Ramsar Information Sheet

Published on 1 July 2022
Update version, previously published on : 1 January 2012

Australia

Towra Point

Designation date	21 February 1984
Site number	286
Coordinates	34°01'02"S 151°09'47"E
Area	632,00 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

Towra Point Nature Reserve lies on the northern side of Kurnell Peninsula, forming the southern and eastern shores of Botany Bay, and is approximately 16 km from the Sydney city centre in New South Wales. It is the largest wetland of its type in the Sydney Basin region and represents vegetation types that are now rare in the area. It is an estuarine complex comprising a mixture of spits, bars, mudflats, dunes and beaches.

The Ramsar site consists of a variety of habitats such as seagrass meadows, mangroves, saltmarshes, dune woodlands, Casuarina forest, small occurrences of littoral rainforest and sand dune grasslands. The vegetation within Towra Point Nature Reserve is regionally significant, with the reserve containing around 40% of the remaining mangrove communities and 60% of the remaining saltmarsh communities in Sydney. Furthermore, almost 300 plant species have been recorded within the Ramsar site including the nationally threatened Magenta Cherry.

Towra Point Nature Reserve is an important area for bird species, with approximately 200 species recorded in the area. This includes 34 species listed under international migratory bird conservation agreements. Large numbers of Eastern Curlew, Lesser Golden Plover, and Ruddy Turnstone have also been recorded within the Ramsar site. The Little Tern, listed as migratory under the EPBC Act and under the JAMBA, CAMBA and ROKAMBA bilateral international agreements occurs within the site and is known to breed in and around the site. The state-listed threatened Pied Oystercatcher are also known to breed within the Reserve.

These features underpin the listing of the site as a wetland of international importance for criteria 2, 3, 4 and 8 under the Ramsar Convention.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Responsible compiler

Institution/agency	NSW Office of Environment and Heritage
Postal address	PO Box A290 Sydney South, NSW, 1232 Australia

National Ramsar Administrative Authority

Institution/agency	Department of Agriculture, Water and the Environment
Postal address	GPO Box 858 Canberra ACT 2601 Australia

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

From year	1999
To year	2018

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Towra Point

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) B. Changes to Site area	the area has increased
(Update) The Site area has been calculated more accurately	☑
(Update) The Site has been delineated more accurately	☑
(Update) The Site area has increased because of a boundary extension	☐
(Update) The Site area has decreased because of a boundary restriction	☐
(Update) For secretariat only: This update is an extension	☐

2.1.5 - Changes to the ecological character of the Site

(Update) 6b i. Has the ecological character of the Ramsar Site (including applicable Criteria) changed since the previous RIS?	Yes (likely)
(Update) Are the changes	Positive ○ Negative ○ Positive & Negative ◉
(Update) Positive %	25
(Update) Negative %	75
(Update) No information available	☐
(Update) Optional text box to provide further information	

A formal assessment was completed for Towra Point Ramsar site in June 2017. The assessment indicated that the Limits of Acceptable Change (LACs) for shorebirds have been exceeded for diversity of species and for little tern breeding success. The assessment of shorebird data from 2002 to mid-2016 has identified a decline in the abundance of key shorebird species in summer and decline in the diversity of shorebird species in Botany Bay in summer and winter. In addition, the breeding success rate of the little tern has been declining, likely in response to threats and loss of available nesting habitat on the island. Even when considered in the broader NSW context of significant year on year variability at other sites, the little tern data at Towra Point indicate declining numbers and limited breeding success over at least the last five years.

Saltmarsh and mangroves condition and extent have declined since the time of listing, but further evidence is required to determine the cause of the decline, the impact of this decline and options for mitigating impacts.

The assessment has found that the change in ecological character in relation to geomorphology was occurring at the time of listing and there is evidence of significant ongoing human-induced geomorphic change which is having an adverse impact on ecological character.

While it is hard to quantify the percentage of change of Towra Point Ramsar site, is evident that a large proportion of the site is subject to change, with change in the geomorphology of the site being a substantial risk and influential factor to its ecological character.

The NSW Government (OEH) has worked with the Commonwealth Government to develop a Response Strategy to manage key threats affecting the ecological character of the Ramsar site. The Response Strategy is constrained by the availability of resources and the limitations of the site occurring within a highly urbanised environment.

(Update) Changes resulting from causes operating within the existing boundaries? ☑

(Update) Changes resulting from causes operating beyond the site's boundaries? ☑

(Update) Changes consequent upon site boundary reduction alone (e.g., the exclusion of some wetland types formerly included within the site)? ☐

(Update) Changes consequent upon site boundary increase alone (e.g., the inclusion of different wetland types in the site)? ☐

(Update) Please describe any changes to the ecological character of the Ramsar Site, including in the application of the Criteria, since the previous RIS for the site.

There has been a change in the; geomorphology and sedimentary processes, abundance and diversity of shorebirds in summer and winter, in little tern breeding numbers and there is a likely change in the area of saltmarsh and mangroves. However, further data is required to quantify changes in seagrasses. Further information can be found within the Towra Point review paper (Attachment 1).

(Update) Is the change in ecological character negative, human-induced AND a significant change (above the limit of acceptable change) Yes ◉

(Update) Has an Article 3.2 report been submitted to the Secretariat? Yes ◉

2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image
<3 file(s) uploaded>

Former maps: 0

Boundaries description

The Towra Point Nature Reserve Ramsar site is approximately 16 km south of Sydney CBD. Towra Point is located on the northern side of the Kurnell Peninsula which forms the southern shore of Botany Bay. The Ramsar site comprises three areas: two small sections along the shores of Quibray Bay and the third which covers the majority of Towra Point and the bed of Weeney Bay.

The Ramsar site boundary is the Towra Point Nature Reserve boundary, as gazetted on 6 August 1982, 8 March 1991, 29 March 1996 and 4 April 2008. The gazetted area of that part of the nature reserve comprising the Ramsar site is 632 hectares (GDA 1994 MGA Zone 56). The boundary has been extended to include 217.3 hectares of land gazetted as part of Towra Point Nature Reserve on 4 April 2008.

The Ramsar site consists of the following land, identified as cadastral lots: Lot 2 DP 856868; Lot 31 DP 217907; Lot 119 DP 752064; Lots 101-109 & 119 DP 777967; Lot 1 DP 1014443; Lots 3 & 4 DP 126710; Lots 1&2 DP 126711; Lot 1 1030269; Lot 4 DP 732257; Lot 105 DP 555205; Lots 1-4 DP 126709.

2.2.2 - General location

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

b) What is the nearest town or population centre? Sydney (5.4 million) 16 km from the centre

2.2.3 - For wetlands on national boundaries only

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

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

2.2.4 - Area of the Site

Official area, in hectares (ha): 632

Area, in hectares (ha) as calculated from GIS boundaries: 633.248

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Other scheme (provide name below)	South East Coast (NSW), Sydney Coast Georges River

Other biogeographic regionalisation scheme

Australian Hydrological Geospatial Fabric (Geofabric): Topographic Drainage Divisions and River Regions (BOM 2012) – South East Coast (NSW), Sydney Coast Georges River

Botany Bay catchment

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

<no data available>

☑ Criterion 2 : Rare species and threatened ecological communities

☑ Criterion 3 : Biological diversity

Justification

In 1993 Botany Bay, including Towra Point Nature Reserve, was recognised as one of the four most important migratory wading bird sites in NSW and Towra Point Nature Reserve is recognised as one of the four most important migratory wading bird sites in NSW. Recent studies (OEH 2013) have identified that there are 34 species listed under international migratory bird agreements (JAMBA, CAMBA and ROKAMBA) frequenting the Towra Point Nature Reserve Ramsar site. This includes 10 threatened migratory species listed under the NSW BCA and seven threatened migratory birds listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The site supports two species at the southern limit of their distribution including brown honeyeater (Lichmera indistincta) and mangrove gerygone (Gerygone levigaster). The plant Gahnia filum, a saltmarsh species, reaches its northern limit of distribution at Carters Island.

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

☑ Criterion 8 : Fish spawning grounds, etc.

Justification

Towra Point is a significant habitat and food source for at least 60 species of fish of which 25 are of economic significance (DECCW 2010). Fish utilise the saltmarsh (wetland type H), mangroves (wetland type I) and seagrass (wetland type B) habitats at and adjacent to Towra Point Nature Reserve for food, protection and as a nursery habitat during the early stages in their life cycle. A species list is included in Appendix A.

The saltmarsh is important for providing habitat for crab species, which release large amounts of larvae in the ebb tide. Certain fish species use the spring tides to access this reliable spawning and some of these fish are of commercial and economic importance, such as yellowfin bream (Acanthopargus australis) and sand whiting (Sillago ciliata). The use of saltmarsh areas by fish and birds allows nutrient cycling and energy transfer and demonstrates the ecological connectivity of the area (Mazumder et al. 2006, 2009; Connolly 2009).

The tidal regime in Botany Bay supports the food web at Towra Point by exporting crab and crustacean larvae from saltmarsh to intertidal and subtidal areas, and by transporting detritus from seagrass meadows to intertidal and supratidal areas (Mazumder et al. 2009; Connolly 2009; Connolly et al. 2005a, 2005b). Tidal export of crab larvae from saltmarsh and tidal import of detrital material from seagrass meadows provides an important food source for fish and birds (Connolly et al. 2005b; Mazumder et al. 2006, 2009).

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 / LILIOPSIDA	*Gahnia filum*	☐	☑	☐		☐		Reaches its northern limit of distribution at Carters Island.Provides biological diversity and habitat, feeding and refuge areas for juvenile fish.
TRACHEOPHYTA / LILIOPSIDA	*Posidonia australis*	☑	☐	☐	NT	☐	EN - Endangered EEC (EPBC Act 1999)	Found within the site. Provides habitat, feeding and refuge areas for juvenile fish.
TRACHEOPHYTA / MAGNOLIOPSIDA	*Syzygium paniculatum*	☑	☐	☐		☐	VU-National Status (EPBC Act 1999)	Found within the site

The magenta lilly pilly is listed as vulnerable under NSW (BCA) and threatened under the Commonwealth EPBC Act, and has been recorded in the littoral rainforest at Towra Point Nature Reserve in 1977 and 2007 (ALS 1977; WODEC 2007). This species is under threat from weed invasion, especially by bitou bush (Chrysanthemoides monilifera) (WODEC 2007). Other threats include fire and loss of habitat through clearing for residential development (OEH 2016).

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																	
CHORDATA / AMPHIBIA	*Litoria aurea*	☑	☐	☐	☐	☐	☐	☐	☐				VU	☐	☐	Commonwealth - vulnerable NSW - endangered	provides habitat
CHORDATA / MAMMALIA	*Pteropus poliocephalus*	☑	☐	☐	☐	☐	☐	☐	☐				VU	☐	☐	Commonwealth - vulnerable NSW - vulnerable	
Fish, Mollusc and Crustacea																	
CHORDATA / ACTINOPTERYGII	*Gerres subfasciatus*	☐	☑	☐	☐	☐	☐	☐	☐				LC	☐	☐	Not listed	Habitat and breeding areas include the site
CHORDATA / ACTINOPTERYGII	*Girella tricuspidata*	☐	☑	☐	☐	☐	☐	☐	☐					☐	☐	Not listed	Habitat and breeding areas include the site
CHORDATA / ACTINOPTERYGII	*Liza argentea*	☐	☑	☐	☐	☐	☐	☐	☐					☐	☐	Not listed	Habitat and breeding areas include the site
Birds																	
CHORDATA / AVES	*Epthianura albifrons*	☑	☐	☐	☐	☐	☐	☐	☐					☐	☐	NSW - vulnerable	last remaining breeding population in Sydney area
CHORDATA / AVES	*Gerygone levigaster*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐	Not listed	Southern limit of their distribution
CHORDATA / AVES	*Haematopus longirostris*	☑	☐	☐	☐	☐	☐	☐	☐				LC	☐	☐	NSW - Endangered (BCA)	
CHORDATA / AVES	*Lichmera indistincta*	☐	☐	☐	☐	☑	☐	☐	☐				LC	☐	☐	Not listed	Southern limit of their distribution
CHORDATA / AVES	*Numenius madagascariensis*	☑	☐	☐	☐	☐	☐	☐	☐				EN	☐	☑	Commonwealth – critically endangered	Migratory shorebird
CHORDATA / AVES	*Sternula albifrons*	☑	☐	☐	☐	☐	☐	☐	☐				LC	☐	☐	Commonwealth – migratory	provides critical breeding habitat

1) Percentage of the total biogeographic population at the site

Acanthospagrus australis (yellow fin bream) also meets criteria 4, as the site provides habitat and breeding areas in the site.

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
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia CEEC	☑	Found in areas of the lower elevations within Towra Point, usually on the landward side of saltmarsh.	Critically Endangered Ecological Community under the EPBC Act (1999) and the NSW BCA (2016).
Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion EEC	☑	Occurs within Botany Bay	Endangered Ecological Community under the EPBC Act (1999)
Casuarina glauca (Swamp Oak) Coastal Floodplain Forest ecological community	☑		Currently being assessed as an EEC bythe Commonwealth for listing
Subtropical and Temperate Coastal Saltmarsh VEC	☑	Found on the landward side of the mangroves throughout Towra and along the shores of Wooloware and Quibray bays.	Vulnerable Ecological Community under the EPBC Act (1999) and the NSW BCA (2016). Coastal saltmarsh community are expected to have flow-on impacts to migratory shorebirds, fish and other species reliant upon saltmarsh habitat. A coastal wetland/saltmarsh

Optional text box to provide further information

Kurnell Dune Forest in the Sutherland Shire and City of Rockdale - fragments of this community are found on the inner part of Towra Point, as the Knoll and at Pelican Point. These are endangered under the NSW BC Act 2016. The community occurs in the Sutherland Shire and in the City of Rockdale (Leo Smith Reserve). Within Sutherland Shire the major occurrences are on the Kurnell Peninsula, with other stands near Bundeena. The extent of the community has been much reduced by clearing and development and remaining stands are disjunct.

Sydney Freshwater Wetlands in the Sydney Basin bioregion - named as freshwater lagoons at Towra Point are Towra Lagoon, Mirrormere and Weedy Pond, all situated between Weeney Bay and Towra Beach. These are endangered under the NSW BC Act 2016. There is only a small number of existing small remnants of these communities within the Sydney Basin Bioregion. These are likely to become extinct in nature in NSW unless circumstance and threatening factors cease to operate.

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

4.1 - Ecological character

Geomorphology:
Geomorphology (including geology, morphology, topography and microtopography, and sedimentation in Botany Bay) of the site influences the diversity, stability, availability and connectivity of habitats for key species. This is particularly important for migratory shorebirds that use the sandy beaches and spits, intertidal shoals and the saltmarsh for roosting, feeding and nesting. The Elephant Trunk spit and subsequently Towra Spit Island have been important roosting sites for migratory shorebirds and the only nesting site for Little Tern in Botany Bay (and formerly the largest breeding site for little tern in the Sydney area). The Ramsar values of Towra Spit Island and Carters Shoals relate to little tern habitat (roosting and breeding) and roosting habitat for other migratory shorebirds. These habitat values have long been affected by geomorphic change, access by predators, vegetation change and disturbance by people using the area for recreation. The relative contribution of these impacts has not been quantified.

Hydrology:
Critical hydrological processes in Botany Bay include tidal regimes, wave energy, surface runoff and groundwater dynamics. These processes are critical for the cycling of water, nutrients and chemicals and are key drivers of ecosystem geomorphology and biological diversity.

Hydrology determines the types of habitats that occur by affecting erosion and accretion, topography and microtopography, salinity, turbidity, nutrient availability, soil chemistry and moisture content. The hydrological cycle in Botany Bay is dynamic and continues to change with anthropogenic influence. Most of the plants and animals of Towra Point have adapted to the current hydrological regime. However, some species such as the green and golden bell frog have been lost in certain areas due to hydrological changes. Wind, wave energy and tidal currents are the most influential processes that change Towra Point's geomorphology. Anthropogenic alterations to the catchment, such as changed river flows and loads or by changing the shape of the north shore of Botany Bay, substantially change the geomorphology of the area and can change the magnitude, direction and frequency of the natural processes in the system.

Physiochemical environment:
Salinity, nutrients, heavy metals and turbidity make up the physicochemical environment which influences water quality at Towra Point. Water quality 'determines the suitability of water for a particular purpose' (DEWHA 2007). Towra Point requires a standard of water quality that will sustain a diverse range of flora and fauna which is well adapted to the current environment as well as aesthetic and recreational uses from bird watching to fishing and swimming.

The physicochemical components have the potential to change the ecological character of Towra Point if they fall outside natural variations over a period of time. Other components that have a large effect on water quality include chlorophyll-a, pH and dissolved oxygen. These components are critical in the upper parts of the catchment. However, due to the well-flushed nature of Botany Bay, they are not so critical for Towra Point.

Biota:
The significance of Towra Point relies on the health and biodiversity of the biota that it supports. Towra Point is the largest remaining wetland of its type in the Sydney Basin biogeographic region and supports four threatened species under the Commonwealth EPBC Act and 28 threatened fauna species and five endangered ecological communities under the NSW TSC Act. On an international scale, Towra Point provides suitable feeding, roosting and nesting habitat for migratory shorebirds during a vulnerable stage in their life cycle, including 34 of 80 migratory species listed under JAMBA, CAMBA and/or ROKAMBA. There are many factors involved in sustaining the biodiversity of flora and fauna at Towra Point Nature Reserve.

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
B: Marine subtidal aquatic beds (Underwater vegetation)	Towra Point	4	458	
E: Sand, shingle or pebble shores	Towra Point	4		
F: Estuarine waters	Towra Point	1	1400	
G: Intertidal mud, sand or salt flats	Towra Point	3		
H: Intertidal marshes	Towra Point	4	134	
I: Intertidal forested wetlands	Towra Point	2	385	
J: Coastal brackish / saline lagoons	Towra Point	4		
K: Coastal freshwater lagoons	Towra Point	4		

(ECD) Habitat connectivity	Towra Point provides important roosting, feeding and nesting sites for migratory birds and supports signifcant habitat that is connected with surrounding areas such as Kamay Botany Bay NP, Royal NP and Georges River NP.

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTA/LILIOPSIDA	*Halophila decipiens*	
TRACHEOPHYTA/LILIOPSIDA	*Halophila ovalis*	
TRACHEOPHYTA/LILIOPSIDA	*Juncus kraussii*	
TRACHEOPHYTA/LILIOPSIDA	*Sporobolus virginicus*	
TRACHEOPHYTA/MAGNOLIOPSIDA	*Suaeda australis*	
TRACHEOPHYTA/LILIOPSIDA	*Zostera capricorni*	

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTA/LILIOPSIDA	*Asparagus aethiopicus*	Actual (minor impacts)	unknown
TRACHEOPHYTA/LILIOPSIDA	*Cortaderia selloana*	Actual (minor impacts)	unknown
TRACHEOPHYTA/LILIOPSIDA	*Juncus acutus*	Actual (minor impacts)	decrease
TRACHEOPHYTA/MAGNOLIOPSIDA	*Lantana camara*	Actual (minor impacts)	unknown
TRACHEOPHYTA/MAGNOLIOPSIDA	*Lycium ferocissimum*	Actual (minor impacts)	unknown
TRACHEOPHYTA/MAGNOLIOPSIDA	*Olea europaea cuspidata*	Actual (minor impacts)	unknown
TRACHEOPHYTA/MAGNOLIOPSIDA	*Opuntia stricta*	Actual (minor impacts)	unknown

Optional text box to provide further information

Other invasive alien species include:

Caulerpa taxifolia (Caulerpa Algae), Chrysanthemoides moniliferum subsp.rotu (Bitou Bush) and Rubus Spp (blackberry).

Caulerpa taxifolia (Caulerpa) is a fast-growing marine alga native to tropical Australia and the South Pacific that has colonised various areas outside its natural range, including several NSW waterways. Caulerpa was first found in NSW in April 2000 and is known to have spread to a total of 14 NSW estuaries or lakes, including Botany Bay (https://www.dpi.nsw.gov.au/fishing/pests-diseases/marine-pests/found-in-nsw/caulerpa-taxifolia)

Lantana is widespread in the understorey in the reserve and is inhibiting regeneration of native vegetation. Weeds, particularly Lantana, represent a major threat to the littoral rainforest communities. Bitou bush, pampas grass and asparagus fern are rapidly spreading into the reserve from adjacent lands.

The site did provide a high tide roost adjoining the tidal flat feeding habitat. Invasion of the foreshore by bitou bush and Juncus acutus together with minor erosion has reduced the size of the beach forcing shorebirds to roost on the nearby oyster lease structures.

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/ACTINOPTERYGII	*Acanthopagrus australis*				
CHORDATA/ACTINOPTERYGII	*Meuschenia australis*				
CHORDATA/ACTINOPTERYGII	*Mugil cephalus*				

Invasive alien animal species

Phylum	Scientific name	Impacts	Changes at RIS update
CHORDATA/MAMMALIA	*Felis catus*	Actual (minor impacts)	No change
CHORDATA/MAMMALIA	*Rattus rattus*	Actual (minor impacts)	No change
CHORDATA/MAMMALIA	*Vulpes vulpes*	Actual (minor impacts)	No change

Optional text box to provide further information

Seagrass meadows play an important role in stabilising sediments, baffling water currents at the sediment surface, improving water quality through nutrient uptake, and providing food and shelter for a wide variety of species in marine and estuarine ecosystems. They provide important feeding and refuges areas for many species of juvenile and adult fish (e.g. yellowfin bream (Acanthopagrus australis), luderick (Girella tricuspidata), leatherjackets (Meuschenia species), snapper and sea mullet (Mugil cephalus), molluscs and crustaceans.

A fox baiting program in Kurnell Peninsula, including Towra Point, is in place from August to March. The program is timed to coincide with the little tern and pied oystercatcher breeding seasons when foxes are the biggest threat. There is also reserve-wide and off-park fox baiting.

There is baiting for rats and removal of invasive plants species around Towra Spit Island and removal and management of invasive weeds from Quibray Bay beach shorebird roost site

4.4 - Physical components

4.4.1 - Climate

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

It is likely that climate change has a role in the shoreline and wetland changes observed at Towra Point. However, with the available evidence of significant human interference in the hydrodynamic context and processes of Botany Bay (both prior to 1984 when the site was listed under the Ramsar convention and since that time), it is unlikely that climate change is the principal cause of geomorphic change at Towra Point (Umwelt 2017).

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres): 120

a) Maximum elevation above sea level (in metres): 140

- 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.

Towra Point Nature Reserve is in the south-eastern part of the Botany Bay catchment. The Georges and Cooks rivers and their tributaries flow into Botany Bay. The sub-catchment that influences Towra Point is South Botany Bay sub-catchment. Water from the South Botany Bay sub-catchment drains into Woolooware Bay and Quibray Bay.

4.4.3 - Soil

- Mineral ☑
- (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 ◉

4.4.4 - Water regime

Water permanence

Presence?	Changes at RIS update
Usually seasonal, ephemeral or intermittent water present	No change
Usually permanent water present	

Source of water that maintains character of the site

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

Water destination

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

Stability of water regime

Presence?	Changes at RIS update
Water levels fluctuating (including tidal)	No change

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

There is a lack of knowledge of surface elevation and groundwater levels across Towra Point, in particular, the implications for the amount of tidal inundation and impact of sea-level rise. There is also a lack of hydrodynamic modelling to describe attenuation of tides throughout the area. There is a lack of knowledge of whether other factors (including changes in groundwater levels) are altering microtopography and providing for expansion of mangroves into saltmarsh. The Botany Sand Aquifer is a shallow groundwater system that extends under Towra Point Nature Reserve and is utilised as a source of water for private and industrial uses on Kurnell Peninsula (DECCW 2010). Reduction in groundwater, either through drought or groundwater extraction, may result in subsidence and compaction of sediments altering microtopography creating pools and providing micro environment for establishment of mangroves, as well as providing for increased tidal inundation (Umwelt 2017).

(ECD) Connectivity of surface waters and of groundwater: No information available

(ECD) Stratification and mixing regime: No information available

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 unknown ☐

Please provide further information on sediment (optional):

SMEC (2003) provided the following summary of overview of rates of sediment transport at Towra Beach and Towra Point:
•Some 30,000 cubic metres of sand has accreted in a shoal on the southern side of Bonna Point. The current rate of accretion, however, is low.
•Sand appears to be transported across the mouth of Quibray Bay to Towra Beach at an average rate of 3,000 cubic metres per annum.
•Since 1973, Towra Beach has eroded at an average rate of 3,500 cubic metres per annum.
•Since 1973, Towra Point has accreted at an average rate of 400 cubic metres per annum.
•Spit Island and the surrounding shoals have accreted at an average rate of around 6,000 – 14,000 cubic metres per annum.
•The average rate of beach erosion was 3,100 cubic metres per year. It is noted here that this is an average rate determined over a period of 27 years.
•The rate of long term erosion was based on a careful review of the existing comparative survey profile data along with that from the photogrammetry.

(ECD) Water turbidity and colour: No information available

(ECD) Light - reaching wetland: No information available

(ECD) Water temperature: No information available

4.4.6 - Water pH

Circumneutral (pH: 5.5-7.4) ☑

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

Unknown ☐

4.4.7 - Water salinity

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

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

Euhaline/Eusaline (30-40 g/l) ☑

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

Unknown ☐

(ECD) Dissolved gases in water

No information available

4.4.8 - Dissolved or suspended nutrients in water

Unknown ☑

(ECD) Dissolved organic carbon: No information available

(ECD) Redox potential of water and sediments: No information available

(ECD) Water conductivity: No information available

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

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

Surrounding area has greater urbanisation or development ☑

Surrounding area has higher human population density ☑

Surrounding area has more intensive agricultural use ☐

Surrounding area has significantly different land cover or habitat types ☐

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

The surrounding area is becoming increasingly urbanised in the Botany Bay catchment, which is increasing human population and placing increased threats and pressures on the site.

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Regulating Services

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

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Picnics, outings, touring	Low
Spiritual and inspirational	Cultural heritage (historical and archaeological)	Low
Scientific and educational	Educational activities and opportunities	Medium
Scientific and educational	Important knowledge systems, importance for research (scientific reference area or site)	Medium
Scientific and educational	Major scientific study site	Medium

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	Medium

Within the site: 100

Outside the site: 1000

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	No current data available on this aspect of the character of the site
(ECD) Nutrient cycling	The mangroves and saltmarsh contribute to estuarine food webs, nutrient and energy cycling, and support the biodiversity of the region providing important wildlife habitat for birds, fish, both aquatic and terrestrial invertebrates and insectivorous bats.

(ECD) Carbon cycling	Mangroves translate significant volumes of atmospheric carbon to their root systems (Saintilan, 1997a) thereby contributing to organic accretion.
(ECD) Animal reproductive productivity	No current data available on this aspect of the character of the site
(ECD) Vegetational productivity, pollination, regeneration processes, succession, role of fire, etc.	Saltmarsh is also a source of nutrition and habitat for commercial and recreational fish during spring tides and are a highly productive source of crab larvae for the estuary in the mid to upper intertidal situations (Mazumder et al. 2006).
(ECD) Notable species interactions, including grazing, predation, competition, diseases and pathogens	No current data available on this aspect of the character of the site
(ECD) Notable aspects concerning animal and plant dispersal	No current data available on this aspect of the character of the site
(ECD) Notable aspects concerning migration	The saltmarsh vegetation is an important roost and feeding site for migratory shorebirds (Spencer et al 2009).

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
Provincial/region/state government	☑	☐

Private ownership

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

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site: NSW Office of Environment and Heritage, National Parks and Wildlife Service (Greater Sydney Branch).

Provide the name and/or title of the person or people with responsibility for the wetland: Manager, Sydney South Area

Postal address: Po Box 375
Kurnell, NSW
2231

E-mail address: info@environment.nsw.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
Housing and urban areas	Medium impact	Medium impact	☐	No change	☑	No change

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Dredging	High impact	High impact	☐	No change	☑	unknown

Energy production and mining

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Mining and quarrying	Low impact	Medium 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	Low impact	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
Unspecified/others	unknown impact	unknown impact	☑	No change	☑	unknown

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	Medium impact	☑	No change	☑	No change

Pollution

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Unspecified			☐		☑	
Industrial and military effluents	Low impact	Medium impact	☐	No change	☑	No change
Garbage and solid waste	Medium impact	Medium 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
Unspecified	High impact	High impact	☑	No change	☑	No change

Please describe any other threats (optional):

It is likely that climate change has a role in the shoreline and wetland changes observed at Towra Point. However, with the available evidence of significant human interference in the hydrodynamic context and processes of Botany Bay (both prior to 1984 when the site was listed under the Ramsar convention and since that time), it is unlikely that climate change is the principal cause of geomorphic change.

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
State Protected Area (NSW)	Towra Point Nature Reserve	https://www.nationalparks.nsw.gov.au/visit-a-park/parks/towra-point-nature-reserve/visitor-info	whole

5.2.3 - IUCN protected areas categories (2008)

Ia Strict Nature Reserve ☑

Ib Wilderness Area: protected area managed mainly for wilderness protection ☐

II National Park: protected area managed mainly for ecosystem protection and recreation ☐

III Natural Monument: protected area managed mainly for conservation of specific natural features ☐

IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention ☐

V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation ☐

VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems ☐

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

Habitat

Measures	Status
Catchment management initiatives/controls	Implemented

Species

Measures	Status
Control of invasive alien plants	Implemented
Control of invasive alien animals	Implemented

Human Activities

Measures	Status
Regulation/management of recreational activities	Implemented
Research	Implemented
Communication, education, and participation and awareness activities	Implemented
Regulation/management of wastes	Implemented

Other:

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

Legal protection:
National Parks and Wildlife Act 1974
Protection of the Environment Operations Act 1997
Water Management Act 2000
EPBC 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 ◉

5.2.6 - Planning for restoration

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

Further information

A Response Strategy for Towra Point Nature Reserve is currently being developed by NSW Government, in close consultation with the Commonwealth Government. Threats will be addressed through this process. This process is yet to commence. More information will be provided in the next RIS update.

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Plant species	Implemented
Animal species (please specify)	Implemented

Little Terns and Pied Oystercatcher monitoring is implemented(https://www.environment.nsw.gov.au/news/endangered-pied-oystercatcher-and-little-tern-of f-to-a-good-season-in-towra and http://ssec.org.au/our_environment/our_bioregion/towra/conservation/little_tern.htm). Ongoing fox control implemented (https://www.nationalparks.nsw.gov.au/visit-a-park/parks/towra-point-nature-reserve/local-alerts).

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

For more please refer to Attachment 2 references in section 6.1.2

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)
<4 file(s) uploaded>

ii. a detailed Ecological Character Description (ECD) (in a national format)
<1 file(s) uploaded>

iii. a description of the site in a national or regional wetland inventory
<no file available>

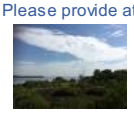
iv. relevant Article 3.2 reports
<no file available>

v. site management plan
<no file available>

vi. other published literature
<1 file(s) uploaded>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:



Towra Point Ramsar site (*Anthea Florance, OEH, 17-02-2017*)

Elephants trunk at Towra - showing erosion at the site (*Anthea Florance, OEH, 17-02-2017*)

Towra Point Ramsar site - mangrove lined channel (*Jason Bishop, OEH, 30-09-2014*)

Little Tern (*Jason Bishop, OEH, 31-10-2010*)

6.1.4 - Designation letter and related data

Designation letter
<1 file(s) uploaded>

Date of Designation: 1984-02-21