Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.

3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

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1. Name and address of the compiler of this form:

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DD MM YY

Designation date

Site Reference Number

2. Date this sheet was completed/updated:
April 2012

3. Country:
Australia

4. Name of the Ramsar site:
The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.
Towra Point Nature Reserve

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only)**:**

a) Designation of a new Ramsar site ❑; or

b) Updated information on an existing Ramsar site ☑

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6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged: ❑

or
If the site boundary has changed:
i) the boundary has been delineated more accurately ☑; or
ii) the boundary has been extended ☑; or
iii) the boundary has been restricted** ❑

and/or

If the site area has changed:
i) the area has been measured more accurately ☑; or
ii) the area has been extended ☑; or
iii) the area has been reduced** ❑

** **Important note**: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

In 1984 Towra Point Nature Reserve met criterion 6 by supporting at least 1% of the international population of eastern curlew (*Numenius madagascariensis*). However, due to an increase in the international population of eastern curlew, the site no longer meets this requirement.

Towra Point Nature Reserve no longer meets criterion 1 because the bioregionalisation has been changed from Interim Biogeographic Regionalisation of Australia to Australian Drainage Divisions which places the site in the South East Drainage Division which is much larger than the Sydney Basin and contains more extensive areas of mangroves and saltmarsh.

As a result of new information, it is now considered that Towra Point Nature Reserve meets Ramsar criteria 4 and 8. Recent studies have shown that the site supports fish and bird species at critical stages in their life cycle. There is also considerable evidence to show that Towra Point is both a significant nursery habitat and food source for fish species. Please refer to section 13 below for further detail.

Due to more recent knowledge, the presence of wetland type I (intertidal forested wetlands) has now been recognised. It has been confirmed from aerial photographs that wetland type I was present at the time of listing but was not identified in previous descriptions of the site.

The area of saltmarsh (wetland type H) has decreased since 1984 and a corresponding increase in mangroves (wetland type I) has been observed.

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7. Map of site

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

i**) a hard copy** (required for inclusion of site in the Ramsar List): ☑;

ii**) an electronic format** (e.g. a JPEG or ArcView image) ☑;

iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** ❑.

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

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 603.7 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.

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8. Geographical coordinates: (latitude/longitude, in degrees and minutes):

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

34 º 00' S; 151 º10' E

9. General location:
Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

Towra Point Nature Reserve is located on the southern shore of Botany Bay, approximately 16 kilometres from Sydney city centre in New South Wales, Australia. Sydney is Australia's largest city with the 2006 census reporting 4,119,190 residents within the Sydney Statistical division. 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.

10. Elevation: (in metres: average and/or maximum & minimum)

Less than 5 metres above sea level

11. Area: (in hectares)
603.7 hectares

12. General overview of the site:
Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

Towra Point Nature Reserve supports approximately 40% of mangrove communities and 60% of saltmarsh communities remaining in the Sydney region. Along with the adjacent marine subtidal aquatic beds (wetland type B), the mangrove (wetland type I) and saltmarsh (wetland type H) communities provide habitat and food for 25 species of fish that are of economic significance. The site also supports 34 species of migratory birds listed under international agreements, three threatened species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), 23 threatened species and five endangered ecological communities under the New South Wales *Threatened Species Conservation Act 1995* (TSC Act).

13. Ramsar Criteria:
Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1	2	3	4	5	6	7	8	9
❑	☑	☑	☑	❑	❑	❑	☑	❑

14. Justification of the criteria selected under point 13, above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
Towra Point Nature Reserve supports three nationally threatened species under the EPBC Act.

Common name	**Scientific name**	**IUCN Red List**	**National Status** (EPBC Act 1999)
Magenta lilly pilly	*Syzygium paniculatum*	Not listed	Vulnerable
Grey headed flying fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable
Green and gold bell frog	*Litoria aurea*	Vulnerable	Vulnerable

There is an annual grey-headed flying fox camp on the Kurnell Peninsula, and the Towra Point Nature Reserve Ramsar site provides foraging habitat for the flying fox population, particularly the coastal banksia and eucalypt forests.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.
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 Spit Island was named the second most important breeding area in NSW for the little tern (*Sterna albifrons*) (NSW Parks and Wildlife Service 2001). Thirty-four species of migratory birds listed under agreements between Australia and Japan, China and the Republic of Korea (JAMBA, CAMBA and ROKAMBA) have been recorded at Towra Point Nature Reserve. The brown honeyeater (*Lichmera indistincta*), mangrove gerygone (*Gerygone levigaster*) and wallum froglet (*Crinia tinnula*) are at the southern extent of their distribution at Towra Point.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.
Species of fish such as common silver biddy (*Gerres ovatus*), yellow bream (*Acanthospagrus australis*) and flat-tail mullet (*Liza argentea*) are found in high numbers at Towra Point and use the mangrove habitats exclusively during the vulnerable juvenile stage of their life cycle. Juvenile luderick (*Girella tricuspidata*) also prefer the mangroves after an initial stage in the adjacent seagrass beds (Bell, Pollard and Burchmore 1984).

Due to loss of habitat along their migratory route, Towra Point Nature Reserve is critical for migratory shorebirds protected under the international agreements, JAMBA, CAMBA and ROKAMBA. The birds roost in saltmarsh within the Ramsar site and feed in the intertidal zone along the shoreline of Botany Bay to replenish their fat reserves before embarking on a long northward migration.

The little tern (*Sterna albifrons*), which is listed as endangered in NSW has regularly used Towra Spit Island as a nesting site since its formation in 1991. The island is considered an important site for little tern conservation in NSW (Keating and Jarman 2004).

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.
Towra Point is a significant habitat and food source for at least 60 species of fish of which 25 are of economic significance. 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. 2006a, 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).

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15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):
Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:
The Towra Point Nature Reserve Ramsar site lies within the South East Coast Drainage Division

b) biogeographic regionalisation scheme (include reference citation):
Australian Drainage Divisions and River Basins. (Commonwealth of Australia (Bureau of Meteorology) 2011. Australian Hydrological Geospatial Fabric)

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16. Physical features of the site:
Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The formation of Towra Point came about between 1,000 and 4,000 years ago as a result of the dynamics between wind, wave and tidal processes moving marine sediments from Botany Bay and fluvial mud from the Georges River. The depositional events pertaining to Towra Point are of the Holocene Period, from approximately 10,000 years ago (Roy and Crawford 1979). The sediments at Towra Point Nature Reserve are mainly made up of marine sand, mud and biogenic material (Roy and Crawford 1979). Tide and wave action has moved much of the sediment from Quibray Bay around Towra Point and towards the Elephants Trunk.

Urban expansion throughout the Botany Bay catchment has increased sedimentation rates. The sand banks and spits of Towra Point are highly mobile and erosion

of Towra Beach and accretion at Towra Spit Island have been accelerated due to dredging activities in Botany Bay from the 1970s (URS 2003). Dredging in the north and north-east areas of Botany Bay has shifted the wave pattern towards the south which has increased wave energy at Towra Point. Towra Spit Island was formed from Towra Point in 1991 due to erosion by wind and waves and is continually changing shape and moving in a south-westerly direction (NPWS 1998).

The embayment of Botany Bay is predominantly marine with some freshwater influence at the surface layer resulting from rainfall and river discharge (Anon 1977); Towra Point may therefore be regarded as part of a tide-dominated estuarine system. Tidal variations at Towra Point are semi-diurnal and range between 0.1 and 2.0 metres (NPWS 1998).

Towra Point has mean minimum and maximum temperatures of 6.2°C in July and 26.2°C in January. Botany Bay receives an average annual rainfall of 1,100 mm. High temperatures and winds combined with low rainfall can stress flora and fauna due to increases in soil salinity and adverse effects on oxygen solubility. Winds from the east-southeast, southeast and south-southeast directions have the biggest impact on Botany Bay and together with storm events, increase the intensity of wave action (Roy and Crawford 1979).

The pH of ground water in the area is 7-7.5. Typical salinity of surrounding waters at Towra Point ranges between 20 and 35 parts per thousand (DECC 2007). Estimated loads of total nitrogen in Botany Bay's waterways have doubled since settlement from 66 to 130 tonnes per annum and total phosphorus has almost tripled from 5.9 to 14 tonnes per annum. (BMT WBM 2007). Concentrations of the heavy metals copper, lead and zinc around Towra Point exceed water quality guidelines for a 99% level of protection of species at 1.4μg/L, 3.2 μg/L and 8.8 μg/L respectively but are below the 95% level of protection. (ANZECC and ARMCANZ 2000)

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

The sub-catchment that influences Towra Point is South Botany Bay. The Georges River and Cooks River flow into Botany Bay. The bay has a catchment area of 1,100 km^2 and a water area of 80 km^2 (Wilton, 2002). The Botany Bay catchment has a high percentage of bushland, however most of the land adjacent to the Ramsar site is urban or industrial. The high proportion of hard surfaces constructed along the northern shore of Botany Bay has altered wave energy and refraction within the Bay.

18. Hydrological values

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Towra Point is a critical wetland in the Sydney area because it maintains natural hydrological processes including evapotranspiration, runoff, infiltration and groundwater flow within the highly modified and heavily populated Sydney basin. Towra Point supports recharge and discharge of groundwater. The wetland also has the ability to retain excess water and release it slowly into Botany Bay which helps prevent flooding and filters some contaminants from the water.

Seagrass, saltmarsh and mangrove communities at Towra Point trap sediments, thereby reducing both sediment loads and turbidity in Botany Bay. Primary producers such as mangroves and saltmarsh at Towra Point are critical components in nutrient cycling because they convert nutrients to a more useable form for other species.

The presence of vegetation at Towra Point improves the surrounding water quality through uptake of nutrients and the trapping of sediments.

19. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp Ts • U • Va •
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:
List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

F, I, G, H, E, J, K, B

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

Towra Point Nature Reserve consists of a variety of habitats including seagrass meadows of strapweed (*Posidonia australis*), eelgrass (*Zostera capricorni*), and paddleweeds (*Halophila ovalis* and *Halophila decipiens*) within Weeney Bay and in the adjacent Aquatic Reserve; stands of mangroves including the grey mangrove (*Avicennia marina*) and river mangrove (*Aegiceras corniculatum*); saltmarsh; and terrestrial vegetation communities such as swamp she-oak forest, littoral rainforest, littoral strandline and a complex mosaic of dune sclerophyll scrub/forest.

The seagrass meadows provide habitat for fish and estuarine invertebrates, act in nutrient cycling, bind sediment and host epiphytes. The mangroves provide important fish habitat, trap and stabilise sediment, allow groundwater recharge, filter contaminated water and help prevent flooding. The saltmarsh provides important habitat for crustaceans, fish and birds, filters pollution and allows groundwater recharge. The terrestrial vegetation provides habitat and ecological connectivity as well as supporting biodiversity.

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Towra Point Nature Reserve is botanically diverse, with almost 300 vascular plant species identified within the Ramsar site. The vegetation is also regionally significant, as the reserve contains approximately 40% of the remaining mangrove communities and 60% of the remaining saltmarsh communities in Sydney.

There are five endangered ecological communities at Towra Point listed under the TSC Act. These are coastal saltmarsh in the Sydney Basin bioregion, Kurnell dune forest in the Sutherland Shire, littoral rainforest in the Sydney Basin bioregion, swamp oak floodplain forest of the Sydney Basin bioregion and Sydney freshwater wetlands in the Sydney Basin bioregion. Most of the communities occurring within the Ramsar site are now regionally uncommon due to urban development and expansion in the area.

The magenta lilly pilly (*Syzygium paniculatum*) is listed as vulnerable under the EPBC Act and TSC Act. Sand spurge (*Chamaesyce psammogeton*), coast groundsel (*Senecio spathulatus*), tessellated spider orchid (*Caladenia tessellata*), Botany Bay bearded orchid (*Pterostylis* sp. *Botany Bay*) and sunshine wattle (*Acacia terminalis subsp. terminalis*) are also listed as endangered under the TSC Act and occur within the Ramsar site. Netted bottle brush (*Callistemon linearifolius*) and narrow-leafed wilsonia (*Wilsonia backhousei*) are both listed as vulnerable under the TSC Act.

The plant *Gahnia filum* reaches its northern limit at Carters Island which is located within the nature reserve.

Vegetation at Towra Point is also of great scientific importance because it was the site for some of the first botanical collections in Australia, by Joseph Banks and Daniel Solander in 1770. Thus the nature reserve is the type locality for some species of indigenous flora.

The major introduced plants which are threats to the Ramsar site's fauna and flora are bitou bush (*Chrysanthemoides moniliferum* subsp. *rotu*), lantana (*Lantana camara*) and caulerpa (*Caulerpa taxifolia*). Other weeds of concern include spiny rush (*Juncus acutus*), blackberry (*Rubus* spp.), prickly pear (*Opuntia stricta*), pampas grass (*Cortaderia selloana*), African olive (*Olea africana*), African box-fern (*Lycium ferocissimum*) and asparagus fern (*Asparagus sprengeri*) (NPWS 2001a).

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22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

With the distinction of being one of the few remaining areas of estuarine wetlands in the Sydney region, Towra Point is important for the survival of many species of birds. Approximately 200 bird species have been recorded from the Towra Point area. Of particular significance is the occurrence of 34 of the 80 species presently listed in the migratory bird agreements that Australia has with Japan, China and the Republic of Korea (JAMBA, CAMBA and ROKAMBA). Counts undertaken in summer and winter by the Australian Waders Study Group show that the total number of shorebirds in Botany Bay has declined by about 46% in summer and about 42% in winter since 1981 (AWSG 2008; Birds Australia, unpub. data). The composition of shorebird species recorded in Botany Bay has also changed since 1981, with four species recorded in summer in the early 1980s no longer present in 2004-08: broad-billed sandpiper (*Limicola falcinellus*), Latham's snipe (*Gallinago hardwickii*), pectoral sandpiper (*Calidris melanotos*) and oriental plover (*Charadrius veredus*) (AWSG 2008).

The estuarine wetlands at Towra Point are important for migratory waders stopping to feed and rest en route to large summer feeding grounds. Some shorebird species have increased in numbers since the early 1980s, such as eastern curlew (*Numenius madagascariensis*) which has increased by about 22%, whimbrel (*Numenius phaeopus*) (by about 72%), and pied oystercatcher (*Haematopus longirostris*) (by about 63%) (AWSG 2008). Little tern (*Sterna albifrons*), listed as endangered under the TSC Act, has been successfully nesting and breeding on Towra Spit Island in two out of every three years on average, with up to 50 nests and 50 fledglings being counted in 2007-8 and 2008-09 (DECCW, unpub. data).

Towra Spit Island is also used for breeding by pied oystercatcher (*Haematopus ostralegus*) which is listed as vulnerable under the TSC Act. Towra Point Nature Reserve is an important feeding and roosting area for the Taren Point shorebird community, which is listed as an endangered ecological community under the TSC Act.

Towra Point Nature Reserve is reported to support green and golden bell frog (*Litoria aurea*), listed as endangered under the TSC Act. Records of regent honeyeater (*Xanthomyza phrygia*) (listed as endangered under the TSC Act) date from the 1970s and this species is now more commonly recorded from inland woodlands. Bush stone-curlew (*Burhinus grallarius*) (listed as endangered) has previously been recorded at the site but is now thought to be extinct in the area. A dugong (*Dugong dugon*) (listed as endangered under the NSW TSC Act) was also sighted near Towra Point but dugongs typically prefer the tropical waters to the north and are unusual this far south.

Twelve species listed as vulnerable under the TSC Act have been recorded at the site including sanderling (*Calidris alba*), great knot (*Calidris tenuirostris*), greater sand-plover (*Charadrius leschenaultia*), lesser sand-plover (*Charadrius mongolus*), sooty oystercatcher (*Haematopus fuliginosus*), pied oystercatcher (*Haematopus longirostris*), broad-billed duck (*Oxyura australis*), masked owl (*Tyto novaehollandiae*), terek sandpiper (*Xenus cinereus*), grey-headed flying fox (*Pteropus poliocephalus*) and greater broad-nosed bat (*Scoteanax rueppellii*).

Towra Point also supplies nutrient rich grounds for fish nurseries and an array of invertebrate species. Appendices A and B list the fish and macroinvertebrate species recorded as occurring within the site in 2007.

Pest animal species at Towra Point include introduced and native species, such as foxes (*Vulpes vulpes*), cats (*Felis catus*) , ravens (*Corvus coronoides*), rabbits (*Oryctolagus cuniculus*), gulls (*Larus* spp.), ants and the black rat (*Rattus rattus*). Foxes are the biggest threat to native birds and mammals. With Towra Point being so close to urban areas, cats also pose a threat, especially to species that use habitat fragments of urban areas to move between habitats. Ravens, gulls, rabbits, ants and rats are a threat to shorebird communities, in particular little tern and pied oystercatcher eggs and chicks (NPWS 2003).

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23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The Towra Point area offers a readily accessible variety of wetland plants and animals in close proximity to Australia's largest city, Sydney, for research and teaching. There are no similar wetlands in central coastal New South Wales. In addition, the development of nearby areas for housing and heavy industry offers an interesting example for the study of interactions between the physical, social and biological environments of the area. Towra Point is also important in understanding what other wetlands in the Sydney area would have been like in the past.

Prior to European settlement the surrounding shores of Botany Bay were occupied by Aboriginal people for thousands of years. The nature reserve has some historic structures and three known Aboriginal sites. The nature reserve also includes an Aboriginal place, known as Towra Point Resting Place, which was gazetted in 2003 under the NSW *National Parks and Wildlife Act 1974* to recognise the cultural significance of the reburial of Aboriginal persons from the Botany Bay area.

Botanical collections made at Kurnell and Towra Point by Banks and Solander on Captain Cook's visit in 1770 are recognised as one of the earliest scientific studies undertaken in Australia.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box ❑ and describe this importance under one or more of the following categories:

i) sites which provide 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) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where 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:

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24. Land tenure/ownership:

a) Within the Ramsar site:
The Ramsar site is a nature reserve dedicated under the NSW *National Parks and Wildlife Act 1974*. It is owned by the NSW Office of Environment and Heritage (OEH) and managed by the Parks and Wildlife Group of OEH.

b) In the surrounding area:
Surrounding lands include Towra Point Aquatic Reserve (Crown land dedicated under the NSW *Fisheries Management Act 1994*), and freehold lands.

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25. Current land (including water) use:

a) Within the Ramsar site:
The Ramsar site is permanently dedicated as a nature reserve and used for nature conservation, research and education

b) In the surroundings/catchment:
Surrounding lands include industrial, sporting and residential areas and Towra Point Aquatic Reserve. The population of the township of Kurnell, 4 km to the east, is 2,110 (2006 census), and the population of Sutherland Shire is 212,513 (2006 census).

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26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:

a) Within the Ramsar site:
Introduced plants, introduced or feral animals and litter are continuous management problems and are a medium to high threat to the Ramsar site. Access by day users from boats is a low threat. Instability and erosion are ongoing management problems within the nature reserve. Shoreline erosion impacts on wader roosting, feeding and nesting habitats. This poses a serious threat to the viability of wading bird populations at Towra Point. Climate change resulting in sea level rise is likely to result in more areas of Towra Point being inundated which could adversely affect the area of saltmarsh.

b) In the surrounding area:
Historically, major developments such as construction of oil refineries, port facilities and airport runways have had a major environmental impact on Towra Point. Dredging within Botany Bay and revetment wall construction has altered wave movements within the bay, which may affect the seagrass meadows adjacent to the nature reserve and assists in shifting the shoreline at Towra Point through accretion and erosion.

Oil pollution associated with shipping movements is a moderate threat to the nature reserve. Recreation adjacent to Towra Point places pressure on wildlife. The anchoring of boats is a significant threat to seagrass beds in Botany Bay. The reduction of other wetlands and migratory habitats in Botany Bay places increased pressure on Towra Point.

Eutrophication is apparent in wetlands adjacent to the reserve. Proposed residential development in the area raises a potential threat to groundwater and wetlands from nutrients and pesticides There also may be threats from proposed sandmining, landfill and dredging activities, and from proposed tourist developments, in the vicinity of the nature reserve.

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27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:
In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

Towra Point is a nature reserve protected under the NSW *National Parks and Wildlife Act 1974*. The Towra Point Aquatic Reserve is adjacent to the site and is protected under the NSW *Fisheries Management Act 1994*.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ☑;Ib ❑; II ❑; III ❑; IV ❑; V ❑; VI ❑

c) Does an officially approved management plan exist; and is it being implemented?:

The current plan of management for the nature reserve was adopted in July 2001. The plan of management addresses numerous conservation and management initiatives to preserve and enhance the area for nature conservation including bush regeneration, exotic weed removal, and protection of the Towra Lagoon and its associated wildlife. Management to eliminate inappropriate activities such as camping and the use of horses and dogs within the reserve, which may compromise its conservation values, is being carried out in accordance with the Plan.

d) Describe any other current management practices:

Management responsibilities of Towra Point primarily rest with the NSW OEH (Parks and Wildlife Group) and NSW Department of Primary Industries (Fisheries). Management initiatives such as reciprocal law enforcement rights and development of regulatory signs have been introduced.

Access to the majority of the nature reserve is by permit only. Regulatory signs have been erected within and surrounding the nature reserve to deter inappropriate activities being undertaken. Beach use is restricted to a designated day use area.

Control and eradication of pest animals and weeds in the nature reserve is undertaken in accordance with the Sydney South Region Pest Management Strategy 2008-2011 (NPWS 2009). The Strategy identifies priority pest animals and weeds for control, such as control of foxes at Towra Point, and significant species and habitats

requiring protection, such as little terns at Towra Point and the endangered Taren Point shorebird community. Other documents relevant to pest and weed control at Towra Point include the NSW Threatened Species Priorities Action Statement, the NSW Fox Threat Abatement Plan, and the NSW Bitou Bush Threat Abatement Plan.

Approximately 90 to 95% of blackberry (*Rubus vulgaris*), pampas grass (*Cortaderia selloana*) and prickly pear (*Opuntia stricta*) has been removed by local volunteers and contractors. Ninety five per cent of bitou bush (*Chrysanthemoides monilifera*) has been removed and the removal of lantana (*Lantana camara*) and buffalo grass (*Stenotaphrum secondatum*) has begun.

Removal of pest animal species is undertaken regularly. Fox baiting is undertaken prior to the Little Tern breeding season. Pig eradication was undertaken in 1993 and has not been necessary again.

OEH has purchased an "oiled bird rehabilitation facility" which can be used in the event of a major oil spill in the area.

A conservation group known as the 'Friends of Towra Point Nature Reserve' was launched by the NSW Minister for the Environment in 1997. This group was established to aid the then Department of Environment, Climate Change and Water with management of the reserve.

Management of little terns and waders continues each breeding season. Activities such as removal of vegetation, sandbagging, signposting, patrolling and law enforcement are undertaken.

A beach renourishment program at Towra Point Nature Reserve began in June 2004. This project has been integral in helping save endangered international waterbirds and restoring a freshwater lagoon mapped by Captain Cook.

Activities undertaken within the nature reserve are regulated by the NSW *National Parks and Wildlife Act 1974*, the National Parks and Wildlife Regulation 2009 and the *Threatened Species Conservation Act 1995*. Activities and developments undertaken on land and waters adjoining the nature reserve and in Botany Bay's catchment are regulated under the NSW *Environmental Planning and Assessment Act 1979* and the *Fisheries Management Act 1994*. Other Acts which contribute to the protection of the nature reserve and the surrounding environment include the *Protection of the Environment Operations Act 1997* and the *Rural Fires Act 1997*.

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28. Conservation measures proposed but not yet implemented:
e.g. management plan in preparation; official proposal as a legally protected area, etc.

Implementation of the current plan of management is on-going and includes habitat mapping, revegetation of degraded areas with native plants, creating opportunities for public education and promoting the strengthening of controls on development in the area. The Elephants Trunk has been identified as being at significant risk from neighbouring development.

A number of artificial roosting sites for migratory birds are proposed to be erected in and around Towra Point Nature Reserve, in order to provide roosting sites at mean high tide when other roosts are inundated. These roosts are in addition to roosts provided by existing remains from oyster farming in the region. Two roosts had been erected by April 2010, one at Pelican Point and the other at the southern side of the entrance to Weeney Bay.

29. Current scientific research and facilities:
e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

A number of universities, government departments and non-government organisations are undertaking research at Towra Point. Areas researched include terrestrial and aquatic flora, intertidal waders and biological control of bitou bush. Additionally, research into discrete bird communities such as the white-fronted chats has been undertaken.

NPWS has undertaken research into the breeding success of little terns at Towra Point since 1991.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:
e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

A NSW Department of School Education Field Studies Centre is located nearby at Botany Bay National Park. The centre conducts educational programs on wetlands. NPWS also operates a visitor centre in the national park which includes an interpretative exhibition on wetlands.

Being the largest wetland of its type in Sydney, Towra Point attracts both school and university students. Students participate in activities such as mapping and recording biophysical interactions and learn about human impacts on the environment. A number of theses have also been written on different aspects of Towra Point Nature Reserve.

31. Current recreation and tourism:
State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Due to the fragile nature of the reserve, access is by permit only. In summer months, in excess of 500 people and 120 boats have been recorded from the western face of Towra Point which is popular for picnicking and swimming and access is generally by boat. Bush walking, usually associated with bird watching, occurs within the nature reserve. Access for this activity is usually by land. The NPWS also offers guided walking tours. Non commercial fishing in the refuge zone of the Towra Point Aquatic Reserve is permitted under licence.

Activities such as horse riding, trail-bike riding and camping were once popular in the nature reserve, but are now prohibited.

32. Jurisdiction:
Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Territorial: Government of New South Wales
Functional: New South Wales Office of Environment and Heritage (Parks and Wildlife Group)

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

NSW National Parks & Wildlife Service (part of OEH)

Address: Area Manager
PO BOX 44
Sutherland NSW 2232

Phone: 02 9542 0666

Fax: 02 9542 1420

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

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Appendix A: Fish species

Scientific name [#]	Common name
Acanthopagrus australis[#]	yellowfin bream
Afurcagobius tamarensis	Tamar River goby
Ambassis jacksoniensis	glassfish
Ammotretis rostratus[#]	longsnout (or large toothed) flounder
Anguilla australis	short-finned eel
Anguilla reinhardtii	long-finned eel
Antennarius striatus	striped anglerfish
Arenigobius bifrenatus	bridled goby
Arenigobius frenatus	half-bridled goby
Atherinomorus vaigiensis	Ogilby's hardyhead
Bathygobius krefftii	Krefft's goby
Batrachomoeus dubius	frogfish
Brachaluteres jacksonianus	pygmy leatherjacket
Centropogon australis	eastern fortescue
Cristiceps australis	crested weedfish
Enoplosus armatus[#]	old wife
Favonigobius exquisitus	exquisite sand goby
Favonigobius lateralis	long finned goby
Gerres subfasciatus[#]	silver biddy
Girella tricuspidata[#]	luderick
Gobiomorphus australis	striped gudgeon
Gobiopterus semivestitus	glass goby
Heteroclinus spp.	weedfish
Liza argentea[#]	flat-tail mullet
Meuschenia freycineti[#]	six-spined leatherjacket
Meuschenia trachylepis[#]	variable (yellow tailed) leatherjacket
Monacanthus chinensis[#]	leatherjacket
Mugil cephalus[#]	sea mullet
Mugilogobius paludis	mangrove goby
Mugilogobius stigmaticus	checkered mangrove goby
Myxus elongatus[#]	sand mullet
Neodax balteatus	little rock-whiting

Ophisurus serpens	serpent eel
Paraplagusia sp.	tongue sole sp
Paraplagusia unicolor	lemon tongue sole
Pelates quadrilineatus[#]	trumpeter
Pelates sexlineatus[#]	eastern striped trumpeter
Petroscirtes lupus	brown sabretooth blenny
Platycephalus arenarius[#]	flag-tail flathead
Platycephalus fuscus[#]	dusky flathead
Platycephalus speculator[#]	yank flathead
Pomatomus saltatrix[#]	tailor
Pseudogobius olorum	blue spot goby
Pseudomugil signifer	southern blue-eye
Pseudorhombus arsius[#]	large toothed flounder
Pseudorhombus jenynsii[#]	small-toothed flounder
Redigobius macrostoma	large-mouth goby
Rhabdosargus sarba[#]	tarwhine
Siganus nebulosus	happy moments
Sillago ciliata[#]	sand whiting
Sillago maculata[#]	trumpeter whiting
Siphamia cephalotes	little siphonfish
Siphamia roseigaster	silver siphonfish
Stigmatopora nigra	wide body pipefish
Taeniodes mordax	snake head goby
Tetractenos hamiltoni	common toadfish
Torquigener pleurogramma	weeping toadfish
Torquigener squamicauda	brush-tail toadfish
Trygonorrhina fasciata[#]	southern fiddler ray
Upeneus tragula	bar-tail goatfish
Urocampus carinirostris	hairy pipefish

[#] Species of commercial or recreational importance
Source: Williams (2000); Williams et al. (2004); Mazumder et al. (2005, 2006b); Saintilan et al. (2007)

Appendix B: Macroinvertebrate species

Scientific name	Common name or type of species
Acetes sibogae australis	swarming shrimp
Alpheus edwardsi	pistol shrimp
Caridina type 1	Algae-eating shrimp
Heloecius cordiformis	semaphore crab
Helograpsus haswellianus	grapsid crab
Hippolytidae	Shrimp
Idiosepius notoides	southern pygmy squid
Latreutes pygmaeus	hump-backed shrimp
Macrobrachium intermedium	grass shrimp
Matuta planipes	two-spined burrowing sand crab
Metapenaeus macleayi	school prawn
Ovalipes australiensis	sand crab; surf crab
Palaemon debilis	estuarine shrimp
Paragrapsus laevis	mottled shore crab
Penaeus plebejus	king prawn
Portunus pelagicus	blue swimmer crab
Salinator solida	air breathing snail
Sepiidae spp.	cuttlefish
Sepioloidea sp.	squid species
Sesarma erythrodactyla	red-fingered marsh crab
Thalamita sima	four-lobed swimmer crab

Source: Roach (2000); Williams (2000); Williams et al. (2004); Mazumder et al. (2005, 2006a, 2006b); Saintilan et al. (2007)