

Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

1. Date this sheet was completed/updated:

1998

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Designation date

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Site Reference Number

2. Country:

Australia

3. Name of wetland:

Peel-Yalgorup System, Western Australia

4. Geographical coordinates:

Latitude: (approx) 32° 32'S to 33° 06'S; Longitude: (approx) 115° 38'E to 115° 46'E

5. Altitude:

6. Area:

Approximately 21,000

7. Overview:

A large system of estuary and saline lakes. Up to 150 000 waterbirds have been recorded in the estuary, and the saline lakes have an interesting hydrology.

8. Wetland Type:

marine-coastal: A B C D E **F** G H I J K

inland: L M N **O** P **Q** R Sp Ss Tp Ts

U Va Vt W Xf Xp Y Zg Zk

man-made: 1 2 3 4 5 6 7 8 9

9. Ramsar Criteria:

1a 1b 1c 1d | 2a 2b **2c** 2d | **3a** 3b **3c** | 4a 4b

Please specify the most significant criterion applicable to the site:

10. Map of site included? Please tick *yes* -or- *no*.

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

Department of Conservation and Land Management

Locked Bag 104

Bentley Delivery Centre WA 6983

12. Justification of the criteria selected under point 9, on previous page.

13. General location:

Mandurah, south-western Australia.

14. Physical features:

Peel Inlet and Harvey Estuary form a shallow estuarine system connected to the sea via a narrow channel at the northern end of the Inlet. The Murray and Serpentine Rivers drain into the north-eastern corner of the Inlet; the Harvey River enters the Estuary at its southern end. Several major drains from agricultural land empty into the eastern side of the Estuary and Inlet.

A large proportion of the Peel Inlet and southern end of the Harvey Estuary contains water less than 0.5 m deep; the maximum depth of the water is only about 2 metres. Salinity varies according to season and location in the system but, in general terms, varies from 10 ppt in winter to 45 ppt TDS in summer. Tidal flushing in summer is not great enough to prevent evaporation making the water slightly more concentrated than seawater.

The Yalgorup lakes vary from about 1-4 metres in depth and are saline (although they are principally supplied by fresh groundwater and precipitation) because of long-term concentration of salt by evaporation; they never overflow. The salinity regime in particular lakes varies according to their hydrology. Lake Clifton has very extensive areas of groundwater seepage, which result in pronounced horizontal salinity gradients; away from the shoreline the water varies from about 10 ppt in winter to 40 ppt TDS in summer. Large quantities of calcium carbonate precipitate out of seepage water as it enters Lake Clifton and Lake Pollard. Lake Hayward reaches about 200 ppt TDS in summer but is remarkable for exhibiting vertical stratification of salinity in winter when it is only about 2 metres deep. Surface water contains about 70 ppt, that on the bottom contains 180 ppt. This results in an inverse thermal stratification with water at the bottom of the lake reaching 35° C and, because of prolific growth of cyanophyta, being about 2 000% saturated with oxygen.

Parts of Peel Inlet and Harvey Estuary and some of the lakes in the Yalgorup chain are fringed by samphire flats. Behind the samphire, or sometimes adjacent to the water where samphire is absent, rushes and sedges occur. Outside this is a zone of trees tolerant of water-logging while the higher ground away from the lake supports open forest. Large parts of the shoreline throughout the Peel-Yalgorup system have been cleared, usually for agriculture, thus altering or eliminating the tree zones.

Samphire vegetation around Peel Inlet and Harvey Estuary is dominated by *Halosarcia Halocnemoides*. The dominant species of sedge is *Bolboschoenus caldwellii*, which grows both being samphire and to the water's edge where low trees of *Melaleuca rhapsiophylla* and *M. hamulosa* around the eastern side of the Inlet or *M. cuticularis* and *M. rhapsiophylla* along the Estuary. *Melaleuca* is sometimes replaced by *Acacia saligna* and *Eucalyptus rudis* farther from the water. As the ground begins to rise the vegetation changes to open forest dominated by *Eucalyptus gomphocephala* and *Agonis flexuosa* on the western side of the system or *E. marginata* and *E. calophylla* on the eastern side.

The vegetation around the Yalgorup lake is virtually the same. Around hypersaline lakes there is a narrow belt of samphire, behind which clumps of *Juncus kraussii* and *Gahnia trifida* occur. Hyposaline lakes lack samphire but have a dense belt of *Melaleuca cuticularis* and *M. rhapsiophylla* in the cast of hyposaline lakes; samphire and rushes are replaced by *M. cuticularis* and *Acacia cyclops* in the case of hypoersaline ones. The surrounding woodland is dominated by *Eucalyptus gomphocephala* and *Agonis flexuosa*.

15. Hydrological values:

16. Ecological features:

In terms of total number, Peel Inlet and Harvey Estuary comprise the most important area for waterbirds in south-western Australia: over 150 000 were recorded in February 1977. It was conservatively estimated that 12 000-15 000 ducks and swans used the area each year between 1981-85; much higher usage occurred in 1976-77. Particularly abundant species of duck are:

Black Swan

Cygnus atratus

5 422 Aug 1976

Australian Shelduck	<i>Tadorna tadornoides</i>	5 644 Dec 1984
Pacific Black Duck	<i>Anas superciliosus</i>	3 000 Feb 1982
Grey Teal	<i>A. gibberifrons</i>	>20 000 Dec 1976
Australasian Shoveler	<i>A. rhynchotis</i>	500 Feb 1982
Blue-billed Duck	<i>Oxyura australis</i>	1 200 Jul 1983

Highest numbers of many species in southwestern Australia have been recorded in the Inlet and Estuary system, including the Little Egret *Egretta garzetta* and Royal Spoonbill *Platalea regia*, which are uncommon in the region. Species recorded in large numbers include:

Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>	1 000s Jun 1977
Australian Pelican	<i>Pelecanus conspicillatus</i>	2 102 Dec 1976
Black-winged Stilt	<i>Himantopus himantopus</i>	2 703 Nov 1977
Banded Stilt	<i>Cladorhynchus leucocephalus</i>	>60000 Feb '77
Red-necked Avocet	<i>Recurvirostra novaehollandiae</i>	>1 100 Apr 1977
Red Knot	<i>Calidris canutus</i>	>1 000 Oct 1976
Sharp-tailed Sandpiper	<i>C. acuminata</i>	2 119 Jan 1983
Red-necked Stint	<i>C. ruficollis</i>	8 063 Mar 1985
Curlew Sandpiper	<i>C. ferruginea</i>	1 000s Dec 1976

A total of 67 species of waterbird has been recorded in Peel Inlet and Harvey Estuary. Many species also occur in the Yalgorup lakes, including large numbers of ducks, swans and waders. Over 2 200 Musk Duck (*Biziura lobata*) were counted in Lake Clifton in March 1986 and 11 000 Australian Shelduck were recorded there in November 1986.

Peel Inlet and Harvey Estuary contain large numbers of fish, Blue Manna Crabs (*Portunus pelagicus*) and Greasy-back Prawns (*Metapeneas dalli*). The area supports the biggest professional and amateur estuarine fishery in Western Australia.

Lake Clifton is one of only two sites known in the world where "stromatolite-like" structures occur in hyposaline water. They are formed by calcium carbonate precipitating out of freshwater seepage and being incorporated in the mucilage secreted by the cyanophyta growing on the bottom of the lake. The hydrology of the Yalgorup lakes is extremely interesting: several types of salinity regime occur in lakes with similar physiognomy that are supplied by the same underground aquifer.

17. Noteworthy flora:

See ECOLOGICAL FEATURES.

18. Noteworthy fauna:

See ECOLOGICAL FEATURES.

19. Social and cultural values:

The major social values of Peel Inlet and Harvey Estuary are fishing, both commercial and recreational, and other aquatic activities. There is extensive residential development on the shores of the Inlet and Estuary; there is also residential development on the eastern shore of Lake Clifton. Farming occurs adjacent to Lakes Clifton and Preston and parts of Peel Inlet and Harvey Estuary.

20. Land tenure/ownership:

The wetlands area in Peel Inlet and Harvey Estuary extends to high water mark and mostly falls within the Shire of Murray; the southern tip of Harvey Estuary is in the Shire of Waroona. Various State Governments agencies, including the Peel Inlet Management Authority, Waterways Commission and Marine and Harbours Department, have statutory powers in the waters of Peel Inlet and Harvey Estuary. There is a series of small Nature Reserves at the southern end of Harvey Estuary and Inlet (2990, 23756, 24739, 2738, 2707, 2436, 4990), some of which are included in the wetland area. There is also an aquatic

Nature Reserve (28087) in the south-eastern corner of the Inlet. Yunderup National Park is located in the delta where the Murray River enters Peel Inlet.

Lake McLarty is a proposed Nature Reserve. Most of Lake Mealup is either Nature Reserve or is owned by the Lake Mealup Preservation Society. These areas are included in the proposed Wetland of International Importance.

The Yalgorup lakes are contained in Yalgorup National Park but in many cases only a very thin band of riparian land has been included in the Park. All Nature Reserves in the wetlands area and Yalgorup National Parks are vested in the National Parks and Nature Conservation Authority of Western Australia; Yalgorup National Park is vested in the Murray Shire. The reserves and Yalgorup National Parks are managed by the Department of Conservation and Land Management; Yunderup National Park is managed by the Murray Shire.

21. Current land use:

Peel Inlet and Harvey Estuary are used extensively for public recreation, especially fishing. The town of Mandurah is on the northern edge of the Inlet and there are several small housing developments along the shores of the Inlet and the north-western part of the Estuary. The area to the east is used principally for cattle farming and there are many farmlets and holiday homes on the western side of the Estuary.

The Yalgorup lakes are in a National Park and are used only for passive recreation associated with their natural values. However, much of the surrounding land has been cleared for cattle farming and an area on the north-eastern shore of Lake Clifton has recently been sub-divided for housing.

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

A major management problem exists in Peel Inlet and Harvey Estuary. Large amounts of phosphate leached from surrounding agricultural land into the estuarine system have caused it to become eutrophic and there is massive production of benthic and planktonic algae, which causes a variety of biological problems. There has been intensive investigation into ways of managing the system and the Peel Inlet Management Authority is implementing a management plan produced in 1982. As far as waterbirds are concerned, any further development around the deltas where rivers enter the Inlet and Estuary should be carefully controlled. Similarly, urban development around the Yalgorup lakes should be approached cautiously, especially in the case of Lake Clifton where it may interfere with the groundwater seepages producing the "stromatolites". Furthermore, intensive human activity on the shore of Lake Clifton would result in severe damage to these comparatively delicate structures.

23. Conservation measures taken:

There are a series of Nature Reserves around Harvey Estuary and Peel Inlet (2990, 23756, 24739, 2738, 2707, 2436, 4990, 28087) and there is a National Park where the Murray River enters Peel Inlet. Yalgorup lakes are all within Yalgorup National Park. A management plan was prepared for Peel Inlet and Harvey Estuary in 1982.

24. Conservation measures proposed but not yet implemented:

There is a proposal to create another connection with the sea (the 'Dawesville Cut') on the western side of Peel Inlet to improve tidal flushing and reduce the build up nutrients (draining in from the catchment) in the system.

25. Current scientific research and facilities:

Extensive research has been, and currently is being, conducted by the Environmental Protection Authority and universities on management of Peel Inlet and Harvey Estuary. Limited research has been conducted on the lakes of the Yalgorup system, where the University of Western Australia operates the Neville Stanley Research Station.

26. Current conservation education:

An education program is being developed by Department of Conservation and Land Management.

27. Current recreation and tourism:

Peel Inlet and Harvey Estuary are used extensively for recreational fishing and boating. There is limited use of Yalgorup National Park for passive recreation.

28. Jurisdiction:

Government of Western Australia

29. Management authority:

Peel Inlet Management Authority

Department of Conservation and Land Management, PO Box 104, Como WA 6152.

30. Bibliographical references:

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