA / AVES	*Ephippiorhynchus asiaticus*	☐	☑	☐	☐	☑	☐	☐	☐				NT	☐	☐	QLD NCA (Nature Conservation Act 1992) – LC	Near-threatened species; wetland indicator species
CHORDATA / AVES	*Esacus magnirostris*	☑	☑	☐	☐	☑	☐	☐	☐				NT	☐	☐	National (EPBC Act)– marine QLD NCA (Nature Conservation Act 1992) – VU	Wetland dependent species; resident shorebird; Has been recorded in small numbers on occasion. Failure to detect during a survey does not mean that the species does not still occur at the Site (Driscoll et al. 2012)
CHORDATA / AVES	*Gelochelidon nilotica*	☐	☑	☐	☐	☑	☐	☐	☐	31	2011 (Oct)		LC	☐	☐	National (EPBC Act)– marine; migratory (CAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland dependent migratory species. Note: although the species occurs at the Site, there was no 1% threshold to compare against. This count was recorded as part of a complete site survey.
CHORDATA / AVES	*Hirundapus caudacutus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)– marine; migratory –- (JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - VU	Non breeding migratory species
CHORDATA / AVES	*Hydroprogne caspia*	☐	☑	☐	☐	☑	☐	☐	☐	21	2012 (Jan)		LC	☐	☐	National (EPBC Act)– marine; migratory (JAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species. The Site has suitable breeding habitat on spits, banks, ridges and beaches. Note: although the species occurs at the site, it does not meet the 1% threshold. Count data from Driscoll et al (2014) and QWSG (2021)) was compared to 1% threshold from WPE5 viewed 29 July 2019. This count was recorded as part of a complete site survey.
CHORDATA / AVES	*Limicola falcinellus*	☐	☑	☐	☐	☑	☐	☐	☐	23	1995-2021			☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) – SL. On Red List as Calidris falcinellus LC	Wetland indicator species; non-breeding migratory species. The EAAFP CSR 1; Sibirica population estimate for this species is 30,000 individuals. Note: although the species occurs at the Site, it does not meet the 1% threshold of 300. Mean count data taken from Driscoll et al. (2012) and QWSG (2021). Count data maybe an underestimate.

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								
CHORDATA / AVES	*Limosa lapponica*	☑	☑	☐	☐	☑	☐	☐	☐	1174	1996-2021		NT	☐	☑	National (EPBC Act)– VU; marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - VU	Wetland indicator species; Wetland dependent species; Non-breeding migratory species; Roosting and feeding occurs. The EAAFP CSR 1; Baueri population estimate for this species is 126,000 individuals. Note: although the species occurs at the Site, it does not meet the 1% threshold of 1300. Mean count data from Driscoll et la. (2012) and QWSG (2021) was compared to the 1% threshold.
CHORDATA / AVES	*Limosa limosa*	☐	☑	☐	☐	☑	☐	☐	☐	1047	2011 (Jan)		NT	☐	☐	EPBC Act 1999 – Marine JAMBA, CAMBA, ROKAMBA QLD NCA (Nature Conservation Act 1992) - SL	Near-threatened wetland indicator species; non-breeding migratory species; Roosting and feeding. The EAAFP CSR 1; Melanuroides population estimate for this species is 160,000 individuals. Note: although the species occurs at the Site, it does not meet the 1% threshold of 1600 (count data from Driscoll et al., 2012).
CHORDATA / AVES	*Numenius madagascariensis*	☑	☑	☐	☐	☑	☐	☐	☐	51	2009-2021		EN	☐	☑	National (EPBC Act)– CE; marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - EN	Wetland indicator species; Wetland dependent species; Non-breeding migrant. The EAAFP CSR 1; C & E Asia (breeding) population estimate for this species is 35,000 individuals. Note: although the species occurs at the Site, it does not meet the 1% threshold of 350. Mean count data taken from Driscoll et al. (2012) and QWSG (2021). Count data may be an underestimate.
CHORDATA / AVES	*Numenius minutus*	☐	☑	☐	☐	☑	☐	☐	☐	6	1995 (Nov)		LC	☐	☐	National (EPBC Act),– marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Non-breeding migratory species. The EAAFP CSR 1; N Siberia (breeding) population estimate for this species is 110,000 individuals. Note: although the species occurs at the Site, it does not meet the 1% threshold of 1100. (count data from Driscoll et al., 2012). Count data was taken from 2 roost sites so may be an underestimate.
CHORDATA / AVES	*Numenius phaeopus*	☐	☑	☐	☐	☑	☐	☐	☐	79	2008-2021		LC	☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; non-breeding migratory species. The EAAFP CSR 1; Variegatus, E & SE Asia (non-breeding) population estimate for this species is 65,000 individuals Mean count data taken from Driscoll et al. (2012) and QWSG (2021). Note: although the species occurs at the Site, it does not meet the 1% threshold of 650.
CHORDATA / AVES	*Onychoprion anaethetus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)– marine; migratory (JAMBA, CAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; migratory species that will breed in Queensland but preference is for offshore islands.
CHORDATA / AVES	*Pandion cristatus*	☐	☑	☐	☐	☑	☐	☐	☐					☐	☐	National (EPBC Act)– marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator and migratory species.
CHORDATA / AVES	*Philomachus pugnax*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act) – marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLDNCA (Nature Conservation Act 1992) – SL	Wetland indicator species; wetland dependent species
CHORDATA / AVES	*Plegadis falcinellus*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)– marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator and migratory species;
CHORDATA / AVES	*Pluvialis fulva*	☐	☑	☐	☐	☑	☐	☐	☐	38	2000 (Jan)		LC	☐	☐	National (EPBC Act)–- marine; migratory (CMS, JAMBA,CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; non-breeding migratory species. The EAAFP CSR 1; E, SE Asia Australia & New Zealand (non-breeding) population estimate for this species is 120,000 individuals Note: although the species occurs at the Site, it does not meet the 1% threshold of 1200 (count data from Driscoll et. al., 2012 and Milton et. al., 2014). Count data was taken from only 2 roost sites so maybe an underestimate.

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								
CHORDATA / AVES	*Pluvialis squatarola*	☐	☑	☐	☐	☑	☐	☐	☐	116	2001 (March)		LC	☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; roosting and feeding occurs; Virtually all of the grey plovers that spend the non-breeding season in Australia are female, making Australia crucial for the survival of the species. The EAAFP CSR 1; Squatarola, E, SE Asia & Australia (non-breeding) population estimate for this species is 80,000 individuals. Note: although the species occurs at the Site, it does not meet the 1% threshold of 800. Count data from was compared to 1% threshold.
CHORDATA / AVES	*Puffinus pacificus*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act) – marine, migratory (JAMBA) QLD NCA (Nature Conservation Act 1992) – VU. Listed as Ardenna pacifica LC in Red List	Migratory breeding and non-breeding.
CHORDATA / AVES	*Rhipidura rufifrons*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)– marine, migratory (CMS; JAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Migratory; the Site has suitable habitat for feeding including swamps and mangroves.
CHORDATA / AVES	*Rostratula australis*	☑	☑	☐	☐	☑	☐	☐	☐				EN	☐	☐	National (EPBC Act)– EN; marine QLD NCA (Nature Conservation Act 1992) - EN	Wetland indicator species; wetland dependent species; possible breeding habitat (Marchant & Higgins 1993)
CHORDATA / AVES	*Sterna dougallii*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA, CAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Migratory species; Site has suitable habitat for roosting including zone on the upper sections of beaches, above the high-water mark (but still in the wash-zone) on banks, spits and bars.
CHORDATA / AVES	*Sterna hirundo*	☐	☑	☑	☐	☑	☐	☐	☐	710	2011 (Nov)	1.5	LC	☐	☐	National (EPBC Act)– marine; migratory (JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; non-breeding migrant species; roosting and feeding; The Longipennis population estimate from EAAFP CSR 1 for this species is 30,000-70,000 individuals (data from 1993-2006), with a 1% threshold of 460. The site supports 1.54% of this population range. Count data maybe an underestimate.
CHORDATA / AVES	*Sterna sumatrana*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)– marine; migratory (JAMBA, CAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland Indicator species; Site has sandy beaches which may be suitable for breeding; migratory species
CHORDATA / AVES	*Sternula albifrons sinensis*	☐	☑	☐	☐	☑	☐	☐	☐	681	2011-2021			☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD (Nature Conservation Act 1992) - SL	Wetland indicator species; migrations undertaken through the Site as part of life cycle. Feeding and roosting at Site. Anecdotal accounts of the Site regularly support 1,000 individuals. Mean count data from Driscoll et al. (2012) and QWSG (2021 was compared to the 1% EAAFP CSR 1; Sinensis population threshold which is 1000 viewed 7 August 2024.
CHORDATA / AVES	*Sula dactylatra*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)–EN; marine; migratory (CMS) QLD NCA (Nature Conservation Act 1992) – SL	Wetland indicator and migratory species
CHORDATA / AVES	*Sula leucogaster*	☑	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)–EN; marine; migratory, JAMBA, CAMBA, ROKAMBA QLD NCA (Nature Conservation Act 1992) – SL	Wetland dependent and migratory species
CHORDATA / AVES	*Thalasseus bergii*	☐	☑	☐	☐	☑	☐	☐	☐	15	2021		LC	☐	☐	National (EPBC Act) – marine; migratory JAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; migratory species; site has banks of sand suitable for breeding.
CHORDATA / AVES	*Tringa brevipes*	☑	☑	☐	☐	☑	☐	☐	☐	80	1998-2021		NT	☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Near-threatened wetland indicator species; Non-breeding migratory species; The EAAFP CSR 1; C & E Siberia (breeding) population estimate for this species is 70,000 individuals. Note: although the species occurs at the Site, it does not meet the 1% threshold of 700. Mean count data from Driscoll et al. (2012) and QWSG (2021).
CHORDATA / AVES	*Tringa incana*	☐	☑	☐	☐	☑	☐	☐	☐				LC	☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; non-breeding migrant

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								
CHORDATA / AVES	*Tringa nebularia*	☐	☑	☐	☐	☑	☐	☐	☐	32	2009-2021		LC	☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; Wetland dependent species; Non-breeding migratory species. The EAAFP CSR 1; E, SE Asia, Australia (non-breeding) population estimate for this species is 110,000 individuals. Count data is Driscoll et al. (2012) and QWSG (2021). Note: although the species occurs at the Site, it does not meet the 1% threshold of 1100.
CHORDATA / AVES	*Tringa stagnatilis*	☐	☑	☐	☐	☑	☐	☐	☐	65	2011 (Oct)		LC	☐	☐	National (EPBC Act)– marine; migratory (CMS, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland indicator species; Wetland dependent species; Non-breeding migratory species. The EAAFP CSR 1; E, SE Asia, Oceania (non-breeding) population estimate for this species is 130,000 individuals. Count data from QWSG (2021). Note: although the species occurs at the Site, it does not meet the 1% threshold of 1300. .
CHORDATA / AVES	*Xenus cinereus*	☐	☑	☐	☐	☑	☐	☐	☐	2	2021		LC	☐	☐	National (EPBC Act) , marine, migratory, JAMBA, CAMBA, ROKAMBA) QLD NCA (Nature Conservation Act 1992) - SL	Wetland dependent species; marine; migratory.

1) Percentage of the total biogeographic population at the site

The Site provides diverse faunal assemblages that are significant in the North East Coast Drainage Division and the Northeast IMCRA Province. The estuarine wetlands that fringe the northern and southern coasts of Cape Cleveland, Cape Bowling Green, up the Haughton River and other creeks are particularly important at providing habitat for migratory birds, fish, benthic invertebrate species and estuarine crocodiles. The Cape Bowling Green Sand Spit (formed as a result of sand transported northward by longshore sediment transport at a time when the Burdekin River discharged in the vicinity of Kalamia Creek) is critical as a high tide migratory shorebird roost site as well as providing nesting habitat for marine turtles (Kelly and Lee Long, 2011, unpublished).

The Site also has species of prawns, shrimp, crayfish and worm as follows: Istiophoridae spp.; Penaeus spp. (tiger prawn); Fenneropenaeus spp. (banana prawn); Atyidae family (atyiid shrimp); caridina shrimp; Cherax sp. (freshwater crayfish family); Parastacidae family (Paratacid crayfish family); Oligochaeta subclass (Oligochaete worm subclass). Neoarius spp. and Hypseleotris spp. also occur at the Site.

Additionally, the Site is habitat for Geijera salicifolia (brush wilga) which is listed as Near Threatened under the Red List and Least Concern under the Queensland Nature Conservation Act 1992.

Threatened species status in table 3.3 is based on when this RIS update was prepared (2022).

EAAFP CSR 1 is 'Report on the Conservation Status of Migratory Waterbirds of the East Asian – Australasian Flyway. First Edition (Mundkur and Langendoen 2022)'.

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

Name of ecological community	Community qualifies under Criterion 2?	Description	Justification
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	☑	Semi-evergreen vine thicket on coastal alluvial plains (RE 11.3.11x1) A groundwater dependent ecosystem located on coastal alluvial plains (Accad et al 2008). 18 ha exists	National (EPBC Act) – Endangered Vegetation Management Act 1999 – Endangered -It is mostly located within the Brigalow Belt Bioregion (North and South) and Nandewar Bioregions and is a groundwater dependent ecosystem closely linked to wetlands habitats.

Optional text box to provide further information

Semi-evergreen vine thicket (SEVT) is considered an extreme form of dry seasonal subtropical rainforest. It occurs in areas with a subtropical, seasonally dry climate on soils of high to medium fertility and is generally characterised by the prominence of trees with microphyll sized leaves (2.5–7.5cm long) and the frequent presence of swollen-stemmed “bottle trees” (Brachychiton australis, B. rupestris) as emergents from the vegetation. The thickets typically have an uneven canopy 4–9m high with mixed evergreen, semi-evergreen and deciduous emergent tree species 9–18m high. Vines, twining or scrambling plants are prominent.
Semi-evergreen vine thickets are widely scattered with a common structure (architecture) but considerable regional variation in floristic associations.
Within the Brigalow Belt Bioregions, semi-evergreen vine thickets have been fragmented, reduced in area and degraded through land clearing and agricultural/grazing practices.

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

4.1 - Ecological character

Seven critical ecosystem services contribute to the ecological character of the Site. 24 critical components and processes support these services. The ecological services (refer to Kelly and Lee Long, 2011, unpublished) are summarised below:

Significant, representative wetlands: The Site is generally representative and particularly distinctive within the Northeast Coast Drainage Division and the Northeast IMCRA Province (marine bioregion) for its diversity and extent of, brackish and freshwater wetland types, far reaching flood tide, and for nutrient assimilation and sediment stabilization to adjacent and downstream areas.

Threatened wetland species: The Site supports key threatened and protected species such as turtles, several waterbird, shorebird species, and a threatened ecological community.

Wetland biodiversity: The Site supports a regionally significant diversity of wetland biota and food webs, including finfish, crustaceans, marine reptiles, waterbirds, shorebirds, soft bottom communities, mangroves and saltmarshes.

Migratory shorebirds and seabirds: The Site regularly supports 1% of the population of at least one species of migratory shorebird in any year.

Waterbird feeding and breeding: The Site provides habitat for waterbirds reliant on freshwater. Most waterbirds however, breed and feed in the adjacent freshwater wetlands.

Fish stocks: The Site supports recreationally/commercially significant fish stocks by providing (a) nursery sites for earlier life history stages (b) foraging sites for larger fishes (c) export of nutrients to adjacent waters and (d) producing prey species (e.g. species such as banana prawns that use mangrove lined estuaries as nurseries then migrate to near shore waters).

Science, conservation and recreation: The Site is an important reference site and resource for scientific, conservation and nature observation activities in relation to coastal wetlands of the tropics.

The critical components and processes underpinning the ecosystem services are numerous and complex, reflecting the diversity and extent of wetland types that transition from fresh to brackish and marine systems. The wetland components that contribute to ecological character include a mixture of palustrine (freshwater and brackish swamps dominated by the bulkuru sedge, Eleocharis spp.), coastal dune and swale systems, mangrove and saltmarsh tidal wetlands, intertidal sand and mudflats, freshwater and estuarine streams, creeks and riverine habitats.

The wetlands also support diverse and abundant flora and fauna, including threatened and migratory species, regionally significant baitfish aggregations and fisheries stocks. The Ramsar site is crucial to large populations of waterbirds, marine reptiles and mammal species for protection, foraging and breeding. A large sand spit at Cape Bowling Green, and several smaller coastal spits, also provide critical habitat for several wetland fauna species that migrate, roost and/or nest.

The processes most critical to supporting the ecosystem services include:

• climate: in particular rainfall and temperature

• hydrological processes (tidal and freshwater), high inter-annual variability in water input, surface flow, inundation, salinity and water quality

• geomorphic and oceanographic processes including transport and mixing of marine sediments, interplay of marine and inland fluvial influences

• energy and nutrient dynamics – nutrient cycling (nitrogen, phosphorus), carbon cycling, decomposition, oxidation-reduction

• biological – primary production, herbivory, predation, migration, reproduction (includes on-and-off-site processes) and trophic food webs

• viable migration pathways for waterbirds and site networks in the Flyway (external to the Site).

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	Seagrass meadows, tropical/subtropical macroalgae	0	50.5	Representative
E: Sand, shingle or pebble shores	Sand bars, spits, sandy inlets, dune systems	0	474.4	Representative
F: Estuarine waters	Permanent water of estuaries and estuarine systems of deltas	4	1159.3	Representative
G: Intertidal mud, sand or salt flats	Tidal flats and mudflats	1	15052.6	Representative
H: Intertidal marshes	Saltmarshes & saltpans	3	2238.5	Representative
I: Intertidal forested wetlands	Mangroves	2	11500.5	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 > Lakes >> R: Seasonal/ intermittent saline/ brackish/ alkaline lakes and flats	e.g. Bulkuru sedgelands on old marine plains	3	45.6	Representative
Fresh water > Marshes on inorganic soils >> Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils	e.g. Bulkuru sedgelands on old alluvial plains	2	119.1	Representative
Fresh water > Marshes on inorganic soils >> Xf: Freshwater, tree-dominated wetlands	e.g. Melaleuca swamps	1	1557	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	Ponded pasture and natural small ponds bunded from tidal influence	1	32.8

(ECD) Habitat connectivity: See Additional material for more information

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTA/MAGNOLIOPSIDA	*Acanthus ebracteatus*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/POLYPODIOPSIDA	*Acrostichum speciosum*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Aegialitis annulata*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Avicennia eucalyptifolia*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Bruguiera exaristata*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Bruguiera gymnorhiza*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Bruguiera parviflora*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/POLYPODIOPSIDA	*Ceratopteris thalictroides*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Ceriops tagal*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Corchorus hygrophilus*	QLD (Nature Conservation Act 1192) VU
TRACHEOPHYTA/MAGNOLIOPSIDA	*Cynometra iripa*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Cyperus alopecuroides*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Cyperus polystachyos*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Cyperus scariosus*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Eclipta prostrata*	Wetland indicator
TRACHEOPHYTA/LILIOPSIDA	*Eleocharis dulcis*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Eleocharis mutata*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Eleocharis spiralis*	Wetland indicator

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTA/MAGNOLIOPSIDA	*Excoecaria agallocha*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Fimbristylis ferrugineae*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Fuirena umbellata*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Heritiera littoralis*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Kali turgida*	Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Leersia hexandra*	Wetland indicator
TRACHEOPHYTA/MAGNOLIOPSIDA	*Ludwigia octovalvis*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Ludwigia peploides montevidensis*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Lumnitzera racemosa*	Wetland indicator species
TRACHEOPHYTA/POLYPODIOPSIDA	*Marsilea mutica*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Melaleuca dealbata*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Monochoria cyanea*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Osbornia octodonta*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Pemphis acidula*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Persicaria attenuata*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Rhizophora apiculata*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Rhizophora lamarckii*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Rhizophora stylosa*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Ruppia maritima*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Salicornia quinqueflora quinqueflora*	Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Sannantha papillosa*	QLD (Nature Conservation Act 1992) EN
TRACHEOPHYTA/MAGNOLIOPSIDA	*Sesuvium portulacastrum*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Sonneratia alba*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Sphenoclea zeylanica*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/LILIOPSIDA	*Sporobolus virginicus*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Suaeda arbusculoides*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Suaeda australis*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Tecticornia australasica*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Tecticornia pergranulata*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species
TRACHEOPHYTA/MAGNOLIOPSIDA	*Xylocarpus moluccensis*	QLD (Nature Conservation Act 1992) - LC Wetland indicator species

Phylum	Scientific name	Position in range / endemism / other

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTA/MAGNOLIOPSIDA	*Alternanthera philoxeroides*	Potential	No change
TRACHEOPHYTA/LILIOPSIDA	*Andropogon gayanus*	Potential	unknown
TRACHEOPHYTA/MAGNOLIOPSIDA	*Annona glabra*	Potential	No change
TRACHEOPHYTA/LILIOPSIDA	*Brachiaria mutica*	Potential	No change
TRACHEOPHYTA/LILIOPSIDA	*Cenchrus ciliaris*	Potential	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Chromolaena odorata*	Potential	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Cryptostegia grandiflora*	Potential	decrease
TRACHEOPHYTA/LILIOPSIDA	*Echinochloa polystachya*	Potential	No change
TRACHEOPHYTA/LILIOPSIDA	*Eichhornia crassipes*	Potential	No change
TRACHEOPHYTA/LILIOPSIDA	*Hymenachne amplexicaulis*	Actual (minor impacts)	increase
TRACHEOPHYTA/MAGNOLIOPSIDA	*Lantana camara*	Potential	No change
TRACHEOPHYTA/LILIOPSIDA	*Panicum maximum*	Potential	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Parkinsonia aculeata*	Potential	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Parthenium hysterophorus*	Potential	No change
TRACHEOPHYTA/POLYPODIOPSIDA	*Salvinia adnata*	Potential	No change
TRACHEOPHYTA/LILIOPSIDA	*Themeda quadrivalvis*	Potential	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	*Vachellia nilotica indica*	Potential	decrease
TRACHEOPHYTA/MAGNOLIOPSIDA	*Ziziphus mauritiana*	Potential	decrease

Optional text box to provide further information

Nutrient inputs derived from agricultural areas appear to be contributing to the eutrophication of freshwater wetlands and have assisted the domination of exotic pasture grass species such as para grass (Brachiaria mutica) and guinea grass (Panicum maximum) in the emergent vegetation zone (Kelly and Lee Long 2011). More recent information suggests olive hymenachne (Hymenachne amplexicaulis) is still a threat to bulkuru within the Site, however, para grass (Brachiaria mutica) is the dominant weed species in this wetland type (Billy O'Grady pers comm 2021). Freshwater weeds have increased since the 2019 flood (Billy O'Grady 2021 pers. comm). Other weeds have become less prevalent e.g. rubber vine, chiney apple and prickly acacia on the marine plain (Marty McLaughlin pers. comm. 2019).

4.3.2 - Animal species

Other noteworthy animal species

Phylum	Scientific name	Pop. size	Period of pop. est.	%occurrence	Position in range /endemism/other
CHORDATA/MAMMALIA	*Dasyurus hallucatus*				National (EPBC Act) - EN Red List - EN. This species is not likely to be wetland dependent .
CHORDATA/MAMMALIA	*Hipposideros diadema reginae*				QLD (Nature Conservation Act 1992) - NT
CHORDATA/AMPHIBIA	*Limnodynastes convexiusculus*				QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AMPHIBIA	*Litoria fallax*				Wetland indicator species. Has a partial aquatic life; QLD (Nature Conservation Act 1992) – LC
CHORDATA/AMPHIBIA	*Litoria gracilenta*				Wetland indicator sp ecies. Lives an entirely aquatic life, QLD (Nature Conservation Act 1992) – LC
CHORDATA/REPTILIA	*Morelia spilota*				QLD (Nature Conservation Act 1992) - LC

Phylum	Scientific name	Pop. size	Period of pop. est.	%occurrence	Position in range /endemism/other
CHORDATA/AMPHIBIA	*Platyplectrum ornatum*				Wetland indicator species. Only requires aquatic environment for early life stages of egg and tadpole; QLD (Nature Conservation Act 1992) - LC
CHORDATA/MAMMALIA	*Rhinolophus philippinensis*				National (EPBC Act) VU; QLD (Nature Conservation Act 1992)-EN
ARTHROPODA/MALACOSTRACA	*Tubuca polita*				Wetland indicator
ARTHROPODA/MALACOSTRACA	*Tubuca seismella*				Wetland indicator
ARTHROPODA/MALACOSTRACA	*Tubuca signata*				Wetland indicator
CHORDATA/AVES	*Accipiter cirrocephalus*				QLD (Nature Conservation Act 1992) LC
CHORDATA/AVES	*Acrocephalus australis*				QLD (Nature Conservation Act 1992) - LC ; Wetland indicator species
CHORDATA/AVES	*Anas gracilis*				QLD (Nature Conservation Act 1992) - LC ; Wetland indicator species
CHORDATA/AVES	*Anas superciliosa*				QLD (Nature Conservation Act 1992) - LC Wetland indicator species
CHORDATA/AVES	*Anhinga novaehollandiae*				Wetland indicator species
CHORDATA/AVES	*Anous stolidus*				QLD (Nature Conservation Act 1992) - SL Wetland indicator species
CHORDATA/AVES	*Anseranas semipalmata*				National (EPBC Act)-marine; QLD (Nature Conservation Act 1992) – LC Small amount of nesting at site. Freshwater wetlands surrounding the site are considered a main stronghold for species in Eastern Australia
CHORDATA/AVES	*Aquila audax*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Ardea modesta*				National (EPBC Act) — marine; QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AVES	*Ardea pacifica*				QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AVES	*Ardeotis australis*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Aviceda subcristata*				(QLD) Nature Conservation Act 1992 - LC
CHORDATA/AVES	*Aythya australis*				QLD (Nature Conservation Act 1992)- LC ; Wetland indicator species
CHORDATA/AVES	*Bubulcus ibis*				QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AVES	*Butorides striata*				QLD (Nature Conservation Act 1992)- LC ; Wetland indicator species
CHORDATA/AVES	*Cacatua sanguinea*				Nature Conservation Act 1992 - LC
CHORDATA/AVES	*Calidris subminuta*				QLD (Nature Conservation Act 1992)- SL ; Wetland indicator species

Phylum	Scientific name	Pop. size	Period of pop. est.	%occurrence	Position in range /endemism/other
CHORDATA/AVES	*Charadrius ruficapillus*				National (EPBC Act)- marine; QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AVES	*Chenonetta jubata*				QLD (Nature Conservation Act 1992)- LC ; Wetland indicator species
CHORDATA/AVES	*Chroicocephalus novaehollandiae*				QLD (Nature Conservation Act 1992)- LC ; Wetland indicator species
CHORDATA/AVES	*Circus approximans*				QLD (Nature Conservation Act 1992)- LC ; Wetland indicator species
CHORDATA/AVES	*Cygnus atratus*				QLD (Nature Conservation Act 1992)- LC ; Wetland indicator species
CHORDATA/AVES	*Dendrocygna arcuata*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Dendrocygna eytoni*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Egretta garzetta*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Egretta intermedia*				QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AVES	*Egretta picata*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Elseyornis melanops*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Erythrogonys cinctus*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Falco berigora*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Falco cenchroides*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Falco longipennis*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Falco peregrinus*				QLD (Nature Conservation Act 1992) – LC CITES Appendix I
CHORDATA/AVES	*Grus rubicunda*				QLD (Nature Conservation Act 1992)- LC Wetland indicator species
CHORDATA/AVES	*Haematopus longirostris*				Australian pied oystercatcher
CHORDATA/AVES	*Haliaeetus leucogaster*				Wetland indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Haliastur indus*				Wetland indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Haliastur sphenurus*				Wetland indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Himantopus himantopus*				National (EPBC Act)– Marine QLD (Nature Conservation Act 1992) – LC Wetland indicator species

Phylum	Scientific name	Pop. size	Period of pop. est.	%occurrence	Position in range /endemism/other
CHORDATA/AVES	*Irediparra gallinacea*				Wetland indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Larus novaehollandiae*				QLD (Nature Conservation Act 1992)- LC ; Wetland indicator species
CHORDATA/AVES	*Lophoictinia isura*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Microcarbo melanoleucos*				Wetland indicator species
CHORDATA/AVES	*Milvus migrans*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Morus serrator*				Wetland indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Myiagra cyanoleuca*				QLD (Nature Conservation Act 1992) - SL
CHORDATA/AVES	*Myiagra rubecula*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Nettapus coromandelianus*				National (EPBC Act)- marine; QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AVES	*Nettapus pulchellus*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Ninox connivens*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Ninox rufa queenslandica*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Nycticorax caledonicus*				Wetland Indicator species QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Pelecanus conspicillatus*				National (EPBC Act)– Marine; QLD (Nature Conservation Act 1992) – LC Wetland Indicator species
CHORDATA/AVES	*Platalea regia*				QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AVES	*Platycercus adscitus*				QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Poephila cincta cincta*				National (EPBC Act)– EN; QLD (Nature Conservation Act 1992) – EN CITES Appendix II
CHORDATA/AVES	*Sterna nilotica*				Wetland Indicator species QLD (Nature Conservation Act 1992) - SL
CHORDATA/AVES	*Symposiachrus trivirgatus*				QLD (Nature Conservation Act 1992)- SL
CHORDATA/AVES	*Tadorna radjah*				National (EPBC Act) – marine; QLD (Nature Conservation Act 1992) - LC
CHORDATA/AVES	*Threskiornis molucca*				QLD (Nature Conservation Act 1992) – LC Wetland indicator species
CHORDATA/AVES	*Todiramphus sordidus*				Wetland indicator
CHORDATA/AVES	*Vanellus miles*				QLD (Nature Conservation Act 1992) - LC ; Wetland indicator species

Phylum	Scientific name	Impacts	Changes at RIS update
CHORDATA/MAMMALIA	*Felis catus*	Potential	No change
CHORDATA/ACTINOPTERYGII	*Gambusia holbrooki*	Potential	unknown
CHORDATA/REPTILIA	*Hemidactylus frenatus*	Potential	unknown
CHORDATA/MAMMALIA	*Oryctolagus cuniculus*	Potential	No change
CHORDATA/AMPHIBIA	*Rhinella marina*	Potential	No change
CHORDATA/MAMMALIA	*Sus scrofa*	Actual (minor impacts)	No change
CHORDATA/ACTINOPTERYGII	*Trichopodus trichopterus*	Potential	unknown
CHORDATA/MAMMALIA	*Vulpes vulpes*	Actual (minor impacts)	No change
CHORDATA/ACTINOPTERYGII	*Oreochromis mossambicus*	Actual (minor impacts)	No change
CHORDATA/AVES	*Acridotheres tristis*	Potential	unknown
CHORDATA/AVES	*Columba livia*	Potential	unknown
CHORDATA/AVES	*Lonchura punctulata*	Potential	unknown
CHORDATA/AVES	*Passer domesticus*	Potential	unknown
CHORDATA/AVES	*Streptopelia chinensis*	Potential	unknown

Optional text box to provide further information

There are also a number of insect wetland indicator species that have been recorded at the Site including: mayfly spp.; sand fly sp.; damselfly spp.; midge sp. and caddis fly spp. and the whirliegig beetle.

Tilapia is a major emerging pest threat that has established in river and dam systems in Queensland, including estuarine environments. Tilapia competes with native fish species, prey upon their eggs and fry and other food sources such as small invertebrates. Native fish species dependant on coastal wetlands are susceptible to Tilapia through predation and competition for food and habitat (Kelly and Lee Long 2011). Damage to wetland vegetation by feral pigs is common (Kelly and Lee Long 2011). Feral pigs and dogs are predating turtle eggs and/or modifying nesting habitat exposing eggs to thermal mortality (Ian Bell pers. com 2021). The feral red fox can be a serious predator, taking eggs and killing chicks (Department of Sustainability and Environment, 2001). Other feral animal species at the site include rabbits (Oryctolagus cuniculus); cats (Felus catus) and cane toads (Bufo marinus) (Kelly and Lee Long 2011).

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
A: Tropical humid climate	Aw: Tropical savanna (Winter dry season)

Rainfall in the Haughton River and Burdekin River catchments are highly variable from year to year and can be influenced by tropical cyclones and monsoonal activity. Rainfall averages suggest a distinct wet and dry season, with the wet season generally November to April and the dry June to October. High rainfall intensities during the wet season cause large local run-off events. Rainfall at Ayr DPI Research Station averaged over 64 years is 945 mm per annum (Bureau of Meteorology (BOM) n.d). Average temperatures range between 29.2 °C maximum and 18 °C minimum recorded over 63 years (BOM n.d).

Over the last 30 years, changes to the climate and weather of the monsoonal north east region have included:
• Growing season rainfall averages have decreased
• Three-monthly rainfall totals leading into the dry season have increased slightly
• Evaporation rates have increased
• There have been more hot days, with more consecutive days above 42 °C.
(BOM Regional Weather and Climate Guide 2019

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres) 0

a) Maximum elevation above sea level (in metres) 558

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.

The Site adjoins the is in the Coral Sea which lies in the South Pacific Ocean. The Site contains sections of two drainage basins which lie within the North East Coast Drainage Division. These are the Haughton Basin and the Ross Basin.

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)

A large area of the Site is comprised of muds and silts of Quaternary age which are replaced further inland by the soils and sediments of the coastal plain (Hopely 1970). According to Murtha (1982), the soils largely correspond to local elevation and parent material. The origins of the mountainous soils of Cape Cleveland and Feltham Cone are largely from course-grained granitic parent materials (Hopely 1970). These are mostly thin sandy soils although there are occasional red soils (Hopely 1970). Seawater inundation has not affected these higher soils.

See Additional material Expanded RIS for more information

4.4.4 - Water regime

Water permanence

Presence?	Changes at RIS update
Usually seasonal, ephemeral or intermittent water present	unknown
Usually permanent water present	unknown

Source of water that maintains character of the site

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

Water destination

Presence?	Changes at RIS update
Feeds groundwater	No change
To downstream catchment	No change
Marine	No change

Stability of water regime

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

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

Hydrology is complex and not well understood (Davis et al., 2014). Irrigation is a feature of the wider area (Walking the Landscape 2018) because the region lacks sufficient consistent or predictable rainfall (Perna et al. 2012). There is however, a good understanding of the impact of the Burdekin Haughton Water Supply (BHWSS) on groundwater. The groundwater has been steadily trending upwards (Petheram et al. 2008), particularly since 1990 (McMahon et al. 2012). Estuarine wetlands downstream of irrigation areas are also subject to elevated and perennial flow rather than the historical seasonal freshwater inflow (Perna et al. 2012). Surface water flow to rivers and streams has increased as a result of irrigation (GBRMPA 2013).

Two main underground aquifers store groundwater on the lower Burdekin flood plain (Davis et al. 2014). Recharge is mostly by rainfall. The older aquifers are deeper (15-45 m) and extend from the slopes of Mt Elliott across the Haughton River to the Burdekin delta (Lenahan and Bristow 2010). The younger, more shallow aquifers occur around the Haughton Riverbed (Davis et al. 2014). There is a poor understanding of the natural variability of groundwater in the lower Burdekin (Davis et al. 2014). Given the large fluctuations in groundwater levels resulting from extraction as well as enhanced recharge from irrigation, it is hard to predict groundwater flow paths (Bristow, 2016).

The Site is drained seaward into Bowling Green Bay by the Haughton River, three larger creeks (Barramundi, Barratta and Sheep Station Creeks) and many small creeks (Lewis et al. 2006). Two large creeks (Cocoa and Alligator Creeks) and a number of minor creeks discharge into Cleveland Bay at the northwestern end of the site. Drainage of the mountainous area to the south of Cape Cleveland and Feltham Cone occurs via seasonally flowing creeks into Cleveland and Bowling Green Bays.

See Additional material Expanded RIS for more information.

(ECD) Connectivity of surface waters and of groundwater: Surface water and groundwater systems appear connected across the coastal floodplain. See Additional material Expanded RIS for more information

(ECD) Stratification and mixing regime	The Ramsar Site is characterised by a broad mixing zone between marine, estuarine and freshwater areas that only occurs at this scale at one other location (Broadsound) in the Northeast Drainage Division.

4.4.5 - Sediment regime

Significant erosion of sediments occurs on the site ☑

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

Significant accretion or deposition of sediments occurs on the site ☑

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

Significant transportation of sediments occurs on or through the site ☑

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

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 Ramsar Site falls within the Ross and Haughton Catchments which fall within the broader Burdekin region. According to the Reef Water Quality Report Card (201917-18) for the Burdekin region, the fine sediment load leaving catchments showed a cumulative reduction of 18.5% to June 2019, a modelled average annual reduction of 0.1% (approximately 3.1 tonnes) from July 2018 to June 2019. Please see, Reef Water Quality Report Card | Reef 2050 Water Quality Improvement Plan (reefplan.qld.gov.au)

According to the Reef Water Quality Report Card (2019) for the Ross Catchment, there was no report card grade for sediment.

According to the Reef Water Quality Report Card (2019) for the Haughton Catchment, there was no report card grade for sediment.

Please see Additional material Expanded RIS for more information.

(ECD) Water turbidity and colour	Please see Additional material Expanded RIS for more information
(ECD) Light - reaching wetland	N/A
(ECD) Water temperature	N/A

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):

N/A

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 ◉

Hyperhaline/Hypersaline (>40 g/l) ☑

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

Unknown ☐

Please provide further information on salinity (optional):

Water salinity varies across the Ramsar Site. The rivers and creeks are largely estuarine (WetlandMaps 2021). Some once seasonally dry wetlands are now subject to elevated and perennial freshwater inflows (Waltham et al. 2020, Waltham and Fixler 2017, Burrows et al. 2012) arising from upstream-irrigated agriculture (GBRMPA 2013, NQ Dry Tropics 2016). Depressed salinities have been recorded in the upper reaches of both Barratta and Barramundi Creeks (Burrows et al. 2012, Sheaves and Johnston 2009) resulting from irrigation tailwaters off Site.

Coastal floodplain groundwater has shown increased salinity (NQ Dry Tropics 2016) since monitoring began in the 1960s (Lenahan and Bristow 2010). Increased salinity of the aquifer results from of a combination of evapotranspiration of irrigation water, displacement of unsaturated zone solutes, enhanced mixing with relict seawater and seawater intrusion.

(ECD) Dissolved gases in water

Variable

4.4.8 - Dissolved or suspended nutrients in water

Eutrophic ☑

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

Mesotrophic ☑

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

Oligotrophic ☑

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

Dystrophic ☑

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

Unknown ☐

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

The Reef Water Quality Report Card (20197-18) indicates the modelled average annual loads leaving the catchments in the Burdekin Region for the following:
• dissolved inorganic nitrogen – the dissolved inorganic nitrogen load leaving catchments showed a cumulative reduction of 31.2% to June 2019, a modelled average annual reduction of 4.5% (approximately 40 tonnes) from July 2018 to June 2019.load was reduced to 26.7% at June 2018, a reduction of 1.2% for the two years since 2016.
• particulate nitrogen – the particulate nitrogen load leaving catchments showed a cumulative reduction of 16.8% to June 2019, a modelled average annual reduction of 0.4% (approximately 12 tonnes) from July 2018 to June 2019. load was reduced to 16.4% at June 2018, a reduction of 0.7% for the two years since 2016. Refer to Additional information section 4.4.8 for more information.

(ECD) Dissolved organic carbon	Variable
(ECD) Redox potential of water and sediments	Variable
(ECD) Water conductivity	Variable

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 has a long history of agricultural development, including sugar cane, rice, horticulture and aquaculture. Sugar cane farming and grazing are the dominant land use in the lower Burdekin River, Haughton River, Barratta Creek, Sheep Station Creek and Hughes Creek catchments immediately upstream of the Ramsar site. Intensive agricultural land use surrounding the Site has modified the natural state of many creeks and wetlands.

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Provisioning Services

Ecosystem service	Examples	Importance/Extent/Significance
Food for humans	Sustenance for humans (e.g., fish, molluscs, grains)	Low

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Maintenance of hydrological regimes	Groundwater recharge and discharge	Medium
Maintenance of hydrological regimes	Storage and delivery of water as part of water supply systems for agriculture and industry	Low
Pollution control and detoxification	Water purification/waste treatment or dilution	High
Climate regulation	Local climate regulation/buffering of change	High
Climate regulation	Regulation of greenhouse gases, temperature, precipitation and other climactic processes	Medium
Hazard reduction	Coastal shoreline and river bank stabilization and storm protection	High
Hazard reduction	Flood control, flood storage	High

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Nature observation and nature-based tourism	Medium
Recreation and tourism	Recreational hunting and fishing	High
Spiritual and inspirational	Inspiration	Medium
Spiritual and inspirational	Contemporary cultural significance, including for arts and creative inspiration, and including existence values	Low
Spiritual and inspirational	Spiritual and religious values	Medium
Spiritual and inspirational	Aesthetic and sense of place values	Medium
Spiritual and inspirational	Cultural heritage (historical and archaeological)	High
Scientific and educational	Educational activities and opportunities	High
Scientific and educational	Important knowledge systems, importance for research (scientific reference area or site)	High
Scientific and educational	Major scientific study site	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
Soil formation	Sediment retention	High
Nutrient cycling	Storage, recycling, processing and acquisition of nutrients	High
Pollination	Support for pollinators	Medium

Other ecosystem service(s) not included above:

Please see Additional material Expanded RIS for more information.

Within the site: 1000s

Outside the site: 100 000s

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

(ECD) Primary production	Primary productivity is central to the growth of the major wetland flora habitats – mangroves, seagrasses. See Additional material Expanded RIS for more information.
(ECD) Nutrient cycling	Nitrogen and phosphorous cycling are part of the critical ecological processes that occur in the Ramsar Site and are supporting services necessary for the production of many other ecosystem services (Kelly and Lee Long, 2011, unpublished)
(ECD) Carbon cycling	Carbon cycling is part of the critical ecological processes that occur in the Ramsar site associated with natural wetland systems. See Additional material Expanded RIS for more information.
(ECD) Animal reproductive productivity	See Additional material Expanded RIS for more information.
(ECD) Vegetational productivity, pollination, regeneration processes, succession, role of fire, etc.	N/A
(ECD) Notable species interactions, including grazing, predation, competition, diseases and pathogens	N/A
(ECD) Notable aspects concerning animal and plant dispersal	N/A
(ECD) Notable aspects concerning migration	Shorebirds, dolphins, dugong, sea turtles, fish & estuarine crocodiles use the Site for migration. See Additional material Expanded RIS for more information.
(ECD) Pressures and trends concerning any of the above, and/or concerning ecosystem integrity	Loss of external habitat and hunting is severely threatening shorebird migration in other parts of the East Asian Australasian Flyway. See Additional material for more information.

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
Public land (unspecified)	☑	☐
National/Federal government	☐	☑
Provincial/region/state government	☑	☑
Local authority, municipality, (sub)district, etc.	☐	☑

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Commercial (company)	☐	☑
Other types of private/individual owner(s)	☐	☑

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

The Queensland Government manages the terrestrial components of the Site as part of the Bowling Green Bay National and Conservation Parks. The Queensland Government also manages the Great Barrier Reef Coast Marine Park component of the Ramsar site between mean high water springs and low water mark as per the Bowling Green Bay boundary description. The Great Barrier Reef Marine Park adjacent to the Ramsar Site is managed by the Australian Government.

Activities such as sand extraction, hobby farming and rural residential occur on freehold land at Cape Cleveland outside the Ramsar Site. The Australian Institute of Marine Science is situated on the Bowling Green Bay side of Cape Cleveland outside the Ramsar Site.

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:
Queensland Department of Environment and Science – www.des.qld.gov.au
Queensland Department of Agriculture and Fisheries – www.daf.qld.gov.au

Provide the name and/or title of the person or people with responsibility for the wetland:
Manager, Wetlands Team, Queensland Department of Environment and Science

Postal address:
Queensland Department of Environment and Science
GPO Box 2454
Brisbane QLD 4001

E-mail address:
info@des.qld.gov.au

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
Unspecified development	Low impact		☑	No change	☑	No change

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Water abstraction	Low impact		☐	No change	☑	No change
Salinisation	Low impact		☑	No change	☑	No change
Water releases	Medium impact		☑	No change	☑	No change
Canalisation and river regulation	Medium impact		☐	No change	☑	No change

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Annual and perennial non-timber crops	High impact		☐	No change	☑	No change
Livestock farming and ranching	Low impact		☐	No change	☑	No change
Marine and freshwater aquaculture		Low impact	☐	No change	☑	No change

Energy production and mining

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Mining and quarrying	Medium impact		☐	No change	☑	No change

Transportation and service corridors

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Roads and railroads	Low impact		☑	No change	☑	No change
Utility and service lines (e.g., pipelines)	Low impact		☑	No change	☑	No change

Biological resource use

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Fishing and harvesting aquatic resources	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

Natural system modifications

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Fire and fire suppression	Low impact		☑	No change	☑	No change
Dams and water management/use	Medium impact		☐	No change	☑	No change
Vegetation clearance/ land conversion	Low impact		☐	No change	☑	No change
Unspecified/others	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	Medium impact		☑	No change	☑	No change

Pollution

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
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
Habitat shifting and alteration		Low impact	☑	No change	☑	No change
Droughts	Medium impact		☑	No change	☑	No change
Temperature extremes	Low impact		☑	No change	☑	No change
Storms and flooding	Medium impact		☑	No change	☑	No change

Please describe any other threats (optional):

Threats within the Site:

The majority of threats manifested at the Bowling Green Bay originate off Site. The Burdekin Haughton Water Supply Scheme (BHWSS) and Lower Burdekin Water Board (LBWB) have significantly modified the hydrology of the Barratta and Haughton sub-basins draining into the Site. Even though Maughan et. al., (2006) notes that many of the hydrological threats were present when the Site was listed, other threats are more recent, such as the spread of hymenachne into the lower reaches (since 2008-2009 floods) and an increase in freshwater aquatic weeds. Other weeds have become less prevalent e.g. rubber vine and prickly acacia on the marine plain.

Within the Site, habitat for shorebirds and important nesting sea turtles on sandy beaches; southern Bowling Green Bay and Cape Bowling Green Bay are vulnerable to erosion from severe storm events.

Threats external to the Site

Extensive modification of land surrounding the site from agricultural activities has occurred with approximately 80,000 hectares under intensive irrigation. Sugar cane is the predominant crop and represents approximately one quarter of Australia's sugar crop. Agriculture poses a number of potential threats to the ecological character of the area including impacts from altered hydrology such as disruption to landscape connectivity, reduced water quality and impacts from pest species. Instream structures and barriers to fish passage in the lower Burdekin can impact ecological functioning of aquatic habitats (Great Barrier Reef Marine Park 2013) affecting connectivity and fish life cycles. At the time of the Site's original listing, many of these threats were already present. Since implementation of the Reef Water Quality Protection Plans (2003, 2009, and 2013) and more recently the Reef 2050 Water Quality Improvement Plan (2017-2022) there has been some improvement in agricultural practices in reef catchments. See Additional material 6.1.2. (iii) 5.2.

Queensland Government has been working with local irrigators to develop a coordinated response to mitigate risks associated with rising groundwater, part of which involves steps to improve irrigation practices. This is further aided by government funding which supports improvements in farming practices that capture run-off in the Lower Burdekin.

A potential breach of the Bowling Green sandspit has been raised which Queensland Government is investigating. The area at risk is outside the Site.

As the global climate continues to warm, the region is projected to experience:
• an increase in average temperatures in all seasons
• more hot days and warm spells
• increased intensity of extreme rainfall events
• rising mean sea level, and the height of extreme sea-level events will also increase
• fewer but more intense tropical cyclones
Natural variability may mask or enhance any long-term human induced trend, particularly in the next 20 years and for rainfall. (CSIRO and Bureau of Meteorology n.d).

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Conservation Park	Bowling Green Bay Conservation Park	https://www.npsr.qld.gov.au/managing/plans-strategies/statements/pdf/bowling-green-bay-rpms.pdf	whole
Fish Habitat Area	Bowling Green Bay FHA - 007	http://www.nprsr.qld.gov.au/managing/area-summaries/bowlinggreen.html	partly
Fish Habitat Area (Cleveland Bay)	Cleveland Bay FHA - 071	http://www.nprsr.qld.gov.au/managing/area-summaries/cleveland.ht ml	partly
Matter of National Significance under the Environment Protection & Biodiversity Conservation Act 1999	Ramsar	https://www.environment.gov.au/epbc/what-is-protected	whole
National Park	Bowling Green Bay National Park	https://parks.des.qld.gov.au/parks/bowling-green-bay/	partly
State Marine Protected Area	The Great Barrier Reef Coast Marine Park	https://www.qld.gov.au/environment/coasts-waterways/marine-parks/about/gbrc	partly

Non-statutory designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Important Bird Area	East Asian-Australasian Flyway Partnership site: Bowling Green Bay EAAF089 - Australia	http://www.eaaflyway.net/about/the-flyway/flyway-site-network/bowling-green-bay-eaaf089-australi a/	partly
Other non-statutory designation	Directory of Important Wetlands	Bowling Green Bay, Burdekin Delta, Burdekin – Townsville Coastal Aggregation, Great Barrier Reef Marine Park, Wongaloo Fans Aggregation, Wongaloo Swamps Aggregation	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
Catchment management initiatives/controls	Implemented
Improvement of water quality	Implemented
Habitat manipulation/enhancement	Implemented
Faunal corridors/passage	Implemented
Re-vegetation	Implemented

Species

Measures	Status
Control of invasive alien plants	Implemented
Control of invasive alien animals	Implemented
Threatened/rare species management programmes	Implemented

Human Activities

Measures	Status
Management of water abstraction/takes	Implemented
Regulation/management of wastes	Implemented
Livestock management/exclusion (excluding fisheries)	Implemented
Fisheries management/regulation	Implemented
Harvest controls/poaching enforcement	Implemented
Regulation/management of recreational activities	Implemented
Communication, education, and participation and awareness activities	Implemented
Research	Implemented

Other:

In Australia, the ecological character of Ramsar sites is protected as a Matter of National Environmental Significance (MNES) under the Environment Protection and Biodiversity Conservation Act 1999.

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 ◉

URL of site-related webpage (if relevant): http://www.nprsr.qld.gov.au/parks/bowling-green-bay/

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? Please select a value

Further information

There is no site specific restoration plan, however various restoration activities undertaken outside the site provide benefits within the site. Projects include:
• The NQ Dry Tropics led Reducing fine sediments by maintaining and restoring Burdekin stream banks and coastal wetlands project (2018 - 2022). This project is about working with community in the Lower Burdekin to reduce sediments and other pollutants flowing through the Ramsar site. Works focus on stream bank and wetland restoration.
• The NQ Dry Tropics led Connecting cane farmers to their local wetlands project (2016 - 2019). This pilot project is about improving the quality of water flowing through the Ramsar Site by increasing the uptake of improved practices.
• The NQ Dry Tropics led Systems Repair project (2013 - 2018).This project improves ecological functioning of priority coastal wetlands by managing invasive species, biodiverse plantings and protecting and enhancing existing native vegetation.
• The NQ Dry Tropics led Landscape Resilience project (2014 - 2018). This project engages land managers to improve their knowledge and understanding of wetland functions and creating linkages between individual practices and their impacts on wetlands downstream.
• Wongaloo-Bowling Green Bay Park rehabilitation and management
• Burdekin Shire Council – Aquatic Weed Control
• Environment Restoration Fund - this project (2019 - 2023) will focus on improving the condition and values of the Bowling Green Bay Ramsar Site through the removal and mitigation of threats, raising awareness of the wetland and the establishment of a robust monitoring program. The improvement to the condition and values of the Bowling Green Bay Ramsar site will also have benefits to fish passage and contribute to improving the health of the Great Barrier Reef World Heritage Area.
• Please also refer to the Wetlands Project Search Tool on WetlandInfo for further information on various on-ground projects in the Burdekin region.

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Water regime monitoring	Implemented
Water quality	Implemented
Birds	Implemented

Paddock to Reef Integrated Monitoring, Modelling & Reporting Program
Reef 2050 Water Quality Improvement Plan 2017-22
Reef 2050 Long-Term Sustainability Plan
Creek to Coral Community Monitoring
Climate change resilience of threatened shorebirds in Queensland's Ramsar Wetlands (granted 2020)
Natural Values Health Check (annual 2021 onwards)
Bowling Green Bay Pest Management Strategy (expiry 2025)
Environmental Flows Assessment Program (EFAP) (statewide)
Water Resource Plan (Burdekin Basin) 2007
Groundwater Ambient Network (GWAN) – Water quality (statewide)
Groundwater Water Level Network (statewide)
Long term Historical Trend Water Quality Monitoring Data (statewide)
Queensland wetland extent change mapping (statewide)
Surface water Monitoring Network (statewide)

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Please see the file in Section 6.1.2.vi (other published literature), under the name "AU632_lit220601__bibliography.docx", for a complete list of references.

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)
<1 file(s) uploaded>

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
<3 file(s) uploaded>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:

Bowling Green Bay (*Natural Resources and Mines, 18-03-2010*)

Date unknown. Cape Cleveland at low tide (Photo DEWHA). (*DEWHA, 01-01-1970*)

Date unknown. The Haughton River flows 5-6 months of the year into Bowling Green Bay (Photo DEWHA). (*DEWHA, 01-01-1970*)

Date unknown. Bowling Green Bay is characterised by coastal plain covered in tidal mudflats, mangrove forest and salt marshes (Photo DEWHA) (*DEWHA, 01-01-1970*)

6.1.4 - Designation letter and related data

Designation letter
<1 file(s) uploaded>

Date of Designation: 1993-10-22